DRAWING REGISTER & ISSUE FORM

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PROJECT: TALLAGHT BUSINESS CENTRE - PHASE 2

PROJECT NO.: 4424 SHEET NO. 1

		DATE	23	28	4
		MONTH	8	8	9
		YEAR	91	91	91
DRAWING NO.	DRAWING TITLE.	DATE ISSUED & REVISION NO.			
M/1	LAYOUT OF EXTERNAL WATER MAINS AND DETAILS		✓	✓	✓
M/2	WATER SERVICES INSTALLATION		✓	✓	(1)

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... COUNCIL
PLANNING

1.4.3

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R.I. for BR ?

DISTRIBUTION	NUMBER OF COPIES		
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MAIN CONTRACTOR		4	
MECHANICAL CONTRACTOR			
ELECTRICAL CONTRACTOR			
SPRINKLER CONTRACTOR			
BUILDING BYE LAWS	1		3

OTHER DOCUMENTS

ONE COPY OF SPECIFICATION

~~THREE COPIES OF SPECIFICATION~~

PURPOSE OF ISSUE	FOR INFORMATION	AS REQUESTED	AS REQUESTED
SIG.	DC	[illegible]	DC

TENDER AND CONTRACT DOCUMENTATION

FOR

MECHANICAL SERVICES' INSTALLATION

TALLAGHT BUSINESS CENTRE
PHASE 2

MECHANICAL SERVICES' INSTALLATIONS

PRELIMINARY CLAUSES

STANDARD SPECIFICATION

PARTICULAR SPECIFICATION

SCHEDULES

SUMMARY OF PRICES

FORM OF TENDER

1. PRELIMINARY CLAUSES

THE WORKS shall be completed in accordance with the aforementioned General Clause 2.0 of the Specifications (Preliminary) and in compliance with the undernoted Clauses.

1.1 SCOPE

1.1.1 THE GENERAL CONDITIONS, Supplementary Conditions and all applicable provisions of the Contract Documents apply to this work.

1.1.2 PROVIDE LABOUR, materials, supervision and necessary incidentals required to complete all Mechanical Work outlined on the Drawings and/or specified hereinafter including that which is considered essential to the Contract requirements regardless of their recognition or not in every instance.

1.2 LAWS, ORDINACES AND REGULATIONS

1.2.1 WHEREVER the requirements of these Specifications and/or Drawings exceed the requirements of the mentioned regulations, these Specifications and/or Drawings shall govern.

1.2.2 SHOULD any change in the Drawings and Specifications be required to conform to these ordinances, the Contractor shall notify the Engineer at the time of submitting his bid. After entering into Contract, the Contractor will be held to complete all work necessary to meet the local requirements without extra expense to the Owner.

1.2.3 THIS CONTRACTOR shall obtain and pay for all necessary permits as required for all Mechanical Work.

1.3 INSPECTION OF PREMISES

THIS CONTRACTOR shall have visited and checked the Site relative to all aspects of the work and include for same in his Tender. No claims will be entertained by the Engineer due to lack of knowledge of Site conditions or existing installations.

1.4 DAMAGE TO OTHER WORK

THIS CONTRACTOR will be held responsible for all damage to other work caused by his work or through the neglect of his workmen. All patching and

repairing of damaged work will be done by the Contractor who installed the work, as directed by the Engineer, but the cost of same shall be paid by this Contractor.

1.5 EXISTING SERVICES

1.5.1 ACTIVE SERVICES: When encountered in work, provide, brace and support existing active sewers; gas; electric and other sevices where required, for proper execution of the work. If existing active services are encountered that are not indicated on the Drawings and require re-location, notify the Engineer and proceed as directed. Do not prevent or disturb the operation of active services that are to remain.

1.5.2 IN-ACTIVE SERVICES: When encountered in the work, remove, cap or plug in-active services. When not indicated on the Drawings, notify the Engineer. Protect or remove these services as directed.

1.5.3 INTERRUPTION OF SERVICES: Where work makes temporary shut-down of services unavoidable, shut down at night, or at such time as approved by the Engineer, which will cause least interference with Owner's established operating routine. Arrange to work continuously, **including overtime** if required, to assure that services will be shut down only during time actually required to make necessary connection to existing work.

1.6 MATERIALS (COMPLETE AS SPECIFICATION CLAUSE 2.1)

1.6.1 STANDARDS: All materials used in the works shall be new, shall be the best of their respective kinds, shall be obtained from reputable manufacturers and shall be fully in accordance with qualities, tolerances, tests, recommendations, method of workmanship and requirements as described or named in the relevant Irish Standard Specification or if no such Specification has been published then in the relevant British Standard Specification of the most recent edition and addenda thereto.

1.6.2 ALTERNATES: The Contractor shall allow in his Tender for the inclusion of the specified materials and equipment by the specified manufacturers. He shall be entitled to submit alternative materials provided prior approval has been obtained in writing.

1.6.3 APPROVED EQUAL: Where the words 'approved equal' are

written into the Specification they shall be interpreted as approved by the Engineer in writing prior to date of Tender.

1.7 PLANT (COMPLETE AS SPECIFICATION CLAUSE 2.2)

1.7.1 DELIVERY AND ERECTION: The Contractor shall provide all materials, tools, tackle, slings, scaffolding, cranes, haulage, labour, instruments and apparatus necessary for the delivery and erection of the Plant on Site.

1.8 STORAGE (COMPLETE AS SPECIFICATION CLAUSE 2.3)

1.8.1 BUILDINGS: The Contractor shall provide Lock-Up, Toilet and Canteen facilities for his staff. The Contractor shall also provide storage sheds and workshops as necessary for the smooth continuance of the works. The Building Contractor shall provide ground space only for these facilities. Materials may not be stored and preparatory work may not be carried out within the Building structure without the previously expressed agreement of the Engineer. Such agreement, if given shall not absolve the Contractor from liability for damage or injury or otherwise vitiate the Contract.

1.8.2 MATERIALS: All goods which are normally stored in the open shall be suitably and adequately protected from the weather and the ingress of dirt to the satisfaction of the Engineer; any materials which are not, in the opinion of the Engineer, adequately protected shall be removed from Site on receipt of instructions from the Engineer and replaced by new materials, at the Contractor's expense.

1.9 SETTING OUT (COMPLETE AS SPECIFICATION CLAUSE 2.4)

1.9.1 POSITIONING: The Contractor shall set out the whole of the Works and be responsible for the correctness of the positions, labels and dimensions of the several works according to the Drawings and Written Instruction of the Engineer as well as for the positioning and marking of openings, plinths, bases and of holes to be cut in the structure.

1.9.2 ROUTING: The exact courses and positions of all pipes, fittings, outlets, valves and other items of equipment shall be duly laid out and marked on the job by the Contractor and approved before execution as the best possible course and position, having regard to all considerations including that of

temperature and the relation of these items to electrical conductors.

1.9.3 CHECKING: The Contractor shall furnish all materials, labour and instruments necessary to enable the setting out to be checked.

1.9.4 ERRORS: The Contractor shall make good any incorrectly set out works and shall be liable for costs of making good any work incorrectly carried out.

1.10 PROTECTION (COMPLETE AS SPECIFICATION CLAUSE 2.5)

THE CONTRACTOR shall pad ladders and similar equipment so that no damage is done to the Building structure or the finishes thereof. The Contractor shall be liable for costs of making good should any damage be caused to the structure by oil, grease or similar goods, or by ladders or like equipment.

1.11 BUILDING WORK (COMPLETE AS SPECIFICATION CLAUSE 2.8)

1.11.1 THE BUILDING CONTRACTOR shall provide the following:-

Forming of floor ducts and wall chases

Forming and cutting of structural openings and recesses

Forming of plinths and bases

Excavation and Back-Fill for Site Services

Supports for tanks

Provision of natural ventilation in Plant Rooms

Making good after the above work

Temporary Roads and approaches

Part of Site Grounds for storage and workshop

1.11.2 THE MECHANICAL CONTRACTOR shall be responsible for the following:-

Setting out the marking of Builder's Work

Preparation of Builder's Work Drawings

Positioning of bases

All labour and gear for loading, unloading and handling

Trestles, ladders, cranes, hoists, scaffolding, etc. as required for the Mechanical Services' Installation, also for off-loading and positioning all of the Plant

Fixing by woodscrews or screws and plugs

The Contractor shall be responsible for the accuracy of information supplied for Builder's Work and shall be charged for any incorrect or unnecessary work carried out at his request.

1.11.3 THE MECHANICAL CONTRACTOR shall furnish and install all necessary auxiliary intermediate steel members between the Building Structure, as necessary for the support of pipe and duct hangers, equipment, etc. Details of auxiliary steel and attachment methods to Structure shall be submitted for approval prior to installation.

1.12 ELECTRIC MOTORS

1.12.1 STANDARDS: Electric motors unless specified otherwise in the particular text shall comply with the following requirements:-

Motors shall be rated 380/220V 50 Hz nominal supply.

Motor dimensions and outputs shall be in accordance with British Standard 3979 and performance in accordance with British Standard 2613.

Motor frames shall be totally enclosed fan cooled type.

Motor windings shall be insulated in accordance with British Standard 2757 at minimum Class B standard suitable for operation at a winding temperature up to 130 deg.C.

1.12.2 AMBIENT TEMPERATURE: The selection of the appropriate motor should be made using an ambient air temperature of 40 deg.C.

1.12.3 TYPE: Motors up to and including 3/4 HP shall be single phase, permanent capacitor type, above this rating three phase squirrel cage.

1.12.4 STARTING: Motors up to 7.5 HP shall be suitable for direct-on-line starting, above this rating shall be suitable for star-delta starting.

1.12.5 RATINGS: The Contractor shall provide the Engineer with the following information when ordering his equipment:-

a) Motor Manufacturer

b) Motor Rating

c) Insulation Class

d) Full load current and appropriate overload setting

e) Special electrical requirements if any (i.e. high starting current, high temperature operation, etc).

1.12.6 DUTY: Notwithstanding the foregoing the Contractor shall ensure that the motors provided shall in every way be appropriate for the function to be performed.

1.13 ELECTRICAL WORK
(COMPLETE AS SPECIFICATION CLAUSE 2.9)

1.13.1 SUPPLY: The Electrical Supply for Mechanical Equipment will be 380/220V, three-phase and neutral, 50 cycles A.C., and all equipment supplied by the Contractor shall be suitable for this supply. The Mechanical Contractor shall include for the supply of 110 Volt Transformers for his own use on Site.

1.13.2 WIRING: Electrical wiring shall be carried out by specialist electrical trades. This Contractor shall supply all necessary wiring diagrams for his equipment.

1.14 STAMPING (COMPLETE AS SPECIFICATION CLAUSE 2.10)

THE CONTRACTOR shall allow for having all valves, cocks, and other components approved and/or stamped by the Local Authority where legally required.

1.15 LOCAL AUTHORITIES
(COMPLETE AS SPECIFICATION CLAUSE 2.11)

THE CONTRACTOR shall observe and comply with the requirements of all Statutes and Bye-Laws and serve notice on the Authorities or Owners of Water, Gas,

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THE CONTRACTOR shall observe and comply with the requirements of all Statutes and Bye-Laws and serve notice on the Authorities or Owners of Water, Gas,

or other Mains, Electricity or other things which may in any way be effected by the execution of the works.

1.16 SAMPLES (COMPLETE AS SPECIFICATION CLAUSE 2.12)

THE CONTRACTOR, when and if required, shall supply samples or prototypes of all materials or workmanship to the Engineer before work is put in hand. The samples may be retained by the Engineer until the main bulk of materials have been delivered to Site. Samples will be required by the Engineer only where reasonable and where examination of quality by Drawings or Description would be unreasonable.

1.17 CONTRACTOR'S SHOP DRAWINGS
(COMPLETE AS SPECIFICATION CLAUSE 2.13)

1.17.1 DRAWINGS: The Contractor shall provide Dimensioned Working Drawings as follows before work is put in hand:-

Details of Building Work Requirements for Mechanical Work.

Details of Construction of Component parts of the Works.

Details of Installation Arrangements of any parts of the Works.

Details of any variations proposed by the Contractor.

Shop Drawings for Ductwork, Plant Room Layout and Boiler House Layout.

1.17.2 CAPACITIES: Equipment Drawings shall include capacity and efficiency curves for all fans and pumps. Two copies of each required Drawing shall be submitted to the Engineer in the first instance. The Contractor shall provide four final copies for distribution upon return to him of the approved preliminary copy.

1.18 CONTRACT DRAWINGS

THE CONTRACTOR shall include in his Tender, a Provisional Sum of IR£1,000.00 for the Preparation and Updating of a complete set of Contract Drawings. The Drawings shall be fully detailed and shall be

used for construction purposes and shall comply fully with the Specification and the Tender Drawings. The Contractor should increase this amount should he feel it is insufficient for the work involved, as the final cost of the Contract Drawings cannot exceed the amount shown in the Summary of Prices.

1.19 QUIETNESS OF OPERATION

1.19.1 SELECTION: It is of the greatest importance that all pumps, fans, motors or other equipment be especially selected for quietness of operation.

1.19.2 REPLACEMENT: Any equipment which produces objectionable noise shall be adjusted or insulated so as to eliminate the noise or shall be removed and replaced by satisfactory equipment.

1.20 CHECK FOR INTERFERENCE WITH OTHER TRADES

BEFORE INSTALLING piping and ductwork, check Mechanical Work Drawings concerned with Architectural, Structural, Electrical and other Mechanical Drawings. Where interferences may appear and departures from indicated arrangements are required, consult as required; come to agreement as to changed locations and elevations of piping and ductwork, obtain the approval of the Engineer of proposed changes before proceeding with the work.

1.21 EQUIPMENT SUPPORTS, FOUNDATIONS AND STANDS

1.21.1 REQUIREMENTS: Where supports, foundations, stands, suspended platforms for machinery, tanks and other mechanical equipment are indicated on Drawings or Specified or required for proper installation, perform as specified herein.

1.21.2 DESIGN AND CONSTRUCTION: Design and construct supporting structures of strength to safely withstand stresses to which they may be subjected and to distribute properly the load and impact over building areas. Conform to applicable Technical Societies' Standards, also to Codes and Regulations of Agencies having jurisdiction. Locate supports for tanks so as to avoid undue strain on shell and interference with pipe connections to tank outlets. For tanks containing tubes, check support locations indicated or specified for tank supports, use cast-iron or welded saddles of curvatures to fit tank.

1.21.3 FOUNDATION BOLTS: Provide foundation bolts, sleeves, washers, nuts and templates to locate position of bolts. Make sleeves of steel pipe finish flush with top of rough concrete. For anchorage, make embedded end of bolts hooked.

1.21.4 FLOOR STANDS: Where equipment is indicated on Drawings or Specified to be floor mounted on stands or legs, construct of structural steel members or steel pipe and fittings, brace and fasten with flanges bolted to floor.

1.21.5 CEILING OR WALL MOUNTING: Where ceiling or wall mounting is indicated on Drawings or Specified, use suspended platform or strap hangers, bracket or shelf; whichever is most suitable for equipment and its location. Construct of structural steel members, steel plates, rods, as required; brace and fasten to building structure or to inserts as approved by the Engineer.

1.22 IDENTIFICATION OF PIPING SYSTEM

1.22.1 STANDARDS: Piping system identification shall conform to the British Standard 1710 for the identification of piping systems. Identification of piping system content shall be by lettered legend placed on a colour band, giving the name of the contents in full or abbreviated form. Arrows indicating the direction of flow shall be placed adjacent to each legend.

1.22.2 SYSTEMS: Piping systems to be identified shall be as follows:-

Mains Water Domestic

Cold Water

Domestic Hot Water

1.23 VALVE TAGS

1.25.1 TAGS: Upon completion of the work the Contractor shall furnish and install, in connection with each valve installed under this Contract, a brass tag, indicating clearly the part of system controlled by same. Different systems shall have different shaped tags which shall be securely attached to valve's body by brass chain and ring.

1.25.2 DIRECTORY: Provide, in duplicate, a neat typewritten directory for each system, giving the valve number, service or function, location of each valve and degree of balanced regulation of valves.

1.25.3 LOCATION : One of each valve directory shall be enclosed under glass, in an aluminium frame, provided with screw holes for wall mounting, and mounted where directed.

1.24 RECEIPT FOR LOOSE AND DETACHABLE PARTS

THE CONTRACTOR shall retain all loose and small detachable parts of the apparatus and equipment furnished under this Contract, until the completion of the work and shall then turn over same to Owner's Authorised Representative and obtain from him in triplicate, an itemised receipt there-for. Contractor shall retain one copy of this receipt for his files and attach the other two copies to his request for final payment for the work.

1.25 TESTING AT WORKS
(COMPLETE AS SPECIFICATION CLAUSE 2.16)

THE CONTRACTOR shall be deemed to have examined Test Certificates for all Plant, equipment and materials provided under this Contract and to have satisfied himself that all component parts of the Works are tested as suitable for erection in the Installation and are as required herein.

1.26 TESTS FOR ACCEPTANCE
(COMPLETE AS SPECIFICATION CLAUSE 2.17)

1.26.1 REQUIREMENTS: The following requirements are supplementary to tests specified for individual equipment or systems in mechanical work sections:-

1. Furnish labour, materials and instruments and bear other costs in connection with all tests.

2. Give written notice in ample time to all concerned, of date when tests will be conducted.

3. Concealed or insulated work shall remain uncovered until required tests have been completed, but if construction schedule requires it, arrange for prior tests on parts of system as approved by the Engineer.

4. As soon as conditions permit, conduct preliminary or 'turn-over' tests of certain equipment as directed, to ascertain compliance with specified requirements. Make needed changes, adjustments or replacements as preliminary tests may indicate, prior to acceptance tests.

5. Testing shall be carried out in reasonable sections as the works proceed to facilitate the Contractor or others. Any temporary blanking off of pipework or Plant necessary for sectional testing shall be carried out by the Contractor.

6. An artificial hydrostatic pressure as tabled shall be applied to pipework and selected plant only and any flaw apparent shall be rectified and the test repeated. Welded pipework shall be thoroughly hammered during test and the Contractor shall not attempt to repair faulty welds but cut out the leaking section of pipework and renew same.

7. Pressure shall not be exerted on any Plant or equipment other than pipework unless so scheduled or mentioned herein.

1.26.2 ACCEPTANCE TESTS: After Mechanical Work has been completed the Contractor shall subject all mechanical systems to acceptance tests under normal operating conditions for periods as directed by the Engineers.

1. All equipment, pumps, fans and motors shall run at their required speed without showing undue vibration, objectionable noise, or sparking. No bearing or journal or any part of electric motors shall heat to a temperature of more than 40 deg.C. above the surrounding air.

2. All plumbing fixtures shall be operated and tested for supply and waste. All valves shall be tested opened and closed and shall be free from leakage at the packing.

3. Conduct tests as specified for each system or equipment unit, in presence of Engineer, other Accredited Representative to Owner, as well as the Representatives of Agencies having Jurisdiction.

1.26.3 ADJUSTMENTS, REPAIRS AND RE-TESTS:

1. Make adjustments, repairs, alterations, as required to meet specified test results.

2. Correct defects disclosed by tests or inspection and replace defective parts when directed.

3. In replacing defective parts use only new materials and in the case of pipe, replace with same length as defective piece.

4. Repeat tests after defects have been corrected and parts replaced, as directed and until pronounced satisfactory.

5. The Contractor shall bear cost of repairs, and restoration of the work damaged by the tests or cutting that had to be done in connection with the tests.

1.27 CLEANING AND FINISHING
(COMPLATE AS SPECIFICATION CLAUSE 2.18)

1.27.1 CLEANING: After all tests have been made and the systems pronounced tight and satisfactory the Contractor shall go over all his work and clean ducts inside and out, equipment, fixtures, piping and so forth and leave clean and in completed working order at final completion of the building.

1.27.2 OBSTRUCTIONS: Should any pipe, duct, or other part of systems be stopped by any foreign matter, disconnect, clean and reconnect wherever necessary for purpose of locating and removing obstructions. Repair work damaged in the course of removing obstructions.

1.27.3 PLUMBING: After satisfactory completion of pressure tests for plumbing, and heating systems piping installed under this Contract and before permanently connecting equipment, blow and flush piping as required to free pipe interior of foreign matter, as approved by the Engineer.

1.28 OPERATING AND MAINTENANCE INSTRUCTIONS
(COMPLETE AS SPECIFICATION CLAUSE 2.15)

1.28.1 INSTRUCTION MANUALS: The Contractor shall deliver to the Engineer before the Completion of the Contract, Three (3) Copies of complete Operating and

Maintenance Instruction Manuals under hardbound covers, for the equipment furnished and installed by him. Each manual shall contain:

1. Description of Systems

2. Manufacturers' Brochures for Operation and Maintenance of all Equipment

3. Spare Parts Lists for all equipment with Contractor's Order Number and Manufacturer's Order Number clearly marked in ink

4. List of all Suppliers giving Contact Name, Telephone Number and Telex Number.

1.28.2 TRAINING: The Contractor shall furnish the services of fully competent personnel to thoroughly instruct the Owner's Operating Personnel in the operation and care of all equipment and systems (including the control systems) and their various components.

1.29 RECORD DRAWINGS
(COMPLETE AS SPECIFICATION CLAUSE 2.14)

PRIOR TO HANDOVER, THE CONTRACTOR shall supply Record Drawings on standard heavy translucent sheets of similar size to the Engineer's Drawings showing the works as fitted and completed as follows:-

One set of Drawings and Schedules, marked 'Record Drawings' including necessary sections and elevations together with one photoprint off each sheet. All valves on Drawings shall have reference number coinciding with valve tag directory.

1.30 PRICING
(COMPLETE AS SPECIFICATION CLAUSE 2.19)

1.30.1 SUMMARY OF PRICES: The Contractor shall pay particular attention to the proper completion of the Summary of prices included in the Form of Tender and must complete the Summary of Prices strictly under the item numbers listed and should note that any section headings in this Specification may apply to one or more of the items in the Summary of Prices. The Contractor shall include in his Tender under additional headings if necessary and irrespective of the items indicated for all work specified or implied by the Drawings and Specification.

1.30.2 SCHEDULE OF RATES AND QUANTITIES: Prior to signing

of the Sub-Contract Documents, the Contractor shall provide the Engineer with a properly detailed Schedule of Rates and Quantities on which the Tender is based. This Schedule shall provide sufficient information for the assessment of variations, interim valuations and increased costs. The schedule, combined with the actual quantities, totalling to the Tender Amount shall conform to the headings in the Summary of Prices. The Contractor shall also submit copies of original quotations for all items of Materials and Plant.

1.30.3 VARIATIONS: All variations to the Contract shall be priced in accordance with the above Schedule of Rates. The total cost of any variation shall be approved in writing by the Engineers before work commences on the variation.

1.30.4 EXTRAS: Extras outside the scope of the Existing Contract shall be carried out for a price to be negotiated and approved in writing by the Engineers before the work is commenced.

1.30.5 DAYWORKS: Should variations to the Contract on a 'Daywork' basis be authorised, they shall be carried out in accordance with H.V.C.A. Rates. Daywork sheets for such variations shall be signed only by one authorised to do so by the Engineers.

1.30.6 PAYMENTS: Claims by the Contractor for interim payments shall indicate separately.

1. Percentages of the various works completed as scheduled in the Summary of Prices.

2. Schedule of increased Labour costs since the previous claim.

3. Schedule of increased Material costs since the previous claim.

If the period between claims exceeds one month then the Contractor shall submit the above Schedules of increased costs of Labour and Materials on a monthly calendar basis.

1.30.7 CANCELLATION: No payments shall be made to the Contractor by the Employer in respect of cancellation of any part or parts of the Contract.

B. P.V.C. COLD WATER SUPPLY

Clauses 5.1 - 5.8	Complete as Specification.
Sluice Valves	Sluice Valves shall comply with the Specification for Sluice Valves, as issued by the Local Authority.
	Pipework shall be carried out in unplastised PVC pipe, Class 'D' conforming to B.S. 3505.

C. FIRE FIGHTING AND DRINKING WATER INSTALLATION

Clause 6.1	Complete as Specification.
Clause 6.2	Complete as Specification.
Clause 6.3	Omit
Clause 6.4	Complete as Specification. Fire Posts shall be as scheduled and in locations as indicated on the Contract Drawings.
Clause 6.5	Complete as Specification, for internal fire mains located above ground level.
Clause 6.6	Omit
Clause 6.7	Complete as Specification.
Clause 6.8	Omit
Clause 6.9	Complete as Specification.
Clause 6.10	All exposed metalwork shall be rubbed down, scraped and primed to the Consultant's Approval and left ready for painting.

D. GALVANISED STEEL STORAGE TANKS

Clause 8.1	Complete as Specification. Tank sizes shall be as indicated on the Drawings. Tanks shall be complete with drip trays and covers.
Clauses 8.2 - 8.4	Complete as Specification.
Clause 8.5	Complete as Specification. Drip trays shall be complete with 15mm overflow connections.
Clause 8.6	Complete as Specification.

E. HOT AND COLD WATER SERVICE' INSTALLATION

Clauses 10.1 - 10.8	Complete as Specification. Intumescent Fire Barrier Putty, as manufactured by 3M or approved equal, shall be fitted between all pipes and pipe sleeves, on all pipework passing through walls.
Clauses 10.9 - 10.11	Complete as Specification.
Gate Valves (Isolating)	Up to and including 50mm shall be Conex Instantor Fig. 367 Compression Joint Fittings. Gate (Isolating) Valves 65mm and over shall be flanged-end connections, Class 100, cast iron body, bronze trim, non-rising stem, Hattersley No. 549.
Globe Valves (Balancing)	Up to and including 50mm shall be screwed-end connections, Class 200 bronze body, rising stem, Hattersley No. 13. Globe (Balancing) Valves 65mm and over shall be flanged end connections, Class 200 bronze body, rising stem, Hattersley No. 17.
Check Valves (Non-Return)	Check (Non-Return) Valves up to and including 50mm shall be screwed-end connections Class 150, bronze swing check valve Hattersley No. 651.
Hose Connections Draw-Off Cocks	Hattersley 81 HU Bronze Draw-Off Cock with Hose Union.
Stop Cocks	Sambra Fyfee Fig. No. 332.
Clause 10.12	Complete as Specification. Stop Cocks to be installed on branch connections to each separate individual fitting or group of fittings.
Clause 10.13	Complete as Specification. All branch connections to Sanitary Fittings shall be in the sizes and positions shown on Drawings. Contractor shall include for final connections to all Sanitary Fittings, Sinks

etc. Final connections shall be carried out in Half-Hard Copper Tube to B.S. 2871, Part One; Table X.

Clause 10.14

Complete as Specification.

Omit reference to Boilerhouse Insulation.

All pipework shall be insulated with fibreglass section and covered with pre-fixed 18 micron bright soft foil fire rated to B.S. 476 Part 6 Class 0 with bands at 300mm centres and to be installed strictly as per manufacturer's recommendations, thick ness to comply with General Specification. Provide Vapour Barrier on cold and mains water pipework.

All insulation shall be neatly finished to the approval of the Consultants.

Armaflex type insulation is not acceptable.

Clause 10.15

Complete as Specification

Clause 10.16

All exposed metalwork shall be rubbed down, scraped and primed to the Consultants approval and left ready for painting.

Electric Water Heaters

Domestic hot water supplies shall be fed from electric water heaters which shall be cistern type wall-mounted, as manufactured by Santon, capacities and types as scheduled.

SECTION 2 SCHEDULE OF DRAWINGS

M/1	Layout of External Water Mains and Details
M/2	Layout of Water Installation

JOB: TALLAGHT BUSINESS CENTRE - PHASE 2

ELECTRIC
WATER HEATER SCHEDULE

JOB NO: 4424/HC
DATE: JULY '91

UNIT NO.	LOCATION	CAPACITY (Ltrs)	TYPE	REMARKS
1.	Unit 27	45	R45 Cistern Type	3kW Immersion at 220/1/50 Hz.
2.	Unit 28	45	R45 Cistern Type	3kW Immersion at 220/1/50 Hz.
3.	Unit 29	45	R45 Cistern Type	3kW Immersion at 220/1/50 Hz.
4.	Unit 30	45	R45 Cistern Type	3kW Immersion at 220/1/50 Hz.
5.	Unit 31	45	R45 Cistern Type	3kW Immersion at 220/1/50 Hz.

JOB: TALLAGHT BUSINESS CENTRE - PHASE 2

JOB NO: 4424/HC
DATE: JULY 1991

SCHEDULE OF FIRE POSTS

LOCATION	TYPE	EQUIPMENT	QUANTITY
Units 27 - 31	Special Risk	9 kg. Dry Powder Fire Extinguishers	5 No. (Total)
Units 27 - 31	General Purpose	9 litre CO_2 Fire Extinguishers	5 No. (Total)

NOTE: All Fire Extinguishers shall be as manufactured by Champion or Angus.

SUMMARY OF PRICES

for

MECHANICAL SERVICES' INSTALLATION

at

TALLAGHT BUSINESS CENTRE - PHASE 2

ITEM	DESCRIPTION	IR£
1.	Supply and Installation of Hydrant Ring Main including Hydrants.	£
2.	Supply and Installation of External Domestic Mains Water including valves and valve boxes.	£
3.	Supply and Installation of Internal Domestic Mains Water Service.	£
4.	Insulation on Domestic Mains Water.	£
5.	Supply and Installation of Cold Water Services, including Water Storage Tanks.	£
6.	Insulation of Cold Water Services.	£
7.	Supply and Installation of Hot Water Services, including Electric Water Heaters.	£
8.	Insulation of Hot Water Services.	£
9.	Fire Posts.	£
10.	Builder's Work Drawings.	£
11.	Contract Drawings.	£ 1,000.00
12.	Operating and Maintenance Manuals and record Drawings.	£
13.	Provision of Schedule of Rates and Quantities.	£
14.	Allow for Contingency Sum of £2,000.00.	£ 2,000.00
	c/f....	£

		b/f....	£
15.	Preliminaries		£
16.	Other		£
	SUB-TOTAL		£
	Collateral Warranty Bond		£
	SUB-TOTAL		£
	Add for 5% Builder's Discount at 1/19th		£
	NETT-TOTAL		£
	Value added Tax at 10%		£
	GRAND TOTAL TO FORM OF TENDER		£

NAME OF FIRM: _____

ADDRESS: _____

_____

DATED: _____ DAY OF _____ 1991

FORM OF TENDER FOR NOMINATED SUB-CONTRACT

PROJECT: **TALLAGHT BUSINESS CENTRE - PHASE 2**

SUB-CONTRACT FOR: **MECHANICAL SERVICES' INSTALLATION**

1. We understand that the materials, goods and work; the subject of this Tender, are or will be covered by a Prime Cost or Provisional Sum in the Building Contract i.e., Agreement and Schedule of Conditions of Building Contract issued by R.I.A.I., in agreement with the C.I.F. and the R.I.C.S., hereinafter referred to as the Main Contract, entered into by the Contractor and Employer. We understand that on acceptance of this Tender by the Contractor (unless previously withdrawn due to reasonable objection to the Contractor where he has not been appointed at the date of this Tender), we shall become a Nominated Sub-Contractor under the Main Contract and shall enter into a Formal Sub-Contract with the Contractor, which shall indemnify the Contractor against the same obligations in respect of the Sub-Contract as those for which the Contractor is liable in respect of this Contract. We understand that the Conditions contained in the Main Contract shall over-ride all conditions to the contrary contained in the Sub-Contract.

2. We hereby under take to:

2.1 Execute and complete the works described in the Tender Documents and to comply with the conditions thereof for the sum of

.....

..... (£), exclusive of Value Added Tax

This sum includes all Statutory Tariffs, Taxes and Duties and is inclusive of 5% discount for prompt payment to the Contractor and exclusive of any Commission, Trade or other discount, or Value Added Tax.

2.2 Enter into the Form of Agreement between Employer and Sub-Contractor issued by the R.I.A.I., in agreement with the C.I.F. and the R.I.C.S., and drawn up by the Liaison Committee of the aforesaid bodies.

2.3 (a) Begin the Works at such time as the Contractor may reasonably require but not less than two weeks from the date of written acceptance of the Tender and complete the whole of the work within a total of _____ weeks from the date upon which the work is required to be started on Site.

OR

b) Commence and complete the work in accordance with the Contractor's Programme.

NAME OF TENDERER: _____

SIGNATURE: _____ DATE: _____

ADDRESS: _____

GENERAL CONDITIONS AND CONTRACT PARTICULARS

1. Main Contract:

The Accepted Tenderer shall be a Nominated Sub-Contractor under the Articles of Agreement and Conditions of Contract issued by the Royal Institute of the Architects of Ireland in agreement with the Construction Industry Federation and the Royal Institution of Chartered Surveyors; 1988 Edition.

- Where quantities form part of the Contract

2. Sub-Contract:

The Sub-Contract between the Contractor and the Sub-Contractor shall not conflict with the Main Contract and shall be one

- Where quantities do not form part of the Contract

The designated date for the purpose of the Sub-Contract for the Price Variation Clause shall be Ten Days prior to date of Tender.

3. Main Contract, Parties and Consultants:

EMPLOYER: **INDUSTRIAL DEVELOPMENT AUTHORITY**

ARCHITECT: **BARRY AND ASSOCIATES**

STRUCTURAL ENGINEERS: **McCABE DELANEY AND ASSOCIATES**

SERVICES' ENGINEERS: **MacARDLE McSWEENEY ASSOCIATES**

QUANTITY SURVEYOR: **MULCAHY McDONAGH AND PARTNERS**

MAIN CONTRACTOR: **TO BE APPOINTED**

GENERAL CONDITIONS AND CONTRACT PARTICULARS

1. Main Contract:

The Accepted Tenderer shall be a Nominated Sub-Contractor under the Articles of Agreement and Conditions of Contract issued by the Royal Institute of the Architects of Ireland in agreement with the Construction Industry Federation and the Royal Institution of Chartered Surveyors; 1988 Edition.

- Where quantities form part of the Contract

2. Sub-Contract:

The Sub-Contract between the Contractor and the Sub-Contractor shall not conflict with the Main Contract and shall be one

- Where quantities do not form part of the Contract

The designated date for the purpose of the Sub-Contract for the Price Variation Clause shall be Ten Days prior to date of Tender.

3. Main Contract, Parties and Consultants:

EMPLOYER: **INDUSTRIAL DEVELOPMENT AUTHORITY**

ARCHITECT: **BARRY AND ASSOCIATES**

STRUCTURAL ENGINEERS: **McCABE DELANEY AND ASSOCIATES**

SERVICES' ENGINEERS: **MacARDLE McSWEENEY ASSOCIATES**

QUANTITY SURVEYOR: **MULCAHY McDONAGH AND PARTNERS**

MAIN CONTRACTOR: **TO BE APPOINTED**

4. Appendix to Main Contract:

The Appendix to the Conditions of the Main Contract is complete as follows:-

Clause 1.	Designated Date: Ten Days prior to date of Tender
Clause 22(b)	Cost of Site Clearance - IR£1,000,000.00
Clause 22(b)	Percentage for Professional Fees: 12.5 Percent
Clause 23(c) (ii)	Minimum Sum for Public Liability Insurance: £2,000,000
Clause 28	Date for Possession: 20th August 1991
Clause 28 & 29(a)	Date for Completion: 20th February 1992
Clause 29(a)	Liquidated and Ascertained Damages: IR£1,000/week
Clause 31 & 35(h)	Defects Liability Period: Twelve Months
Clause 35(a)	Period of Interim Certificates: Monthly
Clause 35(a)	Time for Issue of Interim Certificates by the Architect: Ten Working Days
Clause 35(d)	Percentage of Certified Value Retained: Five-Percent
Clause 35(d)	Limit of Retention Fund: Five-Percent
Clause 35(e)	Joint Account Retention Fund: Not Applicable
Clause 35(g)(iii)	Period of Final Measurement: Six Months
Clause 35(g)	Period of serving notice of Arbitration: Fourteen Days

Any other details of the Main Contract, if required, may be obtained from the Architect or Quantity Surveyor and the Sub-Contractor will be deemed to have made himself familiar with all aspects of the Main and Sub-Contracts, which influence his Tender.

5. General Attendance:

The Sub-Contractor shall be provided with General Attendance, free of charge. General attendance shall be deemed to include the use of the Contractor's temporary roads, pavings and paths, standing scaffolding, standing power-operated hoisting plant, the provision of temporary lighting and water supplies, clearing away rubbish, provision of space for the Sub-Contractor's own offices and for the storage of his plant and materials and the use of messrooms, sanitary accommodation and welfare facilities.

6. Special Attendance:

The Sub-Contractors will be provided with the following Special Attendances, free of charge:-

(a) Storing

(b) Providing power for hand tools and welding

(c) _____

(d) _____

Anything not provided free of charge as above, is deemed to be provided by the Sub-Contractor in the Tender Sum.

7. Order of Work:

The Sub-Contractor shall execute his Works in conformity with an order of work, to be agreed with the Contractor.

8. Other Particulars:

The Tenderer will be deemed to have satisfied himself concerning any other particulars which may affect his Tender.

9. Endorsements:

Any conditions appended by the Tenderer which are at variance with the Conditions set out, may result in the Tender being disregarded.

10. Acceptance:

The Lowest or any Tender will not necessarily be accepted. No Tenderer will be remunerated for any expense incurred in making up his Tender.

SCHEDULE OF RATES

On Which Tender is Based

1. Percentage on Materials ..... %
2. Percentage on Labour ..... %
3. Rate per Hour for Fitter ..... £
4. Rate per Hour for Fitter .....(Charge Hand)... £
5. Rate per Hour for Apprentice ..... £

NOTE:

Rates per Hour shall be Gross Amount inclusive of all approved allowances.

NAME OF FIRM: _____

ADDRESS: _____

_____

_____

DATE: _____ 1991

I/WE undertake that No Other Work will be Sub-Let by ME/US except that as listed below:

Supply and Fix:

Trade	Sub-Let To

Signature .....

Address .....

.....

Date .....

SPECIAL ATTENDANCES

With Reference to Special Attendances by the General Contractor, the following is a List of Additional Facilities and Services including Plant and Equipment which is required by ME/US from the General Contractor for the execution of the Sub-Contract and for which no allowance has been made in MY/OUR Tender Price.

Item	Details

Signature .....

Address .....

.....

Date .....

FORM OF WARRANTY

FORM OF WARRANTY TO BE GIVEN BY NOMINATED SUB-CONTRACTOR IN CONSIDERATION OF NOMINATION

TO: .....(The Employer as defined in the Articles of Agreement)

It is intended to have carried out by a Contractor under the terms of an R.I.A.I. Form of Contract; 1988 Edition, providing for payment of liquidated and ascertained damages for delay at the rate of £ per week.

.....

.....

(The Works as defined in the Articles of Agreement)

WE, the undersigned, warrant that in consideration of you nominating us as Sub-Contractor for:

.....

..... (the Sub-Contract Works)

1. That we HAVE exercised and WILL exercise all proper skill and care in the design of the Sub-Contract Works and the selection of materials and goods therefore sofaras the Sub-Contract Works have been or will be designed by us and such materials or goods have been or will be selected by us.

2. That we will, in addition to 1. hereof, comply with and satisfy any performance Specification or Requirement included in or referred to in our Estimate as part of the description of the Sub-Contract Works.

3. That we will save, insofaras we are delayed by any cause described in Clause 30 (a) to (f) and Clause 30 (h) to (i) of the Main Contract, as such Clause applied to us:

   (a) so perform the Sub-Contract Works and

   (b) supply the Architect or Contractor with such information as either may reasonably require that the Contractor shall not become entitled to an extension of time under Clause 30 of the Main Contract by delay on our part or by our failure to supply information as aforesaid.

4. Nothing in our Estimate is intended to exclude or limit our Liability for Breach of the Warranties set out above.

Signed:_____

in the presence of: _____

_____

_____

SIGNATURE of above-named **Sub-Contractor** (if individual) **or SEAL**, if Limited Liability Company.

_____

_____

_____

in the presence of: _____

_____

Dated:_____

BYE LAW APPLICATION FEES

2895678.

REF. NO.: 91A/0925 CERTIFICATE NO.: 15233B

PROPOSAL: Small Industrial units

LOCATION: Whitestown Road, Whitestown Industrial Park, Tallaght

APPLICANT: Industrial Development Authority

	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 1264.0m²	@ £3.50 per M² or £70	£4424	£4459	£38	Refund	
D	Building or other structure for purposes of agriculture	@ £1.00 per M² in excess of 300 M² Min. £70					
E	Petrol Filling Station	@ £200					
F	Dev. of prop. not coming within any of the forgoing classes	£70 or £9 per .1 hect. whichever is the greater					

Column 1 Certified: Signed: _____ Grade: SHEO Date: 10/6/91.

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

Columns 2,3,4,5,6 & 7 Certified: Signed: _____ Grade: S.O Date: 7/6/91

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

91A/0925 CERTIFICATE NO:- 25532

PROPOSAL: Small Industrial Units

LOCATION: Whitestown Road, Whitestown Industrial Estate, Tallaght

APPLICANT: Industrial Development Authority

1	2	3	4	5	6	7
DWELLINGS/AREA LENGTH/STRUCT	RATE	AMT. OF FEE REQ.	AMOUNT LODGED	BALANCE DUE	BALANCE DUE	DATE/ RECEIPT NO
Dwellings	£32					
	£16					
	£50p per M² in excess of 300M² Min.£40					
metres² 1264.0m²	£1.75 per M² or £40	£2212	£2229.50	£17.50	overlodged	
x .1 hect.	£25 per .1 hect. or £250					
x .1 hect.	£25 per .1 hect. or £40					
x .1 hect	£25 per .1 hect. or £100.					
	£100					
x metres²	£10 per m² or £40					
x1,000m²	£25 per 1,000m² or £40					
x .1 hect.	£5 per .1 hect. or £40					

Column 1 Certified: Signed: [signature] Grade: DHE Date: 10/6/91.

Column 1 Endorsed: Signed: [signature] Grade: Date:

Columns 2,3,4,5,6 & 7 Certified: Signed: Grade: Seo Date: 7/6/91

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

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

ASSESSMENT OF FINANCIAL CONTRIBUTION

REG. REF.: 91A/925

CONT. REG.:

SERVICES INVOLVED: WATER/FOUL SEWER/SURFACE WATER

AREA OF SITE:

FLOOR AREA OF PRESENT PROPOSAL: 13607 Ft^2

MEASURED BY: 10/6/91.

CHECKED BY:

METHOD OF ASSESSMENT:

TOTAL ASSESSMENT

MANAGER'S ORDER NO: P/ /
DATED

ENTERED IN CONTRIBUTIONS REGISTER:

DEVELOPMENT CONTROL ASSISTANT GRADE

Cn934
Site is the
subject of
counter claim
Marked

30/1/91

See also green
sheel on 89A/489

SS only

Register Reference : 91A/0925 Date : 10th June 1991

Development : Construct an extension to Business Centre.

LOCATION : I. D. A. Business Park, Whitestown, Tallaght.

Applicant : Industrial Development Authority,

App. Type : PERMISSION/BUILDING BYE-LAW APPROVAL

Planning Officer : M.DARLEY

Date Recd. : 4th June 1991

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

Yours faithfully,

PRINCIPAL OFFICER

DUBLIN Co. COUNCIL
14 JUN 1991
SAN SERVICES

DUBLIN CO. COUNCIL
SANITARY SERVICES
- 6 AUG 1991

Date received in Sanitary Services .....

FOUL SEWER

Available.

Any effluent other than domestic effluent to be subject to the provisions of the Water Pollution Act

PLANNING DEPT.
DEVELOPMENT CONTROL
Date 8/8/91
Time .....

SURFACE WATER

Available.

Surface water run-off is subject to the provisions of the Water Pollution Act.

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

Dublin 29/7/91.

Encl D/16

Register Reference : 91A/0925 Date : 10th June 1991

.....

ENDORSED _____ DATE _____

WATER SUPPLY Available for zoned use 24 hours
storage to be provided. applicant has agreed
w/main layout with S-S: dept & is to lodge
copies of same with building control for record
purposes -

.....

26/6/91

ENDORSED _____ DATE 1/2/91

DUBLIN COUNTY COUNCIL

REG. REF: 91A/0925.

DEVELOPMENT: Construct an extension to Business Centre.

LOCATION: I.D.A. Business Park, Whitestown, Tallaght.

APPLICANT: Industrial Development Authority.

DATE LODGED: 4.6.91.

This application is for full permission for extension to Business Centre at Whitestown.

The Business Centre was granted permission by Dublin County Council on 18th May, 1989 under Reg. Ref: 89A/489. It is noted that both recommendations relating to a boundary wall and a Roads contribution, put forward by Roads Department were not conditioned to the applicant.

The current proposal is for an extension with a nett additional floor area of 127m². The extension individually requires 38 no. car spaces in accordance with Development Plan Standards. The existing business Centre requires a total of 78 car spaces. Therefore, a total of 116 car spaces is required, the applicant proposes 114. However, some overlap may occur and the car parking provision is considered adequate.

If permission is being considered therefore, it should be subject to:-

1) A Roads contribution of £22,646.00 to be paid towards the completion of the distributor roads required by this industrial estate. (Levy of £18,117.00 per acre to complete N/S route and Killinarden Way See 89A/489).

MA/BMcC
29.7.91.

PLANNING DEPT.
DEVELOPMENT CONTROL SECT
Date .....
Time .....

SIGNED: Michael Arthurs ENDORSED: E. Madden

DATE: 30-7-91 DATE: 30.7.'91

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

Bosca 174
P. O. Box 174
5 Rae Gardiner,
5 Gardiner Row,
Baile Atha Cliath 1.
Dublin 1.
Telephone. (01)727777
Fax. (01)727530

PK

DEVELOPMENT CONTROL 24 JUL 1991

Mr. D. Drumgoole,
Senior Administrative Officer,
Planning Department,
Dublin County Council.

Our Ref. P.P. 589
Your Ref.
Date 19.07.1991

RE: Industrial Development at I.D.A. Business Park, Whitestown, Tallaght. Reg. Ref. 91A/0925.

As outlined in the written submission with this application, it is proposed to carryout a scheme of site landscaping similar to what has been agreed in relation to the remainder of the estate. It will be important to ensure that an adequate scheme of tree planting is carried out along the northern site boundary with the Tallaght By-Pass. Accordingly, the applicants should be required to submit a detailed landscape plan for the site, which should include specific reference to maintenance on a regular basis, in compliance with any grant of permission.

PLANNING DEPT.
DEVELOPMENT CONTROL SECT
Date 25.07.91
Time 9.30
23 JUL 91

SENIOR PARKS SUPERINTENDENT

AW934

Order No. P/3564/91

COMHAIRLE CHONTAE ÁTHA CLIATH

Record of Executive Business and Manager's Orders

All Conditions Subject to

Proposed construction of an extension to the Business Centre at the I. D. A. Business Park, Whitestown, Tallaght for the Industrial Development Authority.

Barry & Associates,
27, Longford Terrace,
Monkstown,
Co. Dublin.

Reg. Ref. 91A-0925
Appl. Rec'd: 04.06.1991
Floor Area: 1,274 sq. m.
Site Area: 23,617 sq. m.
Zoning: E

Report of the Dublin Planning Officer, dated 30 July 1991

This is an application for **PERMISSION**. The proposal consists of an extension to business centre at I. D. A. Business Park, Whitestown, Tallaght.

The area in which the site is located is zoned with the objective "to provide for industrial and related uses." (E)

The history of the site is as follows:

89A-0489 Permission granted for business park in two connected blocks comprising 26 sub-units, and totalling 2,905 sq. m.

The current proposal is for an additional block comprising 5 units, and totalling 1,274 sq.m. Calculations in this Department give a total of 4,276.4 sq. m. giving a total site coverage of 21.78%.

The elevations shown are similar in scale and finish to the original buildings.

A report on file from Supervising Environmental Health Officer finds the proposal acceptable subject to adequate ventilation and compliance with Food Hygiene regulations.

Parks Department require a detailed landscape plan for the site, which should include specific reference to maintenance proposals.

There is no report on file from Sanitary Services Department.

I recommend that a decision to **GRANT PERMISSION** be made under the Local Government (Planning and Development) Acts, 1963-1990 subject to the following (10) conditions:-

(Continued)

Order No. P/3564/91

COMHAIRLE CHONTAE ÁTHA CLIATH

Record of Executive Business and Manager's Orders

Proposed construction of an extension to the Business Centre at the I. D. A. Business Park, Whitestown, Tallaght for the Industrial Development Authority.

CONDITIONS	REASONS FOR CONDITIONS
1. 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.	1. To ensure that the development shall be in accordance with the permission and that effective control be maintained.
2. That before development commences, approval under the Building Bye-Laws be obtained, and all conditions of that approval be observed in the development.	2. In order to comply with the Sanitary Services Acts, 1878-1964.
3. That the requirements of the Supervising Environmental Health Officer be ascertained and strictly adhered to in the development.	3. In the interest of health.
4. That the requirements of the Chief Fire Officer be ascertained and strictly adhered to in the development.	4. In the interest of safety and the avoidance of fire hazard.
5. That the water supply and drainage arrangements be in accordance with the requirements of the Sanitary Services Department.	5. In order to comply with the Sanitary Services Acts, 1878-1964.
6. That no industrial effluent be permitted without prior approval from the Planning Authority and any necessary licences to be obtained from the Sanitary Authority	6. In the interest of health.
7. That off-street car parking facilities and parking for trucks be provided in accordance with the Development Plan Standards.	7. In the interest of the proper planning and development of the area.
8. That the area between the building and roads must not be used for truck parking or other storage or display purposes.	8. In the interest of the proper planning and development of the area.
9. That details of landscaping and boundary treatment including proposals for maintenance be agreed with the ~~County Council~~ Planning Authority prior to commencement of development.	9. In the interest of the proper planning and development of the area.

Order No. P/3564/91

COMHAIRLE CHONTAE ÁTHA CLIATH

Record of Executive Business and Manager's Orders

Proposed construction of an extension to the Business Centre at the I. D. A. Business Park, Whitestown, Tallaght for the Industrial Development Authority.

CONDITIONS	REASONS FOR CONDITIONS
10. That no advertising sign or structure be erected, except those which are exempted development, without prior approval of the Planning Authority.	10. In the interest of the proper planning and development of the area.
NOTE: Compliance with one or more of the conditions of this permission may result in material alterations to the development as initially proposed and, accordingly, may require the submission of a further planning application.	

Order No. P/3564/91

COMHAIRLE CHONTAE ÁTHA CLIATH

Record of Executive Business and Manager's Orders

Proposed construction of an extension to the Business Centre at the I. D. A. Business Park, Whitestown, Tallaght for the Industrial Development Authority.

(Continued)

(GB/DK).

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 (10) conditions set out above is hereby made.

Dated: 31 July, 1991.

K. O'Sullivan
Assistant City & County Manager.

to whom the appropriate powers have been delegated by Order of the Dublin City and County Manager, dated 26th July, 1991.

Geraldine

Dublin County Council Comhairle Chontae Atha Cliath — **Parks Department**

Bosca 174
P. O. Box 174
5 Rae Gardiner,
5 Gardiner Row,
Baile Atha Cliath 1.
Dublin 1.
Telephone. (01)727777
Fax. (01)727530

Mr. D. Drumgoole,
Senior Administrative Officer,
Planning Department,
Dublin County Council.

Our Ref. P.P. 589
Your Ref.
Date 19.07.1991

RE: Industrial Development at I.D.A. Business Park, Whitestown, Tallaght. Reg. Ref. 91A/0925.

As outlined in the written submission with this application, it is proposed to carryout a scheme of site landscaping similar to what has been agreed in relation to the remainder of the estate. It will be important to ensure that an adequate scheme of tree planting is carried out along the northern site boundary with the Tallaght By-Pass. Accordingly, the applicants should be required to submit a detailed landscape plan for the site, which should include specific reference to maintenance on a regular basis, in compliance with any grant of permission.

PLANNING DEPT.
DEVELOPMENT CONTROL SECT
Date 25.07.91
Time 9.30
23 JUL 91

SENIOR PARKS SUPERINTENDENT

DUBLIN COUNTY COUNCIL

Tel. 724755 (ext. 262/264)

PLANNING DEPARTMENT,
BLOCK 2,
IRISH LIFE CENTRE,
LR. ABBEY STREET,
DUBLIN 1.

Notification of Decision to Grant Permission/[redacted]

Local Government (Planning and Development) Acts, 1963-1983

To: Barry & Associates,
27, Longford Terrace,
Monkstown,
Co. Dublin.

Decision Order Number and Date: P/3564/91 - 31.07.1991
Register Reference No.: 91A-0925
Planning Control No.:
Application Received on: 04.06.1991

Applicant: Industrial Development Authority. Floor Area: 1,274 sq. m.

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/[redacted] for:-

construction of an extension to the Business Centre at the I. D. A. Business Park, Whitestown, Tallaght.

SUBJECT TO THE FOLLOWING CONDITIONS

CONDITIONS	REASONS FOR CONDITIONS
1. 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.	1. To ensure that the development shall be in accordance with the permission and that effective control be maintained.
2. That before development commences, approval under the Building Bye-Laws be obtained, and all conditions of that approval be observed in the development.	2. In order to comply with the Sanitary Services Acts, 1878-1964.
3. That the requirements of the Supervising Environmental Health Officer be ascertained and strictly adhered to in the development.	3. In the interest of health.
4. That the requirements of the Chief Fire Officer be ascertained and strictly adhered to in the development.	4. In the interest of safety and the avoidance of fire hazard.
5. That the water supply and drainage arrangements be in accordance with the requirements of the Sanitary Services Department.	5. In order to comply with the Sanitary Services Acts, 1878-1964.
(Continued)	

Signed on behalf of the Dublin County Council: [signature]
For Principal Officer

Date: 31st July, 1991.

IMPORTANT: Turn overleaf for further information

(Continued) CONDITIONS	REASONS FOR CONDITIONS
6. That no industrial effluent be permitted without prior approval from the Planning Authority and any necessary licences to be obtained from the Sanitary Authority.	6. In the interest of health.
7. That off-street car parking facilities and parking for trucks be provided in accordance with the Development Plan Standards.	7. In the interest of the proper planning and development of the area.
8. That the area between the building and roads must not be used for truck parking or other storage or display purposes.	8. In the interest of the proper planning and development of the area.
9. That details of landscaping and boundary treatment including proposals for maintenance be agreed in writing with the Planning Authority prior to commencement of development.	9. In the interest of the proper planning and development of the area.
10. That no advertising sign or structure be erected, except those which are exempted development, without prior approval of the Planning Authority.	10. In the interest of the proper planning and development of the area.
NOTE: Compliance with one or more of the conditions of this permission may result in material alterations to the development as initially proposed and, accordingly, may require the submission of a further planning application.	

NOTE:

If there is no appeal to An Bord Pleanala against this decision PERMISSION/APPROVAL will be granted by the Council as soon as may be after the expiration of the period for the taking of such appeal. If every appeal made in accordance with the Acts has been withdrawn, the Council will grant the PERMISSION/APPROVAL after the withdrawal.

An appeal against the decision may be made to An Bord Pleanala. The applicant may appeal within one month from the date of receipt by him of this notification. ANY OTHER PERSON may appeal within twenty-one days beginning on the date of the decision.

An appeal shall be in writing and shall state the subject matter and grounds of the appeal. It should be addressed to:—

An Bord Pleanala, Blocks 6 and 7, Irish Life Centre, Lower Abbey Street, Dublin 1.

(1) An appeal lodged by an applicant or his agent with An Bord Pleanala will be invalid unless accompanied by a fee of £36 (Thirty-six Pounds). (2) A party to an appeal making a request to An Bord Pleanala for an Oral Hearing of an appeal must, *in addition* to (1) above, pay to An Bord Pleanala a fee of £36 (Thirty-six Pounds). (3) A person who is not a party to an appeal must pay a fee of £10 (Ten Pounds) to An Bord Pleanala when making submissions or observations to An Bord Pleanala in relation to an appeal.

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

FUTURE PRINT LTD.

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/0925

Date : 5th June 1991

LOCAL GOVERNMENT (PLANNING AND DEVELOPMENT) ACTS, 1963 TO 1990

Dear Sir/Madam,

DEVELOPMENT : Construct an extension to Business Centre.

LOCATION : I. D. A. Business Park, Whitestown, Tallaght.

APPLICANT : Industrial Development Authority,

APP. TYPE : PERMISSION/BUILDING BYE-LAW APPROVAL

With reference to above, I acknowledge receipt of your application received on 4th June 1991.

Yours faithfully,

.....

PRINCIPAL OFFICER

Barry & Associates,
27 Longford Terrace,
Monkstown,
Co. Dublin.

Dublin County Council
Comhairle Chontae Átha Cliath

Planning Application Form/ Bye - Law Application Form

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

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

2. Postal address of site or building REAR OF EXISTING I.D.A BUSINESS CENTRE (If none, give description sufficient to identify) WHITESTOWN ROAD, WHITESTOWN INDUSTRIAL ESTATE TALLAGHT CO DUBLIN

3. Name of applicant (Principal not Agent) INDUSTRIAL DEVELOPMENT AUTHORITY

Address MILTON PARK HOUSE, MILTON PLACE DUBLIN 4 Tel. No 602204, 688444

4. Name and address of person or firm responsible for preparation of drawings BARRY & ASSOCIATES, 27 LONGFORD TCE MONKSTOWN CO DUBLIN Tel. No 2806886

5. Name and address to which notifications should be sent BARRY & ASSOCIATES, 27 LONGFORD TCE MONKSTOWN CO. DUBLIN. BYE LAW APPLICATIO

6. Brief description of proposed development SMALL INDUSTRIAL UNITS REC. No 44459 N41465

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

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. NOT APPLICABLE
(b) Proposed use of each floor "

DUBLIN COUNTY COUNCIL — Notice is hereby given by the Industrial Development Authority of its intention to apply to Dublin County Council for planning permission to construct an extension to its Business Centre at the I.D.A. Business Park, Whitestown, Tallaght.

Irish Indep 30/5/91

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 23,617 Sq. m.

(b) Floor area of proposed development 1274 Sq. m.

(c) Floor area of buildings proposed to be retained within site 2905 Sq. m.

12. State applicant's legal interest or estate in site (i.e. freehold, leasehold, etc.) FREEHOLD OWNER, £227.50 4/6

13. Are you now applying also for an approval under the Building Bye Laws?
Yes [✓] No [ ] Place ✓ in appropriate box. N41092

14. Please state the extent to which the Draft Building Regulations have been taken in account in your proposal:
SEE ATTACHED NOTE DATED 31 MAY 1991 (4 COPIES ENCLOSED)

15. List of documents enclosed with application. NEWSPAPER NOTICE IN IRISH INDEPENDENT DATED 30-5-91, 4 COPIES OF THIS FORM DULY COMPLETED, CHEQUE FOR £6688.50 MADE OUT TO DUBLIN CO. COUNCIL, 4 COPIES OF WORKING DRGS NOS 91/4/5,6,7,8,9,10 4 COPIES OF McCABE, DELANEY & ASSOC CERTIFICATES DATED 31-5-91, 4 COPIES OF THEIR DRGS 9125/01 TO 08 INCL, 4 COPIES OF THEIR STRUCTURAL CALCULATIONS, FOUR COPIES OF MAC ARDLE McSWEENEY & ASSOC LETTER DATED 27 MAY 91

16. Gross floor space of proposed development (See back) 1274 Sq. m.

No of dwellings proposed (if any) — Class(es) of Development CLASS 4 AND CLASS C

Fee Payable £ 6,688.50 Basis of Calculation 1274 m² X £5.25 = £6688.50

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

Signature of Applicant (or his Agent) Barry & Assoc. Date 31 MAY 1991

Application Type P/B

Register Reference 91A/0925

Amount Received £ 34.56.4

Receipt No 21-12

Date

FOR OFFICE USE ONLY

RECEIVED
04 JUN1991
REG. SEC.

RECEIPT CODE

COMHAIRLE CHONTAE ÁTHA CLIATH

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

BYE LAW APPLICATION.

REC. No. N 41465

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

£4459.00

Received this 4th day of June 1991

from I.D.A.,
Wilton Park House
Dublin 2

the sum of four thousand four hundred fifty nine Pounds
Pence, being 00 for
bye-law application at Whitestown Rd.

Nadine Deane Cashier

S. CAREY Class C
Principal Officer

RECEIPT CODE

COMHAIRLE CHONTAE ÁTHA CLIATH

PAID BY — 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.

N - 41077

CASH ✓
CHEQUE
M.O.
B.L.
I.T.

£ 2229.50

Received this 4th day of 4th June 1991

from I.D.A.,
Wilton Park House
Dublin 2

the sum of two thousand two hundred & twenty nine Pounds
fifty Pence, being fee for
planning application at Whitestown Rd.

Noelle Deane Cashier

S. CAREY
Principal Officer Cas 4

BARRY & ASSOCIATES ARCHITECTS

27 Longford Terrace Monkstown Co. Dublin telephone 2806886 fax 2808302

Francis Barry FRIAI
Matthew Barry DIP ARCH FRIAI

MB/jh

31 May 1991

The Secretary,
Dublin County Council,
Irish Life Centre,
Lower Abbey Street,
Dublin 1.

IDA : TALLAGHT BUSINESS CENTRE STAGE II

Dear Sir,

We wish to apply on behalf of our clients, The Industrial Development Authority for full Planning Permission and Building Bye-law Approval for the above and enclose the following documents:-

1. Newspaper notice in the Irish Independent dated 30 May 1991.

2. Four copies of this letter dated 31 May 1991.

3. Four copies of Planning Application Form duly completed dated 31 May 1991.

4. Four copies each of working drawings nos. 91/4/5, 6, 7, 8, 9, and 10. On the site location map the site has been outlined in 'red'. Please note that the specification have been incorporated on the drawings.

5. Four copies of our note dated 31 May 1991 concerning the Draft Building Regulations.

6. Our client's cheque for £6,688.50 made out to Dublin County Council calculated as follows:-

   Planning : Class 4 = £1.75 x 1274 sq. m. = £2,229.50
   Bye-laws : Class C = £3.50 x 1274 sq. m. = £4,459.00

   £6,688.50

7. Four copies of McCabe Delaney and Associates, Structural Engineers, Certificate dated 31 May 1991 together with four copies of their working drawings nos. 9125/01 to 08 inclusive, four copies of their specification dated 27 May 1991 and four copies of their structural calculations dated 27 May 1991.

8. Four copies of MacArdle McSweeney and Associates, Mechanical and Electrical Consultants letter dated 27 May 1991.

Planning Permission for the first stage was obtained on 29 June 1989, Reg Ref No. 89A/489 and Building Bye-law Approval on 1 June 1989, Order No. BL/1746/89.

The existing foul and surface water drains were designed and laid large enough to take Stage II and this was agreed with Mr. B. Morris, Drainage Engineer, O'Connell Street, Dublin, at a meeting with him on 23 May 1989.

The toilet accommodation in each unit is designed to cater for fifteen males and twenty five females, however, it is not anticipated that these numbers would be employed in each unit.

We wish to apply for a waiver of the Bye-law requirement to construct the party walls of the light industrial units in 225 mm solid blockwork. They will be constructed as designed by the structural engineer in 200 mm fine textured 25% void 5N per mm2 steam cured blocks. We enclose a copy of the waiver letter dated 26 October 1989 which we received for the existing building from Dublin County Council which is of similar construction.

Car parking spaces at the rate of three per 100 sq. m. of gross floor area (1274 m. sq. = thirty eight cars) are provided in addition to the existing car parking for seventy six cars giving a total of one hundred and fourteen. Trucks will not be parked anywhere on the site.

The area of site surrounding Stage II will be landscaped to the same standard as exists.

We would very much appreciate an early decision.

Yours faithfully,

Matthew J. Barry

cc: Mr. L. Power : I.D.A.
D. Browne : McCabe Delaney and Assoc.
D. Egan : MacArdle McSweeney and Assoc.

FILE
BYE-LAWS

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

Enquiries/Personal Callers:
Liffey House
24/28 Tara Street, Dublin 2
Telephone (01) 773066

Correspondence:
Building Control Section
Block 2, Irish Life Centre
Lr. Abbey Street, Dublin 1

Attention of: Mr. Barry.

Our Ref. EMcD/AOG
Your Ref.
Date 26/10/89

Barry & Associates Architects,
27 Longford Terrace,
Monkstown,
Co. Dublin.

Re: IDA Tallaght Business Centre - 89A/489

Dear Sir,

I refer to your letter dated 14th April, 1989 and your recent telephone call in relation to the content of same.

I would confirm that 200 mm fine textured 25% void 5 N per mm^2 block construction in the party and corridor walls of the light industrial units is acceptable. Also the proposed reduction of the window areas in the light industrial units in this instance is acceptable.

Yours faithfully,

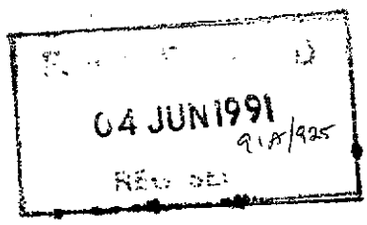
E. McDonagh,
Senior Executive Engineer

BARRY & ASSOCIATES
Received
27 OCT 1989
Job Pass to File Ref.

BARRY & ASSOCIATES ARCHITECTS
27 Longford Terrace Monkstown Co. Dublin telephone 2806886 fax 2808302

Francis Barry FRIAI
Matthew Barry DIP ARCH FRIAI

31 MAY 1991



DRAFT BUILDING REGULATIONS

It is the practice of this office to take account of the Draft Building Regulations as issued by the Minister for the Environment in the design of buildings but this is not to be interpreted as a guarantee that the provisions of the Draft Building Regulations have been implemented in full or in any particular respect in this proposal.

Matt Barry

MATTHEW J. BARRY

RFC 30 MAY 91

McCabe, Delaney & Associates
Consulting Engineers

R.P. McCabe, MA, MAI, PhD, BSc(Lond), CEng, MIEI.
J.D. Kirwan Browne, MA, BAI, CEng, MIEI.

42 Casimir Road,
Harold's Cross,
Dublin 6W
Telephone: 974589/974035
Fax No: 974589

Your Ref: | Our Ref: DB/MG/93 | Date: 31st. May, 1991

CERTIFICATE: I.D.A. BUSINESS CENTRE, TALLAGHT
STAGE II

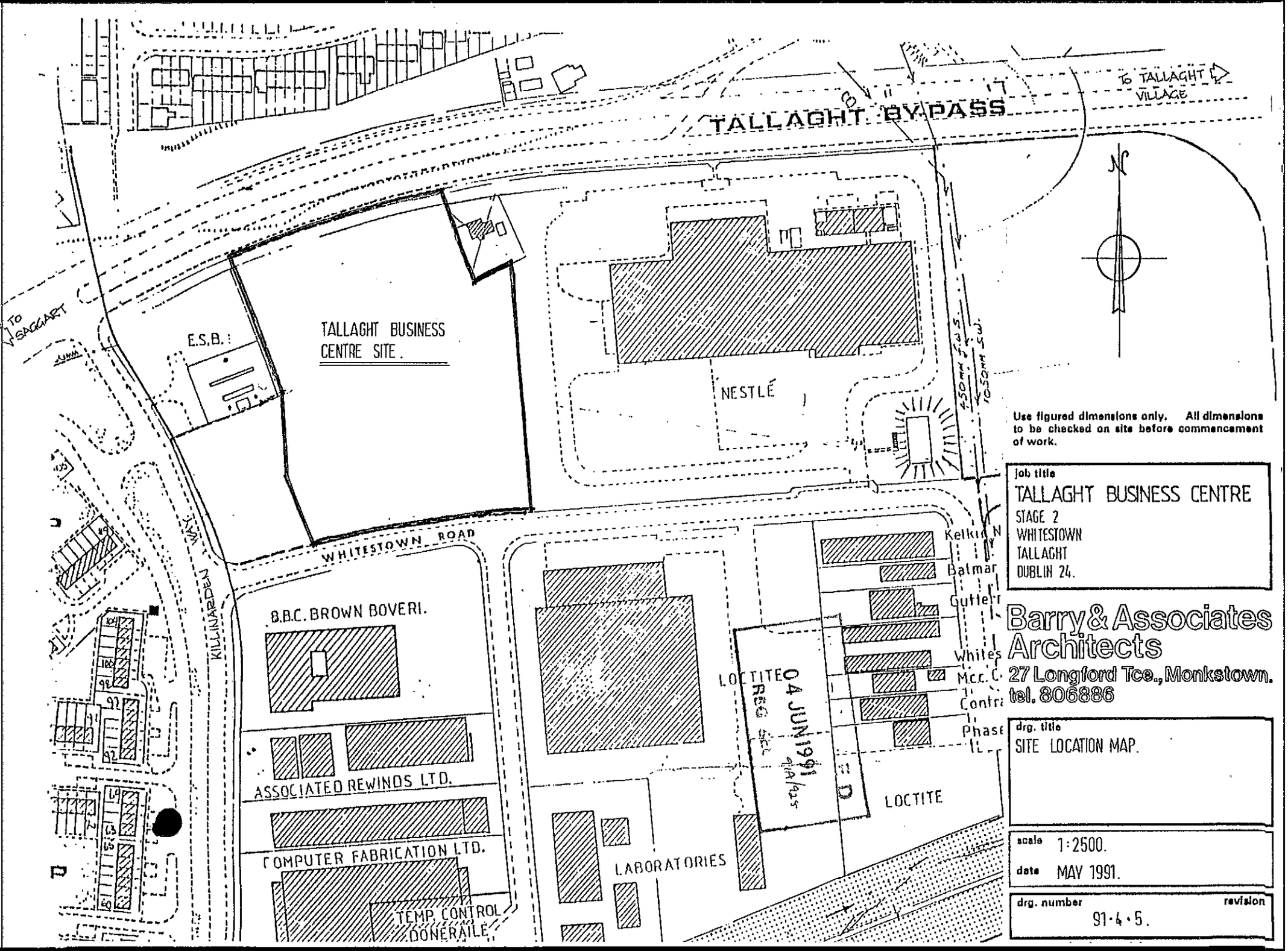
We hereby certify that we have been retained by Barry & Associates, Architects, as Consultant Structural Engineers for the Proposed Tallaght Business Centre, Stage 2, at Whitestown Industrial Estate, Tallaght, Dublin 24.

We certify that the structure of the proposed buildings will be designed by us to the relevant standards and Codes of Practice.

We certufy that the on site construction will be supervised by this office.

SIGNED :

J.D.Kirwan Browne, MA, BAI, CEng, MIEI.,
For McCabe,Delaney & Associates.



Use figured dimensions only. All dimensions to be checked on site before commencement of work.

job title
TALLAGHT BUSINESS CENTRE
STAGE 2
WHITESTOWN
TALLAGHT
DUBLIN 24.

Barry & Associates
Architects
27 Longford Tce., Monkstown.
tel. 806886

drg. title
SITE LOCATION MAP.

scale 1:2500.

date MAY 1991.

drg. number 91-4-5. revision

STRUCTURAL SPECIFICATION

FOR

PROPOSED TALLAGHT BUSINESS CENTRE

PHASE II

AT

WHITESTOWN INDUSTRIAL ESTATE,
TALLAGHT, CO. DUBLIN

FOR

THE INDUSTRIAL DEVELOPMENT AUTHORITY.

27 MAY, 1991.

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Proposed Tallaght Business Centre,
PHASE II
AT

Whitestown Industrial Estate, Tallaght,

Co. Dublin.

DEFINITIONS AND INTERPRETATIONS.

In this Specification, the following words and expressions shall have the meanings hereby assigned.

1. "Employer" means : The Industrial Development Authority,
Wilton Park House,
Wilton Place,
Dublin 2.

2. "Architect(s)" means : Barry & Associates,
27, Longford Terrace,
Monkstown,
Co. Dublin.

3. "Engineer(s)" means : McCabe, Delaney & Associates,
42, Casimir Road,
Dublin 6.

FOUNDATIONS

A. GENERAL : All work to foundations shall comply with the requirements of the following British Standards :

CP 2004 : 1972 : Code of Practice for Foundations.

BS 6031 : 1981 : Code of Practice for Earthworks.

BS 5390 : 1981 : Code of Practice for Site Investigation (formerly CP 2001).

CP 101 : 1972 : Foundations and sub-structures for non industrial buildings of not more than four storeys

CP 102 : 1973 : Code of Practice for Protection of Buildings against water from the ground.

B. SITE INVESTIGATION : A site investigation consisting of trial pits was carried out by Eolas in March, 1989. The results and conclusions are set out in a detailed report which is available for inspection at the offices of the Consulting Structural Engineer.

The foundation levels are to be as shown on Drawings or as otherwise directed by the Engineer on site.

The glacial till is subject to rapid softening and loss of strength on contact with water.

Accordingly, all formation shall be sealed immediately by blinding with lean mix concrete or placing trench fill concrete.

C. APPROVAL OF FOUNDATIONS :

All excavations for foundations shall be made to the depths, levels, widths and dimensions shown on the Drawings. The levels on the Drawings shall be adjusted on site by the Engineer to suit local variations in levels of ground and bearing strata. In all cases, bearing strata exposed and levels shall be approved before concreting is carried out.

Any soft or unsuitable material below formation level disclosed during excavation shall be removed and replaced with lean-mix concrete (20N20) or other approved filling compacted as directed.

If required by the Engineer, the bottoms of excavations, after being trimmed and levelled, shall be well rammed and consolidated to provide a good solid formation.

Should any unapproved excavation be taken below the level required the Contractor shall make good to level specified with concrete at his own expense and to the Engineers approval.

D. KEEPING EXCAVATIONS DRY :

In view of the nature of the sub-soil, it is essential that the bottom of all excavations be kept dry and that excavated trenches be blinded as soon as possible. To this end, the lower 100mm. of materials in bottom of excavations shall not be removed until immediately before placing concrete.

The Contractor shall be responsible and shall provide all necessary equipment and labour for keeping all excavations dry and free from water during excavation and subsequent operations.

The Contractor shall remove and replace with concrete, to the satisfaction of the Engineer, any material softened and weakened as a result of failure to keep excavations dry.

E. FOUNDATION TYPE :

Foundations shall be concrete trench fill or strip foundations. Foundations shall be to dimensions and levels shown on the Drawings. Trench

fill shall be placed for a width equal to that of the wall plus 200mm. Accuracy in setting out is essential to achieve the required tolerances. Levels of top of trench fill shall be achieved by using long steel vertical pins extending from the trench bottom.
Opes shall be left for services.
Starter bars shall be accurately positioned.

Daywork joints shall be as shown on the Drawings.

Concrete shall be 30N20 in accordance with the requirements of the Concrete Specification.

F. BACKFILLING :

No backfilling shall be carried out until foundations and rising walls have been approved.

As site investigation indicated that excavated material is unsuitable for use as infill material to support floors, backfill to trenches under floors shall be imported hardcore placed and compacted in 250mm. layers.

The Contractor shall fill both sides of rising wall at the same time to avoid excessive pressure on one side or another. Rising walls on which bond is broken by excessive filling or careless compaction, shall be taken down to foundation level and rebuilt by the Contractor at his own expense.

G. SETTLEMENT : The Contractor shall be responsible for making good any settlement of filling that may occur and for any consequent damage.

CONCRETE MASONRY WALLS

A. MATERIALS :

1. Blocks :

Solid and Hollow blocks shall be either "Forticrete" type units or fine textured concrete blocks 400 x 200 modular range (as shown on the Architects Drawings).

Blockwork shall comply with BS 6073 : Part i : 1981 or IS 20 : 1974 as appropriate. Blockwork colour, texture and face finish shall be as shown on the Architects Drawings.

Blockwork units shall comply with the special category manufacturing control requirements of BS 6073 and BS 5628. Blockwork shall have a minimum compressive strength of $5.7 N/mm^2$

2. Mortar :

Sand shall comply with BS 1200 : 1985.

Hydrated lime shall comply with IS. 8 : 1973.

Normal Portland Cement shall comply with IS. ; : 1963.

Ready mixed sand-lime mortar shall comply with BS. 4721 : 1971.

Water shall be clean and free from harmful matter, and of Potable quality.

Admixtures and pigments shall not be used without the permission of the Engineer and Architect.

3. Cavity Ties : Metal ties for cavity wall construction shall comply with BS 1243 : 1978. They shall be Grade 304 S15 stainless steel vertical twist type manufactured from strip and shall be 250mm. long for 110 cavity. The width of the tie shall be 20mm. and the thickness not less than 3mm. and not more than 6mm.

The tie shall incorporate stainless steel restraining clip for insulation. Non metal wall ties and proprietary ties for insulation shall not be used.

4. Reinforcement, Anchors and Ties : Masonry bed joint reinforcement shall be fabricated from stainless steel wire or approved expanded metal of a thickness and weight as specified by the Engineer.

Steel bar reinforcement shall be of the type specified and conform to the requirements shown on the Drawings and bending schedules prepared by the Engineer.

5. Concrete for infilled cores : Concrete for embedded reinforcing bars in concrete masonry or for filling cores therein for structural purposes shall consist of ordinary Portland cement and well graded aggregate together with sufficient water to produce the consistency

required for satisfactory placement without segregation of materials. The type of concrete fill shall be as shown on the Drawings.

Additives shall not be used unless specifically approved by the Engineer.

Concrete masonry lintels and bond beams shall be fabricated from units of similar crushing strength and size as those used elsewhere in the wall. They shall be reinforced and the cavities filled with concrete as indicated on the Engineer's Drawings. Lintel units shall be securely propped and cambered to the approval of the Engineer.

6. Damp-Proof Course :

Bitumen damp proof courses with fibre base and lead shall comply with BS 743 Type F.

Polythene damp proof courses shall comply with IS. 57 : 1972.

B. SAMPLES & TESTING :

7. Samples :

Samples of all blocks shall be submitted to Architects and Engineers for approval before ordering same and all subsequent deliveries shall be of the same or higher standard.

8. Testing : Blocks shall be type 'A' with a minimum compressive strength of 5N/mm tested to requirements of IS 20 : 1974 or BS 6073 : Part 1. For the purpose of testing conformity of the blocks with this Specification, 10 blocks shall be selected at random from every batch of 1,000 blocks and tested by Eolas (IIRS) in accordance with IS 20. Compressive strength of blocks shall be edge strength.

A Manufacturer's Certificate of the quality of the blocks shall be produced for all batches of blocks delivered to site.

Mortar shall be tested to BS 4551 : 1970.

Water shall be tested to BS 3148 : 1985.

9. Samples and Sample Panel : Separate samples of each type of block, taken at random from the first load, shall be approved by the Architect before use and all subsequent deliveries shall be up to the standard of the approved sample.

Before any fair face work commences on site the Contractor shall erect a sample panel as shown in BOQ sketch 8m. long using the mortar and type of pointing specified to the approval of the Architect. All subsequent work shall be up to the standard of the approved panel.

C. MORTAR PREPARATION :

10. Delivery of Materials :

All concrete blocks shall be steam cured by the manufacturers and allowed to mature for at least 28 days before being used and shall be delivered to site dry.

Cement shall be delivered in unbroken bags as despatched by the manufacturer or in approved bulk cement delivery vehicles.

11. Storage of Materials :

Concrete blocks shall be carefully unloaded, handled and stored on a firm dry level surface to avoid ground contamination, and under no circumstances will tipping of blocks from trucks be permitted. Stacks shall be covered to prevent saturation, and facing blocks shall be protected to prevent their becoming stained or marked.

A free circulation of air shall be provided around stacked blocks

Cement shall be stored under weatherproof conditions on raised floor or in suitable silos. Air set cement shall not be used and shall be removed from site to tip without delay.

Hydrated lime shall be stored under weatherproof conditions on a raised floor or in suitable silos.

Sand shall be stored on a hard-self-drained area.

Dry pre-mix mortar shall be stored under weatherproof conditions on a raised floor. Ready mixed sand-lime shall be stored on a clean impermeable surface under weatherproof conditions. Prolonged storage before use shall be avoided.

Admixtures and pigments shall be stored in accordance with manufacturer's written instructions, and may not be employed without written approval from the Architect.

12. Mixing of Materials :

The properties of constituents of mortar mixes shall be in accordance with following schedule :

Mortar Type	Name	Cement Type	Proportion of Constituents.		
			Cement	Lime	Sand
CSL3	Cement-NPC Lime - Sand -		1	1	6

Constituents shall be measured by volume using clean gauge boxes of appropriate size. The proportions of sand shall be based on use of dry sand and shall be adjusted for bulking due to moisture or in accordance with manufacturers instructions where admixtures are employed.

Mortar shall be mixed sufficiently to incorporate all the constituents of the mix and ensure consistency of colour for exposed work.

Machine mixers shall be cleaned before starting to mix and before changing mix or mortar type. Hand mixing shall be carried out on hard clean platform. The amount of water employed shall be the minimum adequate to hydrate cement and provide mortar of a workable consistency.

Mortar shall be used within two hours of adding water to cement.

D. WORKMANSHIP :

13. General : Workmanship in blockwork generally shall comply in all respects with the appropriate recommendations in the following British Standards.

CP121 : Part 1 : 1973 Code of Practice for Walling Part 1 Brick and Block masonry, particular note being taken of 4.14 -Points 1,2,4,8,9 & 14.

14. Erection General :

All blockwork shall be set out and built to the dimensions indicated. All perpends, quoins and jambs shall be kept strictly true and square, other angles shall be plumbed and the bed joints levelled as the work proceeds.

All walls shall be carried up regularly, not leaving any part more than 800mm. lower than another. Any wall left at different levels shall be raked back.

Masonry shall be built to the thickness and bond or joint pattern indicated on the Drawings. In areas where no bond or joint pattern is indicated, stretcher units shall be laid in running (half) bond pattern.

Where wall lengths do not conform to the blockwork module, or where units require to be cut, including cutting required to accommodate the work of others, this shall be done using a mechanical masonry saw. The units shall be cut wet, hosed to remove any slurry, and then allowed to dry before being built into the wall. The bolstering of masonry will not be permitted.

Units prior to, and at the time of placing in the wall shall be dry.

Masonry construction shall not be permitted with or upon frozen materials, or when the ambient temperature is 4^{0}C and falling. Masonry shall be protected for 48 hours after being laid when freezing is likely to occur. Nevertheless should any masonry walls be damaged by frost it shall, at the discretion of the Engineer, be pulled down and made good at the Contractor's expense.

Each unit shall be adjusted to its final position in the wall while the mortar is still plastic. Any unit which is disturbed after mortar has stiffened shall be removed and relaid with fresh mortar.

The construction of masonry walls shall be discontinued during heavy rain unless the work is adequately protected.

Anchors, wall plugs, accessories, wall ties, flashings and other items required to be built in with masonry shall be built in as the work progresses.

15. Mortar :

Mixing mortars. All ingredients shall be mechanically mixed together for a minimum of 3 minutes, in a batch mixer. The consistency of the misture shall be only as wet (plastic) as can be used satisfactorily.

16. Mortar Joints :

Hollow and Solid Units shall be laid with full mortar coverage on horizontal and vertical face shells except that webs also shall be bedded in all courses of piers, columns and the starting courses on footings and solid foundation walls, and where adjacent to cores or cavities that are to be reinforced and/or filled with concrete.

All no void solid units shall be laid with full vertical and bed joints.

Horizontal and vertical face joints shall be 10mm. thick unless otherwise indicated and vertical joints shall be shoved tight.

Mortar protrusions extending into cores or cavities to be reinforced and filled, shall be removed.

Raked joints for sealants shall be provided on the exterior face at control joints, around window and door frames and at such other locations where sealed joints are indicated. Such joints shall be raked and tooled smooth to a uniform depth of 20mm.

Overhang work will not be permitted on external walls and all tooling, pointing or raking shall be performed at eye vision levels.

17. Bonding & Wall Intersections :

Bond pattern shall be running (half) bond unless otherwise indicated. Masonry laid in stack bond shall be reinforced horizontally as shown on the drawings but with a minimum of approved joint reinforcement at 400mm. centres vertically in external and load-bearing walls and 600mm. centres vertically in partitions.

Intersecting load bearing walls shall be tied together in a masonry bond at corners where shown on the drawings. At other intersections, load bearing walls, fire walls,and partitions over 100 thick shall be tied together with rigid steel anchors embedded in the horizontal mortar joints at vertical spacings not exceeding 800mm. with the end hooks projecting into and embedded in cores or joints filled with mortar unless otherwise indicated.

Intersecting non-load bearing walls shall be tied together as for load bearing walls, except that partitions 150mm. or less in thickness shall be anchored to each other and to other walls with approved types of wire mesh, joint reimforcement or two looped-wire ties, spaced at vertical intervals not exceeding 450mm.

18. Cavity Walls :

Cavity Walls shall be constructed in accordance with details and shall consist of two masonry walls separated by a 110mm. minimum space and bonded together with cavity wall ties as specified.

Cavity wall ties shall be staggered in alternate course and spaced at 600 horizontally & 400 vertically. Additional ties shall be provided at 225mm. centres (maximum) vertically within 225mm. of openings and on each side of control and expansion joints.

The air space between the walls shall be kept clear and clean of mortar droppings and any projecting mortar struck off flush.

Weep holes 10mm. wide and 75mm. high spaced at 600-800mm. apart and extending through the mortar joints of the outer wall shall be provided where the cavity is closed over, as with flashing of masonry or lintels, or at locations indicated on the drawings.

19. Reinforcement :

Reinforcement consisting of joint reinforcement and/or reinforcing bars shall be incorporated in the masonry as detailed on the drawings and as specified herein.

Prefabricated joint reinforcement shall be embedded in the horizontal mortar joints not closer than 25mm. from the exposed masonry face, and shall be continuous except through control joints, or where otherwise indicated.

Where required only at openings, joint reinforcement shall extend at least 600mm. beyond the end of cills or lintels.

Horizontal bar reinforcement shall be incorporated in continuous masonry courses consisting of special bond beam units. These courses shall be solidly filled with concrete as specified.

Vertical bar reinforcement in concrete masonry columns and walls shall be properly positioned and secured against displacement. The cavities or cores containing such reinforcement shall be completely and solidly filled with concrete as specified. Splices shall be made only at such points and in such a manner that the structural strength is not impaired. Minimum clear distance between vertical bars and masonry units shall be 12mm.

Where the pour height exceeds 1.0m. clean-out openings shall be provided at the base of the vertical cores to be filled and mortar droppings on the base shall be removed through these openings prior to fixing the reinforcement.

20. Concrete Filling : Materials shall be accurately proportioned,mechanically mixed for not less than three minutes in a batch mixer, and the mixture shall be consolidated in place by vibration, or other methods which ensures complete filling of the cores and cavities.

Concrete shall be 30N10 to relevant Clause of R.C. section of Specification

21. Protection of the works : All masonry load bearing walls shall be adequately braced and shored during construction, to the satisfaction of the Engineer, to ensure that no movement takes place before they are taking sufficient load to compensate for any temporary forces

Completed work must be protected against staining from ground splashing, adjacent concreting work, abrasions from scaffolding, staining from painting and other construction activities. Where in-situ concrete is cast adjacent to or above completed masonry work the latter shall be protected by polythene sheetin

or other approved covering. When work stops for rain or at the end of the day, the top exposed bed of the wall must be protected against adverse weather conditions. Scaffold boards shall be turned away during heavy rain and at night to avoid splashing.

Any blockwork damaged by weather or as a result of the Contractors activities shall be taken down and rebuilt at the Contractors expense.

22. Pointing & Cleaning :

At the completion of the work all holes in joints of masonry surfaces to be exposed or painted shall be filled with mortar and suitably tooled. Such masonry walls shall be dry brushed at the end of each day's work and also after final pointing; and shall be left clean and free from mortar spots, splashes and droppings. Any cracks in masonry shall be repaired as directed. Joints shall be "bucket handle" or raked out finish as indicated on Architects Drawings.

23. Blockwork Tolerances :

Notwithstanding the contents of BS 5608: 1978: Code of Practice for Accuracy in Building, the following tolerances shall be applicable to concrete blockwork :

Level : The permissible deviation for any nominally horizontal surface when measured from the nearest reference level shall be ± 5mm.
(A reference line is a gridline).

Position on Plan : The permissible deviation for the position of any nominal vertical surface at the lower edge when measured horizontally from the nearest reference line shall be ± 5mm.

Plumbness : The permissible deviation from plumb of the upper and lower edges of any nominally vertical surface shall be ± 2mm.

Straightness : The permissible deviation from straightness, measured horizontally shall be ± 3mm.

Level of Bed Joints : The permissible deviation for bed joints from the nearest horizontal reference line shall be ± 5mm.

Joint Thickness : The permissible deviation in thickness of vertical joints shall be ± 2mm. per joint but not exceeding ±3 mm. in any 3m. length.

Opes : The foregoing tolerances shall not be applicable to opes for doors and windows which shall be constructed around rigid formers of uniform size so as to ensure neat fit of frames into opes. A 6mm. rebate between outer & inner leaf will be formed around opes. A high standard of workmanship and finish shall be required in this area and the Architect's decision on standard and quality of finish shall be final and binding.

24. Sealing : On the outer face of external walls, joints around door and window frames, control joints, abutting joints at external columns and other joints where sealing is indicated or required shall be raked out to a depth of 20mm. and filled with a two part polysulphide sealant after brush coating with a compatible primer (Calktite G.P. Polysulphide to BS 4254) all in accordance with the manufacturer's recommendations, of colour to match the mortar joints. The sealant joint shall be uniformly smooth, free from irregularities and flush with the surface except it shall be recessed at least 6mm. at control joints. Surfaces adjoining sealed joints shall be cleaned if stained during the application of the sealant.

25. Wall Flashings : Masonry wall flashings shall be built into or secured to the masonry in accordance with the locations and details shown on the drawings. Flashings shall be capable of being formed to the design details and of a type approved by the Architect. Through wall flashings shall be set with a thin bed of mortar above and below the flashing in a manner that maintains regular coursing and joint thickness. Joints in concealed flashing shall be made by interlocking or by lapping edges at least 100mm. and sealing laps with asphalt mastic or other approved sealant. Spaces around dowels and all holes or openings in flashings shall be sealed with mastic before covering the flashing with mortar.

Flashings over lintels and under cills shall extend 100mm. or more beyond the ends of the lintel or cill. Flashings within the separate walls of cavity work shall not project within the cavity to form ledges on which mortar may lodge. Through wall flashings shall terminate within 6 mm. of the exterior wall face unless otherwise shown. Flashings that form cap flashings shall turn down on the face of the wall 100mm. minimum and shall overlap the base flashings not less than 75mm.

26. Final Cleaning Up :

At the conclusion of the masonry work remove all scaffolding and equipment used in the work, clean up all debris, refuse and surplus material and remove from site.

REINFORCED CONCRETE

A. GENERAL :

1. Concrete :

The quality of materials and the standard of workmanship for reinforced concrete shall comply with the relevant Clauses of the B.S. Code of Practice 8110:1985 in regard to all requirements not otherwise described in this Specification.

2. Supervision :

The Contractor shall employ a competent person, fully experienced in reinforced concrete construction, whose primary duty it will be to supervise all stages in the preparation and placing of the concrete. All tests on materials, the making and testing of cubes, and the maintenance and calibration of all mixing and measuring plant shall be carried out under his direct supervision.

B. MATERIALS :

3. General :

Materials used in the works shall be new, of the qualities and kinds specified herein and equal to approved samples. Deliveries shall be made sufficiently in advance to enable further samples to be taken and tested if required. No materials shall be used until approved by Engineers and materials not approved shall be immediately removed from the works at the Contractors cost.

Materials shall be transported, handled and stored on site or elsewhere in such a manner as to prevent damage, deterioration or contamination.

4. Reinforcement :

Steel reinforcement shall comply with BS 4449:1969 in case of hot rolled mild steel bars and BS 4449 : 1969 in case of hot rolled deformed high yield steel bars. Mesh fabric shall comply with BS 4482. All reinforcement shall be of Irish manufacture. Details of all spacers, couplers and fixings shall be submitted to the Engineer for approval before use on site.

5. Cement :

Portland cement used in concrete, concrete products and other cement based products shall be certified as complying with I.S. 1 : 1963 as amended, in accordance with the Irish Standard Mark Licensing Scheme of the I.I.R.S. Manufacturers' or suppliers' certificates of compliance with the standard shall be provided when requested by the Architect or Engineer.

In the case of bagged cement, both the mark, and the information prescribed under the licensing scheme should be inscribed on the bags. In the case of bulk cement, shown either on the delivery documentation or on a separate printed sheet accompanying each delivery. The information so prescribed is as follows:

(a) The name of the manufacturer.

(b) The country of origin.

(c) The designation "Normal" or "Rapid Hardening" as appropriate.

(d) A mark or code to identify the factory in which it was made.

(e) A code indicating the date of despatch.

(f) The Irish Standard Mark.

(g) The legend "I.S. 1 : 1963 " directly beneath the Irish Standard Mark.

(h) The following legend, clearly visible. "Warning: Improper storage and handling will cause deterioration in cement quality".

(i) In the case of bagged cement only, the statement "20 bags contain one tonne".

All cement shall be fresh when delivered.

6. Water : The water to be used in the mix shall be clean and free from harmful matter, and of potable quality. The Contractor shall obtain approval of source of supply from Engineers if not obtained from mains. Test if required shall be to BS 3148.

7. Admixtures : Admixtures shall not be used without written approval of the Engineers. Admixtures containing calcium chloride shall not be used - all to current edition of BS 1014, 3892, 5075.

8. Aggregates :

Details of proposed aggregates shall be provided by Contractor for approval by Engineer.

Aggregates for concrete shall be from sound, hard naturally occurring material complying with I.S. 5" Aggregates for Concrete". For concrete grade 40 and over the "10% Fines Value" (BS 812) of the course aggregate shall not be less than 100 kN. The flakiness index (BS812) shall not exceed 35 for 10, 15 and 20mm. aggregates and shall not exceed 40 for 40mm. aggregates. Aggregates with a high drying shrinkage such as some dolerities and whinstones shall not be permitted. The chloride content of aggregates shall be such that the total chloride content of the concrete mix including that from admixtures and any other source shall not be greater than 0.1% of chloride ion by mass of concrete.

The Contractor shall, if required, supply and deliver, at his expense, to a Nominated Testing Authority, samples of the aggregates which the Contractor proposes to use, consisting of not less than 23 kgs. weight of fine aggregate, and not less than 46 kgs. weight of coarse aggregate. It is the Contractor's responsibility to ensure that the subsequent deliveries of approved aggregate conform to the grading analysis of the approved samples.

C. CONCRETE :

9. Mix Design : Designed mixes only shall be used in accordance with following schedule :

Mix Designation	30N20	25N20	25N10	20N20
Characteristic cube strength at 28 days (N/sq.mm).	30	25	20	20
Cement Type(s).	NPC	NPC	NPC	NPC
Nominal Max Aggregate Size (mm).	20	20	10	20
Minimum Cement Content (kg/m^3).	375	350	290	290
Rate of Sampling (m^3 per sample).	8	10	15	-
Workability - Slump.	50	50	75	-
Maximum Cement Content.	550	550	550	550

The relationship between 28 day and 7 day cube strengths shall be as follows :-

Concrete Grade	Works Cube Strength	(N/SQ.MM)
30N20	30	20
25N20	5	16.5
20N20	20	13.5

Concrete mixes shall be employed as follows :

Location	Mix
Foundations.	30N20
Ground Floor.	30N20
R.C. Columns.	30N20
R.C. Beams.	30N20
R.C. Roof (Precast Slabs).	35N20
Oversite Concrete.	20N20
Core infill to hollow blockwork.	30N10

Blinding Concrete :

Blinding concrete shall be a nominal 1 : 3 : 6 mix with a cement content of 200 kg/ci.m. of finished concrete and a 7 day works cube strength of 7N/sq.mm.

10. Storage :

Different aggregates shall be separately stored on hard self drained areas or in suitable hoppers or containers.

Cement shall be stored under waterproof conditions on a raised floor or suitable silos. Air-set cement shall not be used.

11. Batching :

All batching plant shall be maintained in a clean, serviceable and accurate condition. Quantities of fine and coarse aggregates and cement shall be measured by weight.

12. Mixing :

Concrete shall be mixed to a uniform consistency and colour in a mixer of approved type. The minimum time of mixing after the addition of water shall be two minutes unless otherwise approved by Engineers. Each concrete batch shall be discharged completely before recharging the mixer.

Frozen aggregates or aggregates containing frozen snow or ice shall not be used.

Trial mixes with the materials proposed for use in the works shall be made by Contractor unless the mix is approved by Engineer from details submitted. Any specified concrete may be supplied ready mixed provided Engineer's approval is obtained.

The discharge of ready mixed concrete transported in a truck mixer shall be completed within two hours from the first introduction of the mixing water to the cement and aggregates unless otherwise approved by Engineers.

13. Quality Control : Concrete samples shall be obtained in accordance with BS 1881 : Part 1. One sample of fresh concrete for testing at point of placement shall be taken from every 10 batches or 10 cu.m. whichever is the lesser by volume, or as directed by the Engineers.

The following shall be carried out on each sample :

(a) Workability - Slump test to BS 1881.

b) 12 No. 152mm. x 152mm. test cubes shall be made up, cured and stored in accordance with BS 1881.

Cube strength tests shall be carried out by an approved testing authority, 3, 7 and 28 days after placing or as per the instructions of the Engineers.

The Contractor shall include for delivery of the sample to the testing authority and arrange that copies of the test results are sent directly to the Engineers within an approved period.

14. Acceptance Criteria : Compliance with the specified characteristic strength shall be assumed if :

(a) The average strength determined from any group of four consecutive test cubes exceeds the specified characteristic strength by no less than 0.5 times the current margin, and :

(b) each individual test result is greater than 85% of the specified characteristic strength.

D. FORMWORK:

15. General : The design, erection and removal of all temporary formwork shall be the responsibility of the Contractor.

16. Materials : Formwork for concrete shall be rigidly constructed of approved material and shall be true to the shape and dimensions described on the Engineer's drawings. Timber shall be well seasoned, free from loose knots and except where otherwise approved, wrought on all faces. Joints shall be sufficiently tight to prevent the leakage of cement grout and to avoid the formation of fins or other blemishes.

17. Release Agents : A release agent, marketed as such, compatible with the formwork, the concrete being used and with the finish specified shall be used after approval is obtained in writing from the Engineer's.

18. Construction Generally : Construction or day joints shall be formed in the following positions, unless otherwise shown on the Drawings.

Beams : Middle of the span, vertical and at right angles to main reinforcement.

Columns and Walls : 50mm. below the junction of the vertical member and the soffit of the beam, or slab and at positions defined by kickers, where used. Cast kickers where used shall be monolithic with the lower construction. Kickers shall not be less than 100mm. in height.

Suspended Floors : Middle of the span, vertical and at right angles to the reinforcement.

Holes and chases shall be in accordance with the Drawings or as instructed by the Engineer prior to placing the concrete.

Cast concrete shall not be cut without written instructions from the Engineers.

19. Construction Joints :

Concreting shall be carried out continuously up to construction joints, the position and arrangement of which shall be indicated on the drawings or approved by the Engineers. If the Contractor requires this approval he shall submit a drawing with full details of the proposed joint including a description, where appropriate, of the shuttering and reinforcement details involved in sufficient time to enable the Engineer to consider the implications of the proposal.

Joints shall be perpendicular to the main reinforcement. The upper surface of lifts in walls and columns shall be horizontal. Reinforcement shall be continuous across joints and the concrete surface shall be keyed if the Engineer so directs. Lifts of concrete shall not exceed 2m. without approval. When work has to be resumed on a surface which has set, the surface shall be

treated as follows :

(a) Concrete in place for not more than 4 hours shall have the laitance film, and loose and porous material below it carefully removed by the use of a fine water spray, or by an air-water jet assisted by a light brushing, or by an alternative approved method without loosening or damaging the body of the concrete. New concrete shall then be placed immediately.

(b) Concrete in place for more than 4 hours but not longer than 3 days shall have the laitance film, and loose and porous material removed as in (a) and the surface beneath this cleaned with a wire brush and thorough washing with clean water. Immediately before the fresh concrete is deposited, the surface shall be coated with a 5mm. layer of cement mortar of the same richness and consistency as that embodied in the concrete mix.

(c) Concrete in place for longer than 3 days shall be chipped or sand-blasted so as to expose an entire fresh surface of sound homogeneous concrete without cracks or loosened aggregate. Immediately before the fresh concrete is deposited a slurry of neat cement with the consistency of thick cream shall be well worked

into the prepared surface and followed by a 5mm. layer of cement mortar of the same richness and consistency as that embodied in the concrete mix.

In the case of permanently visible joints the mortar layer shall be kept back 50mm. from the exposed face.

The use of admixtures or coatings to modify the setting time of the concrete shall not be permitted except with the Engineer's special approval.

20. Fixing Blocks, Chases & Holes : The Contractor shall be responsible for the co-ordination with sub-contractors for incorporating any electrical conduit, pipes, fixing blocks, chases, holes etc., in concrete members as required. The Contractor shall submit full details of these items to the Engineers for approval before the work is put in hand. All fixing blocks, chases, holes etc., to be left in the concrete shall be of the sizes required and shall be accurately set out and cast with the concrete. No holes or chases shall be cut in the concrete without the approval of the Engineer.

21. Preparation of Formwork for Concreting : Immediately before concreting, the forms and all other surfaces which will be in contact with the fresh concrete shall be cleaned of all loose material and debris including shavings, wood chips, sawdust, pieces of wire, nails, fragments of hardened concrete and mortar. Adequate clean-out holes shall be provided for this purpose and subsequently securely closed so as to restore the required

formwork quality. The use of compressed air for cleaning will be subject to approval of precautions to avoid the deposition of suspended oil on construction joint surfaces, reinforcement or other items which are to be bonded to concrete.

22. Striking :

All formwork other than permanent forms shall be struck without disturbing, damaging or overloading the concrete structure.

The minimum period for retaining formwork in position before striking shall not be less than the following :

Vertical facing to columns, walls and beams :	12 hours.
Soffit facing to beams :	5 days.
Support to beams :	18 days.

Periods during which the temperature falls below 3°C shall not be taken into account.

Provided always that the minimum times for striking are as above, the actual time shall remain the responsibility of the Contractor.

The stability after striking of the partially completed structure shall remain the responsibility of the Contractor.

Re-propping shall not be permitted without Engineer's approval.

E. REINFORCEMENT :

23. General :

Reinforcement shall be free from pitting, loose rust, mill scale, paint, oil, grease, adhering earth, ice or any other material that may impair the bond between the concrete and the reinforcement or that may cause corrosion of the reinforcement or disintegration of the concrete.

Reinforcement shall be handled so as not to impair its' qualities or cause permanent deformation. Reinforcement shall be stored clear of the ground on a clear site and with adequate protection to prevent corrosion.

Neither the size nor length of a bar or wire shall be less than the size or length described in the bar schedule or elsewhere.

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

Temporarily projecting reinforcement shall be prevented from causing rust staining.

24. Cutting & Bending :

Reinforcement shall be cut and bent in accordance with BS 4466 and the schedules provided.

High yield reinforcement shall not be cold bent when the air shade temperature is below $5^{o}C$ unless the Engineer's approval is obtained.

Cold worked steel reinforcement shall not be heated.

Bars shall not be rebent or have bends removed without approval.

25. Fixing :

All reinforcement shall be placed securely in the positions indicated on the Drawings. Bars shall not be inserted into concrete already placed, without approval.

Laps shall not be formed in reinforcement other than those shown on the Drawings without approval of the Engineers.

Reinforcement shall be fixed adequately with tying wire or proprietary fixings. No metal part of any device for fixing reinforcement shall remain within the concrete provided for cover to the reinforcement. Use annealed iron tying wire of not less than 1.4mm. diameter.

Use ordinary spacers as necessary to support reinforcement in position. Use special spacers to support reinforcement where such are shown on the Drawings. Ordinary spacers shall be proprietary plastic cover spacers.

Top reinforcement in slabs shall be supported at not more than 1m. centres.

Cover spacers shall be fixed to maintain the specific concrete cover. The permissible deviation for cover to reinforcement shall be ± 5mm. from that specified. The permissible deviation for the location of reinforcement shall be 25mm. provided the permissible deviation for cover is not exceeded.

All reinforcement projecting beyond shuttering shall be secured against wind sway to the satisfaction of the Engineer.

All reinforcement shall be inspected and approved by the Engineer before concrete is placed.

F. PLACING CONCRETE :

26. Transporting and Concreting :

All equipment used for transporting and discharging concrete shall be free from contamination and accumulation of hardened concrete.

Concrete shall be transported and discharged in such a manner as to avoid segregation, contamination or loss of ingredients.

27. Placing :

No concrete shall be placed until the site of placing, including forms, reinforcement and embedded items, has been inspected and approved by the Engineer, and adequate notice and safe access arrangements shall be given for this purpose.

All concrete made with ordinary Portland cement shall be placed in its' final position within 30 minutes of being discharged from the mixer. This requirement may be modified with the agreement of the Engineer in the case of ready-mix concrete complying with BS 1926. In the case of high air temperatures (of the order 21°C) or if the temperature of the cement entering the mixer exceeds 65°C. or when other cements or admixtures are used, the time limit may be reduced by the Engineer.

Concrete shall not be placed in or in contact with standing or running water unless so specified or approved.

Concrete shall not be placed against concrete which has been in position for more than 30 minutes unless a construction joint is formed as herein before specified. Concrete shall be placed in the positions and sequences indicated in the Drawings or Specification or as nearly as possible in its' final position working from the stop end, if any. It shall be placed so as to avoid segregation of

the concrete and displacement of the reinforcement, formwork or embedded items and brought up in layers, not exceeding ½ metre compacted thickness. Placing shall be continuous between specified or approved construction joints.

Concrete shall not be dropped freely more than 1½ metres. The design and slope of chutes shall be to the approval of the Engineer and they shall be kept clean and in good repair. The use of pneumatic placers and concrete pumps shall be regulated so as to comply with the requirements of this Specification.

The concrete shall be fully compacted to produce a dense homogeneous mass to the full extent of each layer, and successive layers shall be thoroughly worked together without any visible joint. Unless otherwise directed by the Engineers approved power-driven vibrators shall be inserted or otherwise applied to ensure that the concrete is fully compacted throughout. Immersion vibrators shall produce not less than 167 HZ and external vibrators not less than 84 HZ. Immersion vibrators shall penetrate the full depth of the layer, and shall enter the underlying layer, where this is of fresh concrete, so as to ensure proper integration of succesive layers. They shall be inserted at sufficiently close intervals for a sufficient duration to ensure proper compaction and shall be withdrawn slowly to prevent the formation of voids. External vibrators shall be

adequate in number, capacity and fixing to ensure the required results, and the formwork shall be designed for their use. Over-vibration causing segregation, surface laitance or leakage through formwork shall be avoided. Vibrators shall not be used to move concrete along the forms or in such a way as to displace reinforcement or other embedded items or to damage formwork or concrete already set in position. A spare vibrator of the required capacity shall be available, and shall be tested to ensure that it is working, before concreting commences.

Where more than three vibrators are in use, a second spare vibrator shall be available.

When the concrete is compacted by hand, it shall be thoroughly rammed and spaded into place and around reinforcement and embedded parts and against the shuttering by an adequate number of properly-trained men so as to give homogeneous mass and a surface finish free from defects.

28. Compaction :

All concrete shall be thoroughly compacted using a method appropriate to the workability of the concrete and the nature of the work. Concrete shall be compacted as soon as practicable after placing. Adjacent partially hardened concrete shall not be damaged by such compaction.

Mechanical compaction shall be carried out with approved vibration equipment.

29. Temperatures :

The Contractor shall instal a maximum/ minimum thermometer in an approved position on site to record :

(a) The maximum and minimum overnight air temperature each night.

(b) The air shade temperature on site at three approved times each day.

The Contractor shall retain records of temperature on site for inspection.

Concrete shall not be cast while the air shade temperature is below $2^{o}C$ on a rising thermometer or below $5^{o}C$ on a falling thermometer. Concrete shall not be placed against frozen or frost covered surfaces. The Contractor shall record the time, date and position of all concrete cast and retain the records on site for inspection.

30. Curing :

The Contractor shall maintain the temperature of the concrete at not less than $5^{o}C$ for at least 48 hours after casting unless otherwise approved in writing by Engineer. Approval of proposed methods of maintaining concrete temperature shall be obtained from Engineers.

The Contractor shall protect the concrete from loss of moisture,and from the harmful effects of weather,and from traffic for 7 days after placing. Periods during which the air shade temperature remains below $0^{o}C$ shall not be taken into account.

31. Formwork in Relation to the Surface Finish of Exposed Concrete :

Concrete that is to be left exposed shall have a Class A,B or C finish as shown on the Drawing and/or specified in the Bill of Quantities.

CLASS A FINISH :

This finish shall be obtained by the use of properly designed formwork of sawn boards, metal panels, moulds or other suitable materials.

Small surface blemishes and blowholes with some discoloration may be accepted by the Engineer but the surface shall be free from voids, honeycombing or other large blemishes.

CLASS B FINISH :

Formwork for this finish shall be constructed from timber boards of uniform width and thickness with square edges. The boards shall be sealed with fillets, formers,and stop ends or tongued and grooved where separately specified.

Metal panels used for Class B finish shall be true to shape and free from defects likely to detract from the general appearance of the finished concrete surface.

All boards or metal panels shall be arranged in an approved uniform manner.

Minor surface blemishes and blowholes with some discoloration may be accepted

by the Engineer but the surface shall be free from voids, honeycombing or other large blemishes.

CLASS C FINISH :

Class C finish shall be uniformly smooth produced by good quality concrete faced with plywood or other suitable material in large sheets so that joints are as few as practicable.

The sheets shall be arranged in an approved uniform pattern and joints shall be arranged to coincide with architectural features, sills, or heads of windows or changes in direction of surface.

At all joints between sheets, rebated connections shall be provided to maintain accurate alignment in the plane of the sheets. Unfaced wrought boarding or standard steel panels shall not be permitted for this work.

The finished concrete surface shall be smooth with true, clean arrises. Only very minor surface blemishes will be permitted. Staining or discoloration from the release agent or mould oil will not be accepted.

SURFACE TREATMENT AFTER REMOVAL OF FORMWORK :

Immediately after removal of formwork, the face of exposed concrete shall be rubbed down to remove fins or other irregularities. Honeycombed surfaces, water,and air-holes shall be made good

by filling with fresh cement and fine aggregate paste, taking care to match the colour of the concrete.

32. Surface Finish of Concealed Concrete :

Concealed concrete faces shall be left as from the formwork except that faces of concrete intended to be rendered shall be roughened by approved means to form a key.

33. Schedule of Surface Finishes :

Location	Class
Columns :	
Exposed faces	C
Hidden faces.	A
Beams :	
Exposed sides.	C
Hidden sides.	A
Faces to be plastered.	A
Exposed soffit.	C
Lintels :	
Exposed faces.	C
Faces to be plastered	A

G. TOLERANCES FOR FINISHED WORK : The following tolerances shall be applicable to this project notwithstanding the guidance given by PD 6440.

34. Pad Foundations & Strip Footing: The permissible deviation for concrete foundations shall be:

Plan Dimensions + 75 mm.
- 25 mm.

Vertical Dimensions ± 15 mm.

Where formwork is not used, a larger positive deviation for plan dimensions may be approved.

35. Elements above Foundations : The permissible dimensional deviation for structural concrete elements above foundations shall be as follows :

LEVEL: For any nominally horizontal surface where measured from the nearest reference level:

± 10mm. generally and ± 5 mm. for boot lintels and upstand walls.

POSITION ON PLAN :

For the position of any nominally vertical surface at the lower edge when measured horizontally from the nearest reference line : ± 5 mm.

36. Plumbness : The permissible deviation from plumb of the upper and lower edges of any nominally vertical surface shall be 5mm. per 2m. but not more than 20mm.

37. Cross-Section: The permissible deviation of cross sectional dimensions from those shown on the Drawing shall be ± 10mm. or - 5mm.

38. Deviations at Junctions : The permissible deviation for abrupt changes in nominally continuous surface at the junction of two concrete elements shall be ± 5mm.

39. Bow : The permissible deviation due to bow in the surfaces of columns, walls and beams shall be 5mm. in 2m. but not more than 20mm.

40. Bulging and Local Irregularities: The permissible deviation from bulging and local irregularities in the surfaces of elements shall be ± 10mm.

41. Ground Floor Slab : The permissible deviation from the levels shown shall be ± 2mm.

H. TESTING OF CONSTITUENT MATERIALS :

42. Cement and Steel : The Manufacturer's Certificate issued in accordance with the relevant British Standard shall be accepted as evidence that the materials comply with that Standard but nevertheless the Engineer may order such further tests as he deems necessary.

The Contractor shall pay for those tests, the results of which fail to comply with the Specification.

43. Aggregates : The Contractor shall supply certificates of tests at weekly intervals or for each 750 cu.m. of delivered aggregate, whichever is the more frequent. The Engineer may order such further tests as he deems necessary. The Contractor shall pay for all tests the results of which fail to comply with the Specification.

44. Water : Tests on water drawn from the main of a statutory water undertaking shall only be carried out if specifically ordered by the Engineer. When water is to be drawn from any other source the Contractor shall supply without cost, a certificate as to the suitability of such water. Thereafter he shall supply again without cost, further certificates at monthly intervals.

The cost of more frequent tests shall be borne by the Employer.

45. Additives : Where a Contractor requests approval for the use of any additive the Engineer may require comparative trial mixes to be made for each class of concrete.

I. MISCELLANEOUS :

46. Tamping : The term 'tamping' in conjunction with the phrase 'treating surfaces of unset concrete' means the final compaction and surface finish to be applied to unset concrete beds or the like with a steel shod beam tamper either manually or mechanically operated unless otherwise stated. The resulting surface finish shall have a slightly ribbed appearance.

47. Permissible Loads for Formwork : Reinforced concrete beams have been designed to support varying loads as shown on the drawings.

Supports to beam soffits shall not be removed in less than 18 days when the unsupported beam will be adequate to carry 70% of the loads shown on the drawings.

In any event, freshly poured R.C. beams shall not carry construction loads without back propping to solid support.

GROUND FLOOR SLAB

A. GENERAL : The ground floor slab shall have a power-floated finish.

The Contractor shall take great care to ensure that the floor surface is finished to a very high standard and he shall be responsible for providing temporary rain covering protection as necessary to eliminate pitting by rain or other damage to surface.

The Contractor shall take every care to ensure adequate protection of the d.p.m. from damage.

In this regard great care will be required in operating power-floats adjacent to d.p.m./d.p.c. laps.

B. MATERIALS : All materials shall comply with R.C. section of this specification.

C. SUB-BASE: Sub-base shall be sand blinded hardcore or 50mm. oversite 10N20 blinding. The Contractor shall ensure that any depressions or soft spots which are present are filled with hardcore.

D. SIDE FORMS: Side forms shall be strong and rigid so as not to deform or move under action of tamper.

E. COMPACTION: Wet concrete shall be compacted by heavy vibrating tampers working off side forms with addition of poker vibrators adjacent to side forms and stop ends.

F. CURING : Curing consists in substantially reducing the rate of evaporation of moisture from the surface of the slab for the first 48-96 hours.

This shall be achieved by covering slab after completion of power trowelling with sheets of polythene, well lapped at joints and held down by sand or concrete blocks.

G. TOLERANCES: The maximum permitted deviation from specified floor level shall be 5 mm. In any area, variation in level over 3.0m. shall not exceed ± 2mm.

PRECAST PRESTRESSED CONCRETE SLABS :

A. General : Precast concrete units shall be in accordance with BS 8110 : 1985 in all respects. They shall be supplied by a manufacturer approved by the Engineer.

B. Materials : All materials used in precasting shall comply with the Reinforced Concrete Section of this Specification.

C. Manufacturing Tolerances : The permissible deviation from the dimensions shown on the Drawings shall not exceed the following :

Length :	± 5mm.
Breadth :	± 5mm.
Thickness :	± 5mm.
Squareness :	± 5mm. between two diagonals of same unit.
Bow :	± 15mm.
Twist :	± 5mm. at one corner from a place containing the other three corners.
Local Irregularities :	± 5mm. over 1.5m.

Soffit of units shall have a steel formwork finish free from joint marks and blemishes.

D. Erection Tolerances : Notwithstanding the tolerances permitted for the manufacture of precast units, the permissible deviations for the erection of precast units shall be :

Level : ± 5mm.

Position on Plan : ± 5mm.

Deviations at Junctions : ± 5mm.

Plumbness : ± 15mm.

Abutments at cross-walls : 2mm. max. 1mm. min.

E. Holes and Chases : No holes or chases other than those shown on the structural Engineer's Drawings shall be permitted. Any units not complying with this requirement are liable to be condemned by the Engineer and shall be replaced at the Contractors expense.

F. Handling : Units shall be erected with care and shall be lifted as directed by the supplier.

Any units damaged during erection shall be replaced at the Contractor's expense.

The Units shall be placed on a slip bearing strip on supporting cross-walls. The slip strip bearing shall be Slipstrip I & II as manufactured by Servicised. The slipstrip shall be formed in an envelope of two layers to widths shown on detailed drawings and fixed in position with Pak Adhesive on a steel floated top finish to band beam, strictly in accordance with the manufacturers instructions.

Units shall be gently dropped vertically onto the bearing strip. Sliding and wedging across units shall not be tolerated or any mishandling which damages the bearing strip.

Units must be accurately placed on cross-walls to achieve the required bearing of 90mm.

G. Design Loads : Precast roof slabs shall be provided to carry the following loads :

Imposed Load : $0.75 kN/m^2$.

Dead Load
excluding unit
self weight
Screed 50-100mm.
and Roof weathering. $3.5 kN/m^2$.

Unit self weight
should not exceed : $2.7 kN/m^2$.

H. Layout Drawings: At least two weeks before commencing casting of precast units layout Drawings shall be provided by the manufacturer, together with calculations to the Engineer for approval. The layout Drawings shall be based on measurements taken by manufacturer on site.

I Grouting : After erection of precast slabs joints between slabs shall be grouted up in 20N10 concrete by Main Contractor.

J. Screed :

Screed to falls (shown on Architects Drawings) shall vary from 50 to 100 mm. Screed shall be 20N20 Conc. reinforced with one layer A98 mesh.

The water/cement ratio of the concrete screed shall not exceed 0.5.
A plasticizer may be added to increase workability. Sloppy screed mixes shall not be tolerated. The screed mix shall be 20N10 concrete. The falls shown on Architects Drawings shall be carefully adhered to and the screed shall be set-out using side forms to achieve the falls shown. The screed shall be tested for fall by flooding with water on completion and areas not freely draining or ponding (2mm. depth of water) shall be rejected, taken up and relaid.

K. Fixing for Accidental Damage :

Cores shall be broken over cross-walls and tie rods inserted as shown on the Drawings to provide a minimum tie to prevent collapse due to accidental damage of wall support.

L. Fire Rating :

The precast concrete fabricator shall specify the minimum fire rating capacity of the units in situ and shall provide to the Engineers adequate information to verify the stated fire rating.

PAVING :

1. Site Clearance :

1.1 The Contractor shall strip the site to reduced levels during periods of suitably dry weather. Cut-off drains (as shown on Drawings) and outfalls from existing ditches shall be carried out sometime previously to assist the site to dry out and to lower the water table.

1.2 The Contractor shall take all necessary precautions against growth of noxious weeds on the site of the Works during the currency of the Contract.

1.3 Adjoining paved and grassed areas, if littered with mud, clay or any material which has been deposited there as a result of the Contractors operations shall be thoroughly cleansed by him immediately or as often as requested by the Engineer or his representative.

2. Excavation : Excavation shall mean all materials except solid rock and shall include rock fill. The existing ground shall be excavated as required, trimmed and graded to accommodate a macadam paving (on 300mm. hardcore) to the slopes and levels specified. Any depressions which develop during compaction shall be filled with approved quarry run material and compacted to the Engineers satisfaction.

3. Preparation of sub-grade :

The greatest care shall be taken at all times during preparation of the sub-grade for the paving to keep the surface of the sub-grade truly graded and to level. Immediately before commencing paving the sub-grade and screeds shall be checked for level

4. Sub-Base :

Sub-base material shall be broken stone hardcore thoroughly compacted and blinded to meet the test loading requirements. Compaction shall be carried out on layers not greater than 250mm. in a dry state with sufficient passes of a 7 ton vibrating roller to ensure adequate compaction.

Hardcore for sub-base shall be crushed rock to Engineers approval within following grading limits.

Sieve Size BS 410 :	Percentage by weight passing :
75mm.	100
37.5mm.	85 - 100
10mm.	40 - 70
5mm.	25 - 45
600 µm.	8 - 22
75 µm	0 - 10

All materials used shall be frost resistant. Flat or flakey material shall not be used.

Samples of the material the Contractor proposes to use shall be provided on site for the Engineers examination and trial compaction tests on site shall be carried out if so directed by the Engineer.

In the event soft ground is encountered, it shall be excavated to sound formation level and replaced with compacted hardcore.

5. Test Loading : When the sub-base has been formed to grade and level, it shall be load tested to the Engineer's approval before compaction is completed and macadam placed.

The sub-base shall be tested as follows :

A fully loaded short wheelbase truck (15-20 ton axleload) shall be moved slowly and repeatedly over the test area without the ground showing sensible yield. In the event that sensible yield does occur, the sub-base shall be excavated and replaced with hardcore to a depth which will resist the yield. The formation shall then be completed to level in the usual way.

6. Kerbs :

Precast concrete kerbs shall be 250mm. deep x 125mm. thick complying with I.S. 146. They shall be laid on a 100mm. thick x 300mm. wide bed and haunch of concrete 20N20.

Cast in-situ kerbs shall be 250mm. deep x 150mm. thick concrete 30N20 cast on a 100mm. thick x 300mm. wide bed and haunch of concrete 20N20.

7. Paving Types :

7.1 Car Parks & Roadways :

Car Parks shall have 75mm. - 2 coat macadam finish (25 wearing course, 50 base course) on sand blinded hardcore.

8. Bitumen Macadam :

8.1

Road base, Base course, and wearing course, Dense Bitumen Macadam, and Bitumen Macadam shall be made in accordance with B.S. 4987 and shall conform in respect of aggregate grading, binder content, grade of binder and mixing temperature with the appropriate tables of that standard as specified in the Contract.

8.2 All Bitumen Macadam shall be laid and compacted to Clause 9.

8.3 Bituminous Sealing Grit.

Bituminous sealing grit shall be made with 3mm. nominal size crushed igneous rock, limestone, blended where necessary with clear limestone sharp sand in accordance with B.S. 1621.

Appendix A8, coated with 2 to 3 per cent of straight - run or cut-back bitumen or alternatively fine cold asphalt to BS 1650.

8.4 Tack Course : Tack Course shall consist of bituminous emulsion (anionic) complying with the requirements of BS 434 Type 1C having a viscosity under 5^0 Engler and containing 35 per cent bitumen.

9. Transporting, Laying and Compacting Pavement Materials Containing Bitumen Binder :

9.1 Bituminous materials shall be transported in clean vehicles and shall be covered over when in transit or awaiting tipping. The use of dust, coated dust, oil or water on the interior of the vehicles to facilitate discharge of the mixed materials is permissible but the amount shall be kept to a minimum, and any excess shall be removed by tipping or brushir

9.2 Whenever practicable bituminous macadam shall be spread, levelled and tamped by approved self-propelled pavers. The mixed materials shall be delivered with minimum delay to the paver and in such quantity as to permit its continuous operation and it shall be so operated whenever practicable.

9.3 The rate of travel of the paver and its method of operation shall be adjusted to ensure an even and uniform flow of material across the full laying width, freedom from dragging or tearing of the material and minimum segregation.

9.4 The material shall be laid generally in conformity with the recommendations for laying in the British Standard to which it has been made subject also to the following additional over-riding requirements.

9.5 Hand laying of any bituminous material will be permitted only in the following circumstances :

i For laying regulating courses of irregular shape and varying thickness

ii In confined spaces where it is impracticable for a paver to operate.

iii For footways.

iv Where directed in the Contract.

9.6 Materials shall be compacted as soon as rolling can be effected without causing undue displacement of the mixed material and while this has at least the minimum rolling temperature stated in the appropriate British Standard. The material shall be uniformly compacted by an 8-10 tonnes smooth steel wheeled roller having a width of roll not less than 450 millimetres. The force per unit width of the rear roller shall be not less than 53N/mm or 302 lb/in.

9.7 The compaction achieved will depend on the workability and temperature of the material at the time of rolling, which should commence as soon as is possible without causing undue displacement of the coated macadam, and should continue until all roller marks have disappeared. Adequate compaction is essential to ensure full strength and in the case of dense road base macadam and dense base course macadam these materials shall be compacted at temperatures not less than those given in the Table below. The temperature of these mixed materials as delivered to the laying site shall be within the appropriate range given in Table below.

Recommended delivery and rolling temperatures for dense roadbase and dense base course macadam.

Type and Grade of binder.	Temperature on delivery.		Rolling temperature Minimum
	Minimum	Maximum	
	^{0}C	^{0}C	^{0}C
Bitumen : 200 pen	80	105	65
100 pen	105	130	80

Rolling shall proceed in a longitudinal direction with the larger rolls nearer the spreaders or laying machine, working from the sides to the centre of the lane, over-lapping on successive passes by at least one half of the width of the large roll. The roller shall be fitted with a quick reverse and smooth-acting clutch and operated by an experienced driver. The points of reversing must be staggered.

The number of rollers employed will depend on the area to be covered daily and shall be sufficient to enable the rollers while travelling at a slow but steady speed to make sufficient passes to adequately compact the coated macadam.

Rollers shall not stand on freshly laid coated macadam while there is a risk it might deform and all changes of lateral direction shall be made on cool material.

9.8 Hand laid work shall conform to all the specification requirements of this Clause except those relating to the manner of operating pavers.

9.9 When laying wearing courses the Contractor shall so organise his work that as far as possible there are no longitudinal joints left at the end of any day's work. Where joints between laying widths or transverses joints have to be made, the material shall be fully compacted and the joint made flush by cutting back the exposed joints to a vertical face of not less than the specified thickness, discarding all loosened material and coating the vertical face completely with a grade of hot bitumen suitable for the purpose before the next width is laid. A similar coating shall be applied to edges of projecting features eg. kerbs, manholes.

9.10 All joints shall be off-set at least 300 millimetres from parallel joints in the layer beneath.

9.11 Base course material shall not remain uncovered by either the wearing course or surface treatment whichever is specified in the Contract for more than three consecutive days after being laid. Consent may be given for the extension of this period by the minimum

amount of time necessary if compliance therewith is impracticable because of weather conditions or for any other reasons such as awaiting the results of tests made.

10. Flexible Surfacing :

10.1 Single Course Bitumen Macadam : This material shall be made in accordance with Clause 8.1 and laid to Clause 9 to a compacting thickness shown in the Contract.

10.2 Immediately after compaction, or such time later as the Engineer may think necessary, because of weather or other conditions intervening, the surface of the bitumen macadam shall be closed as stated in the Contract with either the bitumen coated grit specified in Clause 8.3 applied at the rate of 8-10 kilogrammes per square metre, and well brushed in. A tack coat will only be applied when directed and shall comply with Clause 10.5

10.3 Two Course Bitumen Macadam : This material shall be made in accordance with Clause 8.1 laid to Clause 9 to give a compacted thickness of base course and of wearing course as shown in the Contract.

10.4 Tack Coat : When it is necessary to use a tack coat it shall consist of bitumen emulsion conforming to Clause 8.4. The emulsion shall be applied uniformly without pooling, preferably by a pressure sprayer, at a rate of

0.35 to 0.45 litres per square metre or as directed.

10.5 Surface Dressing : Before the initial surface dressing of a coated macadam course the surface shall, where required under the Contract, or directed, be blinded by coated grit in accordance with Clause 9.2. The surface dressing shall then be applied after whatever interval may be permitted.

10.6 Immediately before binder is sprayed on the road surface the latter shall be thoroughly brushed, cleaned and free from any deleterious matter, free from standing water and preferably dry. All iron work in the roadway shall be coated with heavy oil or grease to prevent adherence of the surface dressing and shall be unmasked before the paving is opened for use.

10.7 An approved adhesive agent shall be incorporated either in solution applied to the aggregate or contained in the binder, the percentage content and manner of application being as stated in RRL Road Note 14, or as directed.

10.8 The binder shall be applied evenly to the road surface by means of a distributor complying with B.S. 1707 and the distributor shall have been calibrated for overall rate of spread within 3 months of its current use.

Hand spraying will only be permitted in locations inaccessible to the distributor.

10.9 The chippings shall be hard, tough, clean crushed rock of 10 millimetres nominal size, or as directed, and comply with B.S. 63 for single sized chippings.

10.10 Surface dressing applied to bitumen macadam single courses or wearing courses shall be in accordance with the requirements of RRL Note 38. Recommendations for Surface Dressing with Cutback bitumen. The binder shall be bitumen to B.S. 3690 : Table 2 of an approved viscosity within the specified ranges. The proportion of bitumen for costing shall be about 0.75 per cent by weight of chippings.

10.11 Rates of spread of surface binder and of coated chippings shall be as tabulated in Road Note 38, for medium traffic on normal surfaces, or as directed. Immediately after being spread the coated chippings shall be rolled by a rubber-tyred roller, or a steel tyred-roller, weighing not more than 8 tonnes until a uniform compact surface is obtained. Excess chippings shall be swept off and traffic shall not be permitted on the dressed surface until the binder has reached its preliminary set.

DRAINAGE :

1. General : All drainage shall be carried out in accordance with the requirements of the Engineer and Dublin County Council to lines and levels shown on the Architects Drawings using spigot and socket concrete pipes complying with I.S. 6 or B.S. 556 for surface water drains and Wavin uPVC pipes for foul drains.

2. Workmanship : Not less than three sight rails shall be erected in each section of trench by the Contractor. They shall be of suitable material and provided with accurate and easy means of adjustment. They shall be securely fixed in positions indicated by the Engineer and the Contractor will be responsible for their maintenance.

The trenches for drains and excavation for manholes shall be excavated in straight and even lines and to such depths as will permit the drains to be laid on concrete bed specified with invert lengths and gradient as shown for each section. A clear horizontal space of 600mm. shall be left between the excavated material and the edge of the trench.

Suitable surface materials shall be stored separately and preserved for restoration of surfaces or for banking as shown on the Drawings.

3. Surface Water Drains :

3.1 Cover : All pipes shall be laid with a minimum cover of 1.0m. where possible in paved areas and 0.9m. in grassed areas. Pipes shall be bedded and surrounded in concrete as specified below.

3.2 Concrete bed & haunch : Drains shall be laid on a bed of concrete at least 150mm. in thickness and projecting at least 200mm. on each side of drain.

The drain shall be haunched in concrete and the concrete haunching shall extend to the full width of the concrete bed aforementioned and the concrete haunching shall be carried up not less than three quarters the external diameter of the pipe.

The pipe shall be wrapped in one layer of 300 gauge polythene sheet.

3.3 Selected Fill : Selected fill shall be graded granular material and shall be compacted in 100mm. loose layers to a depth not less than 300mm. above crown of pipe.

3.4 Concrete bed & surround : Where drains are laid under paved areas or where depth of cover is less than that specified in 3.1 above, or where depth of cover is greater than 3m. such drains shall have 200mm. concrete bed extending to 200mm. on each side of drain and

shall have 200mm. minimum thickness concrete surround.

3.5 Backfilling : Backfilling shall be placed in layers not exceeding 300mm. in depth and each layer shall be thoroughly rammed.

Outside paved areas, material that is too wet or otherwise unsuitable shall not be used for backfilling and shall be replaced with pea gravel, hardcore or pit run gravel approved by the Engineers.

Within paved areas backfilling shall be in hardcore to Clause 4 (Page 59).

4. Manholes : A 50mm. thick blinding layer of concrete shall be placed under the floors of all manholes which shall comprise 150mm. thickness of concrete 30N20. Manhole walls shall be 1.65m. diameter precast concrete rings with step irons to B.S. 1247. Manhole roofs shall be 1.65m. diameter precast concrete Heavy Duty lids reinforced to withstand 11.25 tonne point load in accordance with B.S. 556.

Manhole covers and frames shall be of Heavy Duty type complying with B.S. 497. Grade A, of tough cast-iron, sound and free from all cracks or other defects. They shall have double seated conical covers and fit tightly and evenly in frames. Covers and frames

shall be supplied by a manufacturer approved by the Engineer and shall not weigh less than 240kg. The frame shall be bedded and haunched in 1 : 3 cement mortar.

The inverts of manholes shall be finished perfectly smooth with steel trowel in 1 : 3 cement mortar. The benching at the edge of the channel shall be brought vertically to a height equivalent to maximum size of pipe entering or leaving the manhole. It shall then be neatly rounded off and trowelled back at a slope of 1 : 6. All benching shall promote streamlined flow to Engineers approval.

Where pipes enter manholes, they shall be cut flush with the internal face of the manhole and no jagged edges or rough edges shall be presented.

Branches and junctions coming into the manhole shall have the same crown level as the pipe leaving the manhole.

All junctions to the main channel shall be swept to even curves and shall join the main channel tangentially.

Special manholes such as overflows, ramps, drops, etc., shall be constructed in accordance with the Drawings as the Engineer may deem necessary to provide.

5. Gullies :

Gully chambers shall have minimum internal dimensions of 600mm. x 600mm. x 450mm. deep. Floors and walls shall be 200mm. thickness of concrete 30N20. Gratings shall comply with B.S. 497 : Grade E. Pipe outlets shall be as high as possible above sump level to facilitate rodding and shall be trimmed to the inside face of the wall of the chamber into which it is built.

The gully grating and frame shall be set flush with the level of the channel and the transverse bars of the grating shall be at right angles to the line with the hinged end of the grating on the side of approaching traffic.

Alternatively precast chambers may be used if approved by the Engineer.

6. TESTING OF DRAINS & SEWERS :

Wherever possible, testing shall be carried out from manhole to manhole. Short branch drains connected to a main sewer between manholes shall be tested as one system with the main sewer. Long branches shall be tested separately.

Pipes not exceeding 750 millimetres nominal internal diameter shall be tested in one of the following ways :

6.1 Water Test :

A test pressure of 1.2 metres head of water above the soffit of the sewer shall be applied at the high end but not more than 6 metres at the low end by means of a standpipe. Steeply graded sewers shall be tested in stages where the above maximum head will be exceeded if the whole section is tested at once. A period of one hour shall be allowed for absorption. The loss of water over a period of 30 minutes shall be measured by adding water from a measuring vessel at regular intervals of 10 minutes and noting the quantity required to maintain the original water level in the standpipe. The average quantity of water added for sewers up to 300 millimetres nominal bore shall not exceed 0.06 litre per hour per 100 linear metres per millimetre of nominal bore of the sewer. For sewers exceeding 300 millimetres nominal bore, the average quantity of water added shall not exceed 0.12 litre per hour per 100 linear metres per millimetre of nominal bore of the sewer.

6.2 Air Test : The length of sewer under test shall be effectively plugged air pumped in by suitable means eg. a hand pump, until a pressure of 100 millimetres head of water is indicated in a U-tube connected to the system. The air pressure shall not fall to less than 75 millimetres head of water during a period of 5 minutes, without further pumping, after a period for requisite stabilisation.

6.3 Sewers shall be tested :

i. After laying and placing concrete if any but before backfilling, and

ii after backfilling has been completed.

6.4 Where required by the Contract the sewer shall be tested for obstruction by the insertion and pulling through of twin-coupled rubber plungers of the same diameter as the sewer.

6.5 Sewers shall be tested for infiltration after backfilling. All inlets to the system shall be effectively closed and the residual flow shall be deemed to be infiltration.

The following limits of infiltration shall not be exceeded :

i For sewers not exceeding 750 millimetres nominal internal diameter, 0.08 litre per hour per 100 linear metres per millimetre of nominal bore of the sewer.

ii For sewers exceeding 750 millimetres nominal internal diameter, 0.16 litre per hour per 100 linear metres per millimetre of nominal bore of the sewer.

Infiltration to manholes shall not exceed 5 litres per hour per manhole.

STRUCTURAL CALCULATIONS

TALLAGHT BUSINESS CENTRE

STAGE 2

FOR

THE INDUSTRIAL DEVELOPMENT AUTHORITY

27 MAY, 1991.

INDEX

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Contract	Job ref.
Business Centre Stage II.	91/25
Part of structure: Design Data.	Calc. sheet No. 1.
Drawing ref. / Calculations by / Checked by	Date: May 1991.

Members ref.	CALCULATIONS	OUTPUT

General Structural Summary.

Codes of Practice.

Concrete. BS 8110 Part 1 1985
Manual to BS 8110 1985.

Steel. BS 449 1970

Loading BS 6399 & CP3 Ch. V II 1972.

Roof imposed = 0.75 kN/m².

Finishes & P/c units. = 6.60 kN/m²

Wind Speed 46 m/s.

Factors $S_1 = 1$, $S_2 = 0.74$, $S_3 = 1.0$

Fire resistance 2 hrs all elements

Bearing Strata.
Brown boulder clay
A.B.P 125 kN/m²

Materials: Concrete 30N/20
Reinf. grade 460 (Type II)
& 250 (Links)

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Contract	Job ref.
Business Centre Stage 2	9125.
Part of structure: Design Data.	Calc. sheet No. 2
Drawing ref. / Calculations by / Checked by	Date: May 1991.

Members ref.	CALCULATIONS	OUTPUT

Blockwork.

Forticrete Hollow ($f_k = 4.3$)
(190 x 190 x 390)

Solid. (100 x 190 x 390)
$f_k = 4.0$

Accidental Damage to B.S 5628
Option 2.

Single storey blockwork structure load bearing blockwork walls supporting roof slab. U block beams within walls as lintels hidden columns at opes to take vertical & horizontal loads from adjoining panels. U block band beams at Roof Level. Walls also braced by solid foam Roof construction

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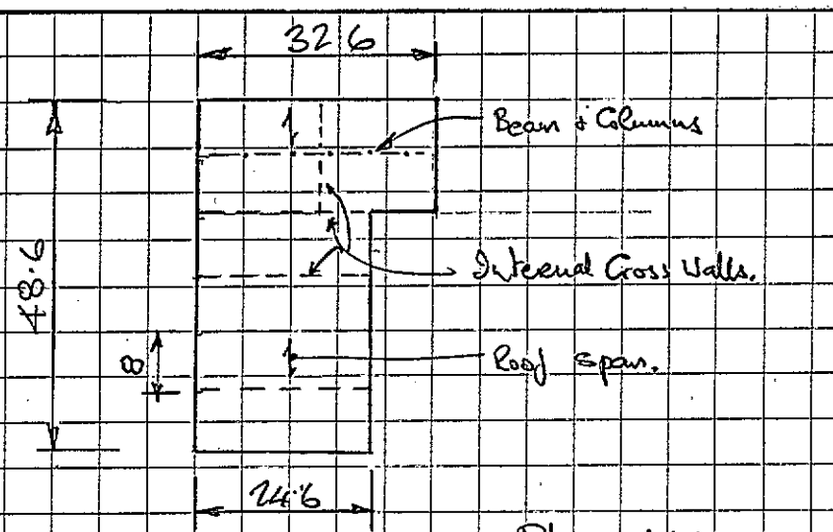
Contract	Job ref.
Business Centre Stage 2.	91/25
Part of structure: Wind loading	Calc. sheet No.: 3.
Drawing ref. / Calculations by / Checked by	Date: May 1991.

Members ref.	CALCULATIONS	OUTPUT



Plan 1:1000

Wind Loads. Height of building 5.2 m.

S1 = S3 = 1. Topographical factor 2.
⇒ S2 = 0.74

Design Wind Speed = 46 × 0.74 = 34.04.

$W_K = 0.613 \times 34.04^2 / 1000$
$= 0.71$ kN/m²

Ch. Wind Press.
$W_K = 0.71$

Roof loadings.

	kN/m²
2/10 mm layers Asphalt	0.60
Insulation	0.10
200 P/c slab	2.60
100 av. screed.	2.40
Selv: 100.	0.90
g_K =	6.60
Live q_K =	0.75

$W = 1.4(6.6) + 1.6(0.75) = 10.44$ kN/m²

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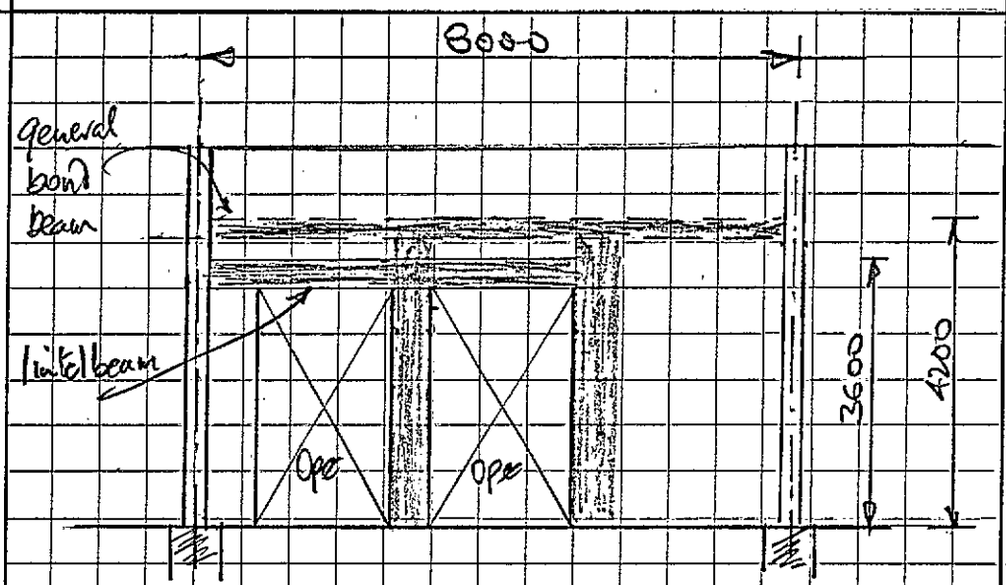
Contract	Job ref.
Business Centre Stage II.	91/25.
Part of structure: External Wall Panels	Calc. sheet No.: 4.
Drawing ref.: 9125/4.	Calculations by:	Checked by:	Date:

Members ref.	CALCULATIONS	OUTPUT



800 | 1800 | 400 | 2000 | 400 | 2600

shading indicates b/w. unit reinforcing.

Elevation

Wall Section.

$Z = 7.68 \times 10^6 \text{ mm}^3$.

$f_{kx}.1 = 0.45$.

Take $\gamma_m = 2.5$ ie. Special category for both construction & manufacture.

M_R (horiz) $= 0.45 \times 7.68 / 2.5$

$= 1.38$ Knm./m ht.

Max horiz span = 2.5 m

Max applied moment

$= 1.2 \times 0.71 \times \frac{2.5^2}{8} = 0.67$ Knm/m ht.

(< 1.38)

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Contract	Job ref.
Business Centre Stage II	91/25.
Part of structure: Wall Panels.	Calc. sheet No. 5
Drawing ref. / Calculations by / Checked by	Date

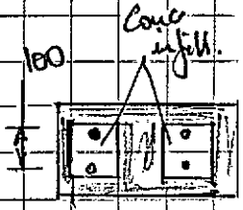
Members ref.	CALCULATIONS	OUTPUT

Vertical Reinforcement

height 5m., width of wind loading = 2.3m.

$M = 1.4 \times 0.71 \times 2.2 \times \frac{5^2}{8}$

$= 6.83$ kNm.



(Z) lever Arm = 100mm. for 190 h.b.

$f_{steel} = 0.87 f_y$ $f_y = 400 N/mm^2$

$M_R = 0.87 f_y A_s Z.$

$400 A_s \times 100 = 6.83 \times 10^6$ Nmm

$\Rightarrow A_s = 170.75$ mm².

$\Rightarrow$ Use 2T16 bars each side of opes

($A_s = 201 mm^2 > 169.5$)

See Detail 12/7.

Horiz. Reinforcement.

Horiz beam limited spans onto vertical bands.

Detail 15/7.

M_R horiz. $\approx 0.4 \times 0.1 \times 101 = 4.02$ kNm.

M_R vert. $\simeq 2.5 \times 4.02 = 10$ kNm.

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Contract	Job ref.
Business Centre Stage II	91/25
Part of structure: Wall Panels.	Calc. sheet No. 6
Drawing ref. / Calculations by / Checked by	Date 14/6/91

Members ref.	CALCULATIONS	OUTPUT

Wind moment over 2.6 m span deals:

$= 1.2 \times 0.71 \times \frac{2.6^2}{8} \times 1.5$ ult

$= 1.08$ (< 4.0 ok)

Vertical Span of lintel 2.6m.
Height of block 1.0

$M = 0.3$ wide $\times 1.0 \times 20\,kN/m^3 \times 1.4^{\gamma_f} \times 2.6^2/8$

$= 7.10$ kNm. < 10 kNm

∴ Panel Satisfactory.

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Contract: Business Centre Stage II.
Job ref.: 91/25
Part of structure: Internal Wall.
Calc. sheet No.: 7
Drawing ref.:
Calculations by:
Checked by:
Date: May 1991

Members ref.	CALCULATIONS	OUTPUT

Width of loading. = 8m.

Ult. load from P/c Units — kN/m.

8 × 10.44 = 83.32

½ wall wt.

= 20 kN/m³ × 0.2 × 4/2 × 1.4 = 11.20

94.52

Strength of unit = 8.2 N/mm².

Aspect Ratio = 1.0.

f_k = 4 N/mm².

$\frac{SL}{190} = 0.75 \times \frac{5000}{190} = 19.74$

$e_x = 0.05t \Rightarrow \beta = 0.70$

Capacity = $\beta f_k t / \gamma_m$

$= \frac{0.70 \times 4 \times 190}{2.5}$

= 212.8 kN/m

(> 94.52)

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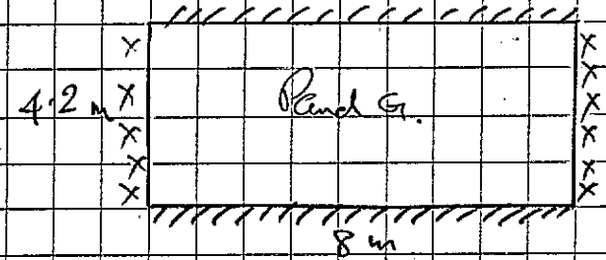
Fax 974589

Contract	Job ref.
Business Centre Stage II.	91/25
Part of structure: Wall Panels.	Calc. sheet No. 8
Drawing ref. / Calculations by / Checked by	Date

Members ref.	CALCULATIONS	OUTPUT



f_{kx} H = 0.25 f_{kx} L = 0.5

$g_d = \frac{4.75}{190} = 0.03 \text{ N/mm}^2$

$f_{k/\gamma_m} = 0.25/2.5 = 0.10 \text{ N/mm}^2$

$g_{dk}/f_{k\gamma_m} = \frac{0.03}{0.10} = 0.3 < 1.$

⇒ fully pinned base.

$\mu = 0.5$ $\frac{l_y}{l} = 0.53$

⇒ α 0.025

$M = 0.025 \times 1.2 \times 0.71 \times 8^2$

$= 1.36 \text{ kN/m}$

$M_R = 0.5 \times 7.60/2.5 = 1.54 \text{ kN/m}$

> 1.36

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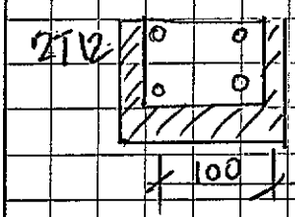
Contract	Job ref.
Business Centre Stage 5	91/25
Part of structure: Band beam.	Calc. sheet No.: 9
Drawing ref. / Calculations by / Checked by	Date

Members ref.	CALCULATIONS	OUTPUT

Band beam at top of wall
ie. at Roof slab level.



height of loading = 5.2/4.
= 1.3 m

$M = 1.3 \times \left(\frac{1.2}{1.2 \times 0.71}\right) \times 8^2/10$

$= 7.09$ kNm.

$\Rightarrow A_s$ req'd $\quad \frac{7.09 \times 10^6}{100 \times 400} = 177.25$

2T12 each face = 226 > 177.25.

satisfactory.

δf 1.2
Temporary
Condition

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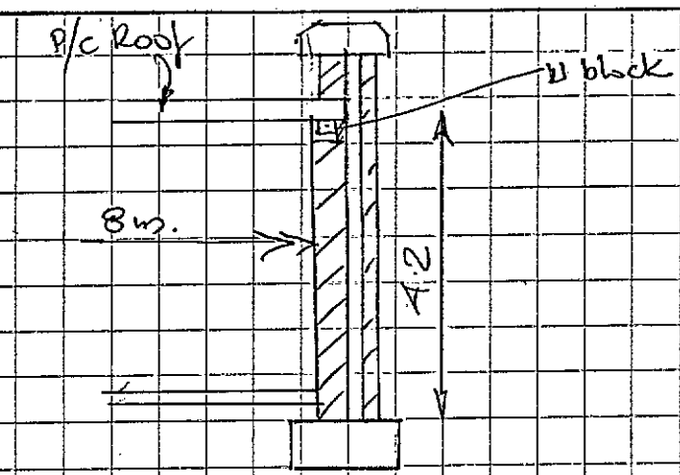
Contract	Job ref.
Business Centre Stage II	91/25
Part of structure: Wall Panels	Calc. sheet No. 10
Drawing ref. / Calculations by / Checked by	Date: May 91

Members ref.	CALCULATIONS	OUTPUT



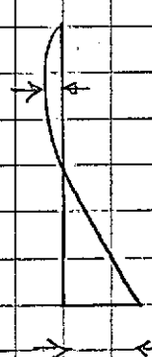
D/L per m. from Roof

$= (6.9 \times 6.6) \times (0.45 \times 8)$ (DL × span)

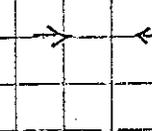
$= 21.38$ kN/m

f_{kx} ⊥ joint $= 0.25 + \frac{2.5 \times 21.38}{190}$

$= 0.53$ N/mm².



$\frac{1}{128} \times 1.4 \times 0.71 \times 4.2^2 = 1.23$ KNm/m



$\frac{1.4 \times 0.71 \times 4.2^2}{8} = 2.19$ KNm/m

Mr top Section $= f\frac{Z}{F_m} = 0.45 \times \frac{7.68}{2.5}$

$= 1.38 \; (> 1.23)$ OK

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Contract	Job ref.
Business Centre Stage II	91/25
Part of structure: Wall Panels.	Calc. sheet No. 11
Drawing ref. / Calculations by / Checked by	Date: May 91

Members ref.	CALCULATIONS	OUTPUT

M_R at base

$g_d = 21.38 + 4 \times 12.5\ kN/m^2 \times 0.19 \times 0.9$ (lt.)
$= 29.93\ kN/m$ run

f_{kx} (|| joints) $= 0.25 + 2.5\,(29.93)/190$

$= 0.64\ N/mm^2$

$M_R = 0.64 \times 7.68/2.5 = 1.97\ kNm/m.$

which approx. equals M base &
is acceptable.

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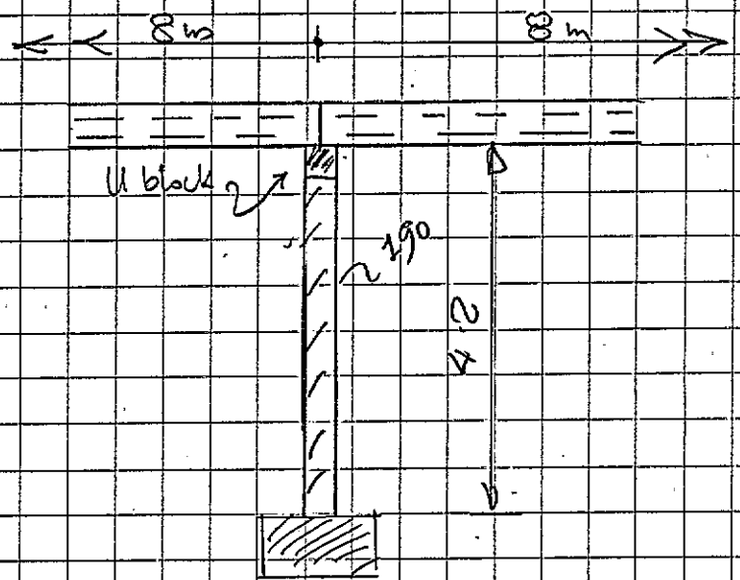
Contract	Job ref.
Business Centre Stage II	91/25
Part of structure: Internal Walls	Calc. sheet No. 12
Drawing ref. / Calculations by / Checked by	Date: May 91

Members ref.	CALCULATIONS	OUTPUT



190 blo. of 5N/mm² av. strength

Aspect ratio $190/190 = 1 \Rightarrow f_k = 2.5 + \frac{0.4}{1.4} 2.5$

$= 3.2$ N/m

UDL load from roof 10.4×8 — 83.52

block self wt. $10\text{kN/m}^3 \times 0.19 \times 1.4 \times \frac{4.4}{2}$ — 5.85

89.37

S.R. $= \frac{0.75 \times 4200}{190} = 16.6$

$E_x = 0.05\,t \Rightarrow \beta = 0.81$

Capacity $= \beta t f_k / \gamma_m$

$= 0.81 \times 190 \times \frac{3.2}{2.5} = 197$ kN/m

(> 89.37)

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Contract	Job ref.
Business Centre Stage II	91/25.
Part of structure: R.C. frame	Calc. sheet No.: 13.
Drawing ref. / Calculations by / Checked by	Date

Members ref.	CALCULATIONS	OUTPUT

Frames on Grid 2 + 6. 4 span + 3 span.

loading.

		kN/m
from slab	$10.44^2 \times .8$	83.52
Self	$0.6 \times 0.4 \times 24$	5.76
		89.28

$d = 550$
$b = 400$

$$M = \pm \frac{wl^2}{10}$$

$$= 89.28 \times \frac{8^2}{10} = 571.4 \text{ KNm}$$

$$K = \frac{M}{bd^2 f_{ck}} = \frac{571.4 \times 10^6}{400 \times 550^2 \times 30} = 0.16 > 0.156$$

$$A'_s = \frac{(0.16 - 0.156)\, 400 \times 550^2 \times 30}{450 \times 550}$$

$$= 23.24 \text{ mm}^2$$

$$A_s = 23.24 + 0.156 \times 550 \times 30$$

$$= 2574 \text{ mm}^2$$

$4 \cdot T32 = 3220$

Use 4 T32 T+B

Note: Calc. Sheet 14 blank

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Contract	Job ref.
Business Centre Stage II	91/25
Part of structure: Beams	Calc. sheet No. 15
Drawing ref. / Calculations by / Checked by / Date	

Members ref.	CALCULATIONS	OUTPUT

Defln.

$f_s = \frac{5}{8} \times 460 \times \frac{2574}{3220} = 229.8\ N/mm^2$

$\frac{M}{bd^2} = \frac{57.4 \times 10^6}{400 \times 550^2} = 4.72$

$\% A_s = \frac{100 \times 3220}{400 \times 550} = 1.46\%$ T & B.

Mod. factor Tension. 0.8

Mod factor Comp 1.25

Allowable span

$26 \times 550 \times 1.25 \times 0.8$

14.3 m > 8 m.

Shear

$V = 89.28 \times 0.6 \times 8$

$= 428.54\ kN.$

$v = \frac{428.54 - (89.28 \times 0.5)}{400 \times 550}$

$= 1.74\ N/mm^2.$

$v_c = 0.79\ N/mm^2$

$\frac{b(v - v_c)}{}$

$400(1.74 - 0.79)$

$= 380$

R10 in pairs @ 150 ctrs.

$= 2 \times 228 = 456 > 380$

Use R10 @ 150 pairs at support

Curtail to R10 @ 200 in pairs

at 2 m. from each support

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Contract: Business Centre Stage II | Job ref.: 91/25

Part of structure: Columns. | Calc. sheet No.: 16

Drawing ref. | Calculations by | Checked by | Date: May 1991

Members ref.	CALCULATIONS	OUTPUT

Centre Column (braced).

Use 300 x 300 with 4 T20 bars.

Slenderness Ratio.

$0.8 \times 5500/300$

$= 14.7 \quad (< 15)$

$\Rightarrow$ Short Column

Load capacity.

$0.35 f_{cu} A_c + 0.6 f_y A_s$

$9 \text{ kN} \times 22.$

$= 1166 \text{ kN}.$

Max load $= 2 \times 428$

$= 856 \text{ kN}$

(< 1166)

End Columns.

End reaction from Roof

$= 88.9 \times 0.45 \times 8 \quad = 320 \text{ kN}.$

4 T20

$f_k = 4.3 \text{ N/mm}^2$

$SR. = 0.75 \times 5500/190 = 21.7.$

$\Rightarrow e_a/h = 0.22$

Nominal min. condition $\Rightarrow e_a/h = 0.05$

$M_{add} = (0.22 + 0.05) Nh$

$= 0.27 \times 320 \times 190 \times 10^{-3}$

$= 16.42$

$M/bh^2 f_{cu} = 0.2. \qquad N/bh f_{cu} = 0.75.$

$\Rightarrow A_s = 1229 \quad$ min Steel

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Contract	Job ref.
Business Centre Stage II	91/25.
Part of structure: Column Pads.	Calc. sheet No. 17.
Drawing ref. / Calculations by / Checked by	Date

Members ref.	CALCULATIONS	OUTPUT

Column Pads

Max load = 850 KN. ult.

Equiv Serv. load = 607 KN
add 10% for
self wt & overburden = 668 KN.

Use ASBP = 125 KN/m².

Area Reqd. = $\frac{668}{125}$ = 5.34 m²

Use 2.5 × 2.5 × 500 pads

Ult Press.
= $\frac{850}{2.5^2}$ = 136 KN

$M = \frac{wl^2}{8}$ = $\frac{136 \times 2.5^2}{8}$
= 106.25 KNm/m

$\frac{M}{bd^2}$ = $\frac{106.25 \times 10^6}{10^3 \times 450^2}$
= 0.52

$\frac{100 A_s}{bd}$ = 0.15.

A_s = 675

T16@300 = 670

use T16 @ 300 e.w.

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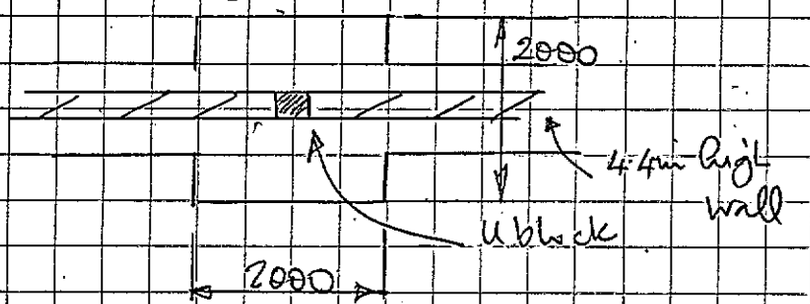
Contract	Job ref.
Business Centre Stage II	91/25
Part of structure: End Columns.	Calc. sheet No. 18
Drawing ref. / Calculations by / Checked by	Date: May '91

Members ref.	CALCULATIONS	OUTPUT

End Columns



Wall loading ult.

Wall self. $4.4 \times 1.2\ kN/m^3 \times 1.4 \times 0.29 = 21.44$

Load $2.0 \times 0.45 \times 24 \times 1.4 = 30.24$

51.70

Ult. col. reaction 320.00

371.70

Ult pressure $371.7 / 2^2 = 92.93$

Service Press. $\simeq 66.38 < 125$

Bending $M = .93 \times 2^2/8 = 46.5\ kNm$

$d = 400$

provide nom. reinf.

R16 @ 300

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Contract: Business Centre Stage II.
Job ref.: 91/25.
Part of structure: Foundations
Calc. sheet No.: 19
Drawing ref.:
Calculations by:
Checked by:
Date:

Members ref.	CALCULATIONS	OUTPUT

External walls.

Reaction from Roof

10.44 × 8 × 0.6 — 50.11

Wall self.

0.3 × 20 × 5 × 1.4 — 42.00

Found.

0.45 × 0.6 × 24 × 1.4 — 9.07

101.18

Service Stress

$$\text{Service Press} = \frac{73}{0.6 \times 1} = 120.45$$

73 KN/m.

< 125

satisfactory.

BRETON-ROECRETE LTD. PRESTRESSED CONCRETE DESIGN PROGRAM

DATE : 07-MAR-89 Time : 16:57

Contract ref:

Unit ref: 2. 200 DEEP SLAB TO ENTERPRISE CENTRE TALLAGHT

Calculations to BS8110:1985

SPAN GEOMETRY :
O/All length of unit : 7900.mm
L. H. Support 100.mm wide R. H. Support 100.mm wide
Clear Span 7700.mm
Effective Span(s) : 7800.mm
Unit is divided into 18 design stations

CROSS SECTION DETAILS :
Sect. ref: B200
Standard thickness 200.0mm Standard width 1197.mm

Effective web widths : 278.mm

Core(s) 2,5 are broken out for 600.mm from L.H. end

Core(s) 2,5 are broken out for 600.mm from R.H. end

SECTION PROPERTIES :

C/S area	=	1.300E+05mm**2
Height of N.A.	=	99.0mm
Ig	=	6.373E+08mm**4
Zt	=	6.311E+06mm**3
Zb	=	6.435E+06mm**3
C/S area above N.A.	=	6.431E+04mm**2
y'	=	65.5mm

SECTION PROPERTIES AT L.H. END :

C/S area	=	1.176E+05mm**2
Height of N.A.	=	90.9mm
Ig	=	5.523E+08mm**4
Zt	=	5.064E+06mm**3
Zb	=	6.075E+06mm**3
C/S area above N.A.	=	5.420E+04mm**2
y'	=	68.1mm

SECTION PROPERTIES AT R.H. END :

C/S area	=	1.176E+05mm**2
Height of N.A.	=	90.9mm
Ig	=	5.523E+08mm**4
Zt	=	5.064E+06mm**3
Zb	=	6.075E+06mm**3
C/S area above N.A.	=	5.420E+04mm**2
y'	=	68.1mm

APPLIED LOADS :
Dimensions in mm, Dist loads in kN/m**2, Point loads in kN

No.	Point/Dist.	Live/Dead	Magnitude	Start Posn.	End Posn.
1	Dist.	Live	0.8	0.	7800.

APPLIED LOADS :

Dimensions in mm, Dist loads in kN/m**2, Point loads in kN

No.	Point/Dist.	Live/Dead	Magnitude	Start Posn.	End Posn.
1	Dist.	Live	0.8	0.	7800.
2	Dist.	Dead	3.0	0.	7800.

CONSTRUCTION DETAILS

Class 2 Structure
Screed Thickness 0.mm

CONCRETE PROPERTIES :

	Precast		Screed
	Transfer	Service	
Grade	35.	50.	0.
Ec(kN/mm/mm)	25.	30.	0.
Allowable compression(N/mm/mm)	17.5	16.5	0.0
Allowable tension(N/mm/mm)	2.7	3.2	
Density(kN/m/m)	24.0		24.0
Shrinkage strain	300.E+00		
Creep coeff.	1.8		

BENDING MOMENTS -- SERVICE LIMIT STATE (kNm)

Stn.	Self wt.	SW+Screed + Prop	Rem. Prop	App. Load main span	App. Load side spans
L.H. React	12.17	12.17	0.00	17.74	
R.H. React	12.17	12.17	0.00	17.51	
Max. B.M.	23.73	23.73	0.00	34.59	
Min. B.M.	0.00	0.00	0.00	-0.00	

FACTORED MOMENTS AND SHEARS -- ULT. LIMIT STATE

	Max. +ve moment			Max. -ve moment		
	SF left	SF right	Moment	SF left	SF right	Momen
Max. value	40.98	42.61	83.10			
Min. value	-42.29	-42.07	0.00			

PRESTRESSING DETAILS -- FORCES IN kN, AREAS IN mm**2

Layer No. 2 Type 3846
Stressed to 70.% ultimate at 37.0mm above soffit

Wire	Ch. Strength	Area	Diam	Offset from CL	Trans. length	Relaxation class	60%	70%	80%
1	164.0	93.0	12.5	-554.0	507.1	2	1.0	2.5	4.5
2	92.0	52.0	9.3	-374.0	377.3	2	1.0	2.5	4.5
3	92.0	52.0	9.3	-187.0	377.3	2	1.0	2.5	4.5
4	164.0	93.0	12.5	0.0	507.1	2	1.0	2.5	4.5
5	92.0	52.0	9.3	187.0	377.3	2	1.0	2.5	4.5
6	92.0	52.0	9.3	374.0	377.3	2	1.0	2.5	4.5
7	164.0	93.0	12.5	554.0	507.1	2	1.0	2.5	4.5

Total area = 487.0mm**2 Jack force = 602.0kN

7	164.0	93.0	12.5	554.0	507.1	2	1.0	2.5 4.5

Total area = 487.0mm**2 Jack force = 602.0kN

Average loss of prestress in layer 2 : Transfer 21.% Service 35.%

CONCRETE STRESSES (kN/mm/mm)

		Top Fibre		Bottom Fibre		Screed	
		Max.	Min.	Max.	Min.	Max.	Min.
Transfer	Allowed	17.50	-2.66	17.50	-2.66		
	Actual	2.52	-0.50	8.98	2.12		
Main Span	Allowed	16.50	-3.18	16.50	-3.18	0.00	0.00
	Actual	8.18	-0.14	5.88	-0.49	0.00	0.00

ULTIMATE LIMIT STATE : MOMENT

MAXIMUM SAGGING MOMENT

At X = 3950.mm Mult = 83.10kNm
Neutral Axis at 33.mm from compression face
Resultant tensile force at 163.mm from compression face
Lever arm = 149.mm Steel strain = 1.9021%
Ult. resistance moment = 111.47kNm

SECTION IS O.K.

ULTIMATE LIMIT STATE : SHEAR

Forces in kN

Uncracked shear capacity is computed on the full cross section

LOAD CASE 1 MAIN SPAN LOADED

Critical section is at X = 5900.mm
Applied shear force = 21.31kN
Uncracked shear capacity, Vco, = 118.81kN
Section is cracked -- Vcr = 44.43kN

SECTION IS O.K.

REC 30 MAY 91

MacArdle McSweeney Associates
CONSULTING ENGINEERS

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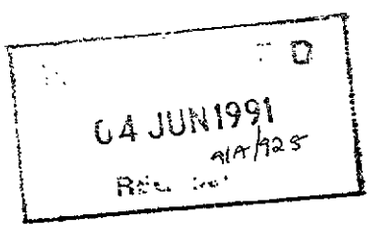
Tel: 01-608777
Telefax: 01-608237

Our Ref: DE/vch

27th May 1991
4424/AR

Mr. Matt Barry
Messrs. Barry and Associates
Architects
27 Longford Terrace
MONKSTOWN
County Dublin



Dear Mr. Barry,

I.D.A. TALLAGHT BUSINESS CENTRE, TALLAGHT: PHASE II

I confirm that the Mechanical and Electrical Services will be designed and installed in accordance with the Codes and Standards as set out in the appended schedules.

Yours sincerely,
MAC ARDLE MC SWEENEY ASSOCIATES

DAMIEN EGAN

encl:

Cork Office: Trafalgar House, Montenotte, Cork
Tel: 021-503633 Fax: 021-503227

London Office: In Association with -
The Gore Partnership, New Enterprise House,
85 Clerkenwell Road, London EC1R 5AR
Tel. 03-071-8313493 Fax. 03-071-8317618

Reg. Office: Century House, Harold's Cross Road, Dublin 6. Reg. No. 37227.

Directors:

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M.McLoughlin B.E., C.Eng., M.I.E.I., M.C.I.B.S.E., M. Cons E.I.

J.S. Harper Eng. Tech. I.C.I.B.S.E., M.A.S.H. R.A.E.
M. Scanlan B.E., M.I.E.I.
B. Woods B.E., Dip Comp Sc., M.I.E.I.
P. J. Cummings T.Eng., M.I. Elec., I.E.
D.Egan

Consultant: V. MacArdle F.C.I.B.S.E.

SERVICES' ENGINEERING - STATUTORY BODIES

We indicate below the compliance with the various Statutory Bodies etc., within the Services' Engineering Design:

1. Low-Pressure Hot Water Radiator Heating Installation

1.1 Procedures and Standards of C.I.B.S. Guides and Commissioning Codes of Practice.

1.2 Fire Officer's Requirements

1.3 Proposed Building Regulations

2. Mechanical Ventilation and Air-Conditioning

2.1 B.S. 5720: 1979 (Formerly C.P. 352: 1958)

2.2 Procedures and Standards of C.I.B.S. Guides and Commissioning Codes of Practices.

2.3 H.V.C.A. Specifications for Ventilation Ductwork

2.4 Fire Officer's Requirements

2.5 Proposed Building Regulations

3. Water Services' Installation

3.1 Procedures and Standards of C.I.B.S. Guides and Commissioning Codes of Practices

3.2 Bye-Law Regulations; including compliance with Sanitary Services' Department and the Department of Health Requirements

3.3 Proposed Building Regulations

4. Fire-Fighting Installations

4.1 Procedures and Standards of C.I.B.S. Guides and Commissioning Codes of Practices.

4.2 Bye-Law Regulations

4.3 Proposed Building Regulations

4.4 Fire Department/Fire Officer's Requirements

4.5 F.O.C. Recommendations

4.6 British Standards i.e.,

B.S. 5306: Part 1/Formerly C.P. 402,101 (Hose Reels)

B.S. 5306: Part 3/Formerly C.P. 401 Part 3 (Portable Fire Extinguishers)

4.7 B.S. 5306: Part 5/Halon Systems

4.8 B.S. 6266: Fire Detection Densities

5. Fire Alarm System

5.1 Fire Department/Fire Officer's Requirements

5.2 B.S. 5839: Part 1; 1988 - Formerly C.P. 1019 (Fire Detection and Alarm Systems in Building)

6. Emergency Lighting System

6.1 Fire Department/Fire Officer's Requirements

6.2 I.S. 3217: 1989

7. Electrical Services Generally

7.1 National Rules for Electrical Installations as issued by the Electro-Technical Council of Ireland

7.2 Requirements for Earthing in Electrical Installations

7.3 The Factories' Act

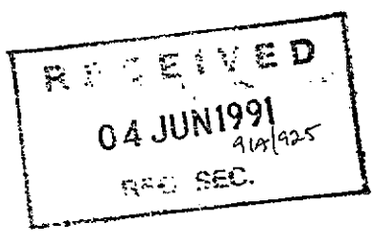
7.4 British Standard Code of Practice C.P. 1003; Part 1: 1964, Part 2: 1966, Part 3: 1967

7.5 The Institute of Petroleum Model Code of Safety Practice in the Petroleum Industry (Part 1, Electrical) - 5th Revised Edition (1965)

7.6 Directive for Industrial and Commercial Metering Installations issued by the Electricity Supply Board

DE/vch

SPECIFICATION OF WORK TO BE DONE AND MATERIALS TO BE USED IN THE PROPOSED STAGE II EXTENSION TO THE TALLAGHT BUSINESS CENTRE AT WHITESTOWN ROAD, TALLAGHT, CO. DUBLIN FOR THE INDUSTRIAL DEVELOPMENT AUTHORITY.



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MONKSTOWN
CO. DUBLIN

MAY 1991

EXTERNAL WALLS

Outer Leaf

90 mm Forticrete blockwork outer leaf, smooth finish with bucket handle pointing, Split Fluted Forticrete blockwork panels as dimensioned and indicated cross hatched on the plans, with raked joints laid in 1 cement, 6 roadstone or equal mortar with cormix W2 efflorescence inhibitor and pigmented to match colour of blocks in accordance with Architect's instructions.

Cavity

110 cm cavity with 30 mm shelterboard insulation to inner leaf, and stainless steel twist type wall ties at 400 mm c/c vertically and 600 mm c/c horizontally, having insulation retainers, and minimum embedment of 50 mm in each leaf. Extra ties at control joints and jambs.

Inner Leaf of Cavity Wall

190 mm thick fine textured modular concrete blockwork inner leaf, fairfaced finished with bucket handle pointing.

Inner Leaf to be of 50% void hollow blocks as above, laid in 1 : 1 :6 mortar and bucket handle joint finished.
5N/mm^2 high strength blocks shall be manufactured on static machine and steam cured.

INTERNAL WALLS (PARTY)

190 mm thick fine textured modular 25% void concrete blockwork throughout with cast-in-situ concrete lintol blocks at all openings reinforced to Engineers details and specification. 5N/mm^2.

WINDOWS

Windows throughout shall be of Aluminium Syntha Pulvin finish with polycarbonate and laminated clearglass and 6 mm glass.

D.P.C's.

D.P.C's to be provided at minimum of 150 mm above finished ground levels, over all lintols, under all ceills, cappings to all parapets, etc., to all door and window jambs etc. See Engineer's specification for full details.

WATERTANKS

All water tanks shall be of 1000 x 1500, and shall be supported on steel framing to Engineer's details.

Sinks shall be provided to units where shown on the drawings.

CAPPINGS

All cappings shall be of 390 x 190 x 190 mm Forticrete capping block (Ref. R.20D), and shall be laid on high performance D.P.C., and fixed to outer leaf with s.s. ties.

CONTROL JOINTS

Control joints to all walls, slabs, roofs, etc. to be to Engineer's details and specifications, and shall be generally located at grid lines.

FLOORS

150 mm concrete slab, reinforced to Engineer's details and specification with powerfloat finish, and sealed with a dust sealer to units. Corridors and public areas to have selected P.V.C. tiling throughout.

On 1000 gauge Visqueen D.P.M.

On 50 mm polystyrene insulation to perimeter, and 50 mm sand blinding.

On minimum 200 mm well compacted hardcore bed.

FOUNDATIONS

All foundations shall be to Engineer's details and specification.

ROOF

20 mm two coat mastic asphalt to B.S. 988T.

On separating layer of loose laid sheeting felt.

On 38 mm insulation board.

Bonded to two layer vapour barrier to B.S. 747 (3B).

On minimum 50 mm sand/cement screed laid to fall of 1/40.

On 200 mm precast Breton Slab units to Engineer's detail and specification.

20 mm two coat mastic asphalt to B.S. 988T on separating layer of loose laid sheeting felt on 38 mm shelter insulation board (polyurethane) for use under asphalt laid staggered joint in hot bitumen on 3B reinforced vapour barrier laid in hot bitumen and lapped joints on a primed screed (bituminous primer) asphalt to be painted in two coat solaflect paint.

Screed to be of low water/cement ratio to Engineer's Specification and to be laid to a minimum of 1:40. This minimum fall of 1:40 to be strictly adhered to and no variation or deviation from this minimum will be allowed.

DOORS

External doors shall be of hardwood timber construction throughout with paint finish.

Internal doors shall be to Irish Standard specification.

BOLLARDS

All bollards shall be of 150 mm diameter steel C.H.S. and shall be filled with concrete and set in concrete pad to Engineer's detail.

ROOFLIGHTS

All rooflights shall be of double skin coxdomes with vents and shall be supplied and erected by specialist contractor.

DRAINAGE

Drainage shall be of 150 mm diameter U.P.V.C. and shall be encased in minimum 150 mm concrete.

All drainage shall be laid to falls of 1/1000, and shall be laid on concrete bed to Engineer's Specification.

KERBING

All kerbs to edges of roads shall be 150 x 50 mm rounded precast concrete kerb units.

Disposal of Excavated Material

The Contractor's prices for excavating and disposing of excavated material are to include for depositing same in temporary spoil heaps if necessary and loading and removing as required. All surplus excavated material shall be carted off the site to a tip or shoot to be provided free of charge by the Contractor.

MATERIALS

Blinding

Blinding shall be clean boiler ashes, free from dust, rubbish, unburnt particles of coal, etc.

Hardcore

Hardcore shall be good clean brick, cement concrete, hare tiles, stone or ballast, broken before placing to pass 75 mm ring, free from all rubbish.

WORKMANSHIP

Notice

The Contractor shall give the Architect 7 days notice in writing when the excavations for foundations are ready for inspection. All excavations must be inspected and approved by the Architect prior to the execution of further work.

Excavation below required levels

Should any excavation be taken below the required levels, or the depths necessary to obtain a suitable bottom, the Contractor will be required to fill in the excavation to the proper level with material as directed at his own expense.

Returning, Filling and Ramming

Selected excavated material shall be returned and filled around foundations or to make up levels under floors and pavings in layers not exceeding 300 mm thick, carefully rammed and consilidated with the addition of water if required or directed by the Architect. No filling in shall be executed until the foundations footings, etc. have been inspected and approved by the Architect or his representative.

BRICKWORK AND BLOCKWORK

GENERALLY

Samples

Samples or bricks, blocks and facings shall be submitted to the Architect for his approval before any are delivered to the site.

MATERIALS

Concrete Blocks

Concrete blocks for walling shall be obtained from approval specialist manufacturers they shall be true in size with clean sharp arrises.

Concrete blocks shall comply with the requirements of the Irish Standard 20.

Stock concrete bricks

Stock concrete bricks shall be "Clondalkin" or equal approved precast bricks size 8 5/8" x 4 1/8". (219 x 105 x 67 mm).

Cement

Portland cement shall comply with I. S. 1 or B. S. 12.

Lime

Hydrated limes for cement/lime mortars shall comply with I. S 8 or B. S. 890. semi-hydraulic, Class "B" calcium limes.

Sand

Sand for mortar shall comply with B. S. 1200.

Damp-Proof Course

Damp-proof course shall be bitumen type reference D lead cored in accordance with B.S. 743. It shall be lapped 100 mm at all joints.

WORKMANSHIP

Storage of materials

Cement and limes shall be stored off the ground, under cover and away from damp and in such a manner to enable them to be used in rotation in order of delivery.

Sands shall be stored separately according to type, on clean, hard, dry standings and protected from contamination.

Precast concrete blocks and facing bricks shall be open stacked to permit vertilation and protected from rain, snow and rising damp.

Work in cold weather

No brickwork or blockwork shall be carried out when the temperature is at or below 3^{o} Centigrade (37^{o} Fahrenheit) unless the permission of the Architect has been obtained that the work should be continued with agreed precautions being taken, to ensure a minimum temperature of 40^{o} C (40^{o}F) in the work when laid and thereafter to maintain the temperature in the work at above freezing point until the mortar had hardened. The addition of anti-freeze compounds to the mortar will not be permitted.

Wetting bricks and blocks

Blocks shall be wetted as necessary during hot or dry weather.

Laying concrete blocks and bricks

Blocks shall be fully bedded and the joints completely filled. Wetting blocks before laying shall only be done where, and as necessary, to adjust suction on the faces in contact with the mortar. All laced brickwork shall be protected with felt or polythene and any accidental damage made good immediately.

Mortar mixing

All materials shall be accurately gauged by gauge boxes and mechanically mixed.

Retempering of mortar constituents shall be in accordance with the mixes stated in the headings to brickwork and blockwork.

Mortar mixes

The proportions of mortar constituents shall be in accordance with the mixers stated in the headings to brickwork and blockwork.

Protection

Protect all work in this section until completion.

ASPHALT WORK

GENERALLY

Approved Firms

All materials shall be supplied by a firms approved in writing by the Architect and the works executed by their own workmen.

Guarantees

The Contractor shall obtain from the approved Sub-Contractor for asphalt work and deposit with the Architect, a written guarantee and undertaking in the form issued by The Mastic Asphalt Employers Federation to the effect that during a period of twelve calendar months from and after the certified date of completion of the whole of the works such Sub-Contractor shall at his own expense make good to the satisfaction of the Architect all and any defects in the asphalt work which shall be attributable to improper materials or faulty workmanship and shall bear the cost of any consequential damage as is provided for in such guarantee.

MATERIALS

Asphalt for roofing

Asphalt for roofing shall comply with B.S. 988; Table 1, Column 2.

Asphalt for tanking

Asphalt for tanking shall comply with B.S. 1097; Table 1, Column 2.

Felt Underlay

The underlay shall be impregnated flax black sheathing felt complying with B.S. 747; (Type 4A) (i), weighing 15 kg per 22.50 metre roll, and shall be supplied by the Sub-Contractor.

Reinforcement

Reinforcement shall consist of metal lathing complying with B.S. 1369 Type 1 (a) "Plain expanded" but not less than 10 mm short way of the mesh and not lighter than 26 S.W.G. and shall be supplied by the Sub-Contractor.

Rubbing sand

Rubbing sand shall be clean natural coarse sand.

Preparation of surfaces

All surfaces to receive asphalt are to be dry, rough and finished to the requirements and to the entire satisfaction of the Asphalt Sub-Contractor from whom the Contractor whall obtain, for submissiou to the Architect a signed statement that such finish is satisfactory.

Melting asphalt on site

Asphalt blocks shall be broken into pieces of convenient size and carefully melted in cauldron or mechanically agitated mixers on the size at a temperatur not exceeding 215°C. (420°F.) or the molten material may be delivered to the site in mechanically agitated mixers.

Dusting of buckets

Buckets used for carrying molten asphalt shall be dusted with a fine inert dust. On no account shall ashes or oil be used for this purpose.

Laying

Asphalt shall be laid in bays generally not exceeding 1.80 wide, and subsequen coats shall be laid breaking joint. Junctions between bays and fillets shall be properly married, the laid asphalt being heated by the application of hot material, the whole being worked so that the joints are neatly made. Surfaces of roofing shall be finished with rubbing sand.

Air stains and pockets

Air pockets and stains on the asphalt will not be permitted and the finished asphalt work shall not ring hollow over any parts of the surface.

Joints and Fillets

Joints in all asphalt work shall be carefully made and complete fusion obtaine to make them watertight. Fillets shall be run at all internal angles and in at least two operations. Perfectly watertight joints shall be made around pipes passing through walls and floors and around gullies, etc.

Felt underlay

The felt underlay shall be fixed by the Sub-Contractor and generally be laid loose except on vertical or sloping timber surfaces of 10° and over where it is to be fixed with glavanished, round extra large head felt nails at 150 mm centrs. It shall generally be laid with butt joints except on roofs where joints shall be lapped 75 mm.

Temporary Protection

All Asphalt shall be adequately protected immediately after laying.

CARPENTRY AND JOINERY

MATERIALS

Timber

All timber shall be free from loose and unsound knots, clusters of knots, waney edges, pitch pockets, decay and woodworm.

Timber and timber components shall be delivered to the site with maximum moisture content according to use, as set out in Irish Standard No 90 1958. Care shall be taken after installation to ensure that the moisture contents do not rise above these figures before final conditions of use are achieved.

Rough white deal shall be home-gorwn or imported Quebec white deal. Wrought white deal shall be imported. Redwood (Red Deal) shall be imported Baltic Red deal (or home-grown, if obtainable). Oregon Pine shall be best quality clear, imported. All other woods shall be imported. Where there is a choice, preference shall be given to the home-grown woods. If a home-grown wood is not procurable in the required sizes and quality the specified, alternative may be used and if an alternative is not shown the Architect's directions shall be obtained.

Hardwoods shall be prime selected quality free from all defects.

Mahogany shall be first quality Afrormosia West African well seasoned.

Oak to be Japanese oak, thoroughly seasoned.

Parana Pine shall be selected qualiy, suitable for polishing.

Iroko shall be selected African, well seasoned.

Afrormoise shall be selected quality, suitable for polishing or clear varnishing.

Blockboard

Blockboard shall be the specified thickness and veneered if necessayr. It shall be edged with hardwood slips and shall be of approved make and quality.

Hardboard and Chipboard

All hardboards and chipboards to be obtained from an approved manufacturer to the thickness specified.

Plywood

Plywood shall comply with the Conditions of B.S. 588 and where used externally it is to be resin bonded, obtained from approved suppliers.

Preservative

Treatment shall be by impregnation under pressure with an approved water borne solution or by immersion in an approved organic oil solution, and the solution shall be appropriate to the position of the timber in the building, i.e. internal or external.

Ends and any other surfaces cut, trimmed or planed after treatment, shall be brushed liberally with the solution before fixing.

Timbers treated with water borne solution shall be dried down again to the required moisture contents before installation.

If the Contractor proposes to carry out the treatment on the site he shall obtain the Architect's approval of the method and the solution before doing so.

Flush doors

Flush doors to comply with I.S. 48 1955 as amended 1956 and 1965 and also amended as follows:-

(a) 3.2mm plywood to be used on both faces.

(b) Afrormosia lipping to all edges.

Fire resistant flush doors shall comply with B.S. 459, Part 3.

WORKMANSHIP

Storage

Joinery shall be protected from the weather during transit and shall be stored under cover, clear of the ground, before and after priming.

Framing

Frame up all carpentry work in a secure and strong manner and in accordance with the best practice, using screws, nails, bolts, straps and connectors as appropriate to each position and avoiding splitting or otherwise damaging the timber.

Joinery

Put joinery together according to the best practice with accurate workmanship in morticed, dovetailed, grooved, scribed, mitred and all other joints, with proper cramping and with hardwood wedges. After preparation and working of the timber, assemble the joinery dry and leave it properly stacked out of winding for one month before finally glueing and wedging.

Put external joinery together with white lead or a waterproof glue and internal joinery with an appropriate first quality glue.

(Contd.)

Finish all exposed faces of joinery work absolutely straight and smooth so that only normal glass-papering will be required later as preparation for painting or other finish.

Before putting joinery in hand obtain all necessary moulding and other details from the Architect and seek his approval to the place of manufacture, the methods of jointing, the glues, the timber to be used, and all other details affecting the work. Likewise obtain the Architect's approval to the assembled joinery before priming.

The hardwoods in each fitting shall be uniform and consistent in colour and grain, where finished with oil, polish or similar transparent finish.

All joinery's work which may split, fracture, shrink, part in the joints, or show flaws or other defects or unsoundness, want of seasoning or bad workmanship, is to be removed and replaced with new materials.

Note

The prices for hardwood skirtings, architraves and the like not exceeding 0.002 m^2 sectional area and softwood not exceeding 0.004 m^2 sectional area, shall include for all mitres, ends, etc.

Timber sizes

The sizes given for wrot timbers are nominal and an allowance of 3.2 mm shall be allowed from the nominal size for each wrought face or edge, except where the work is described as being to finished sizes.

MATERIALS

Steel

Mild steel shall comply with B.S. 3706, Grade 1.
Hot rolled sections shall comply with B.S. 4, Part 1.
Hot rolled hollow sections shall comply with B.S. 4, Part 2.
Tubes (other than circular hot rolled hollow sections) shall comply with B.S. 1775 and shall be of the type of steel and method of manufacture described

Galvanised work

Iron and steel, where galvanised, shall comply with B.S. 729, Part 1, entirely coated with zinc after fabrication by complete immersion in a zinc bath in one operation and shall excess carefully removed. The finished surfaces shall be clean and uniform.

Bolts and nuts

Bolts and nuts shall comply with B.S. 1494 and B.S. 916 and have Whitworth threads complying with B.S. 84.

WORKMANSHIP

Protection

Protect all metalwork until completion.

Method of Measurement

Unless otherwise described all welding shall be left as laid. Joints in the running lengths of members of balustrades, etc. required by the fabricator for ease of transporting and fixing shall be deemed to be included by the Contractor in his prices.

TILE, SLAB AND BLOCK FINISHINGS

Preparation

All surfaces to receive finishings shall be thoroughly cleaned; screeds to receive finishings bedded in mortar shall be well wetted before laying is commenced.

Vinyl Tile: Sheet Vinyl Flooring

Vinyl Tile and Ceramic Tile floor finishings shall be laid by an approved Sub-Contractor. No flooring shall be laid until the plastering of ceilings and walls has been completed. Before laying is commenced, the Contractor shall obtain from the Sub-Contractor and foward to the Architect (a) a written statement to the effect that the trowelled bed is in all respects satisfactory to receive the tiling (b) a guarantee that any defects due to faulty workmanship or materials, occuring within one year of the certified date of completion of the whole of the works, will be made good by the Sub-Contractor at his own expense, to the satisfaction of the Architect.

Protection

Protect all work in this Section.

GLAZING

GENERALLY

Samples

Samples, not less than 150 mm square, of special types of glass are to be submitted for approval before any glass is cut.

MATERIALS

Glass

All glass shall comply with the appropriate section of B.S. 952.

Putty for glazing to wood

Putty for glazing to wood shall comply with B.S. 544.

Sealing strip

Sealing strip shall be a non-setting compound as 'Everseal' or 'Seal-A-Strip' (butyl mastic) 'Prestik' (Grade 5925) or 'Arbostrip' or other approved.

WORKMANSHIP

Glass to be kept free from moisture

All glass surfaces shall be kept dry during transit and storage. Glass becoming moist from condensation or other causes shall be thoroughly dried and aired.

Rebates and beads

All glazing and beads in wood or galvanised steel shall be sealed or primed before glazing is commenced.

Edges of glass

All glass shall have clean cut edges.

Bead glazing

Glazing fixed by beads shall have both glass and beads bedded and back puttied and the putty trimmed off flush. Where sealing strip is used it shall pass round both faces of the glass and be trimmed off flush on both sides. Metal surfaces to receive sealing strip shall be treated with mineral oil before glazing.

Wired glass

The wire in wired glass shall extend to the edges and be free from rust. The wires of Georgian wired glass shall be parallel to the framing.

Protection

Protect all glass until completion.

PAINTING AND DECORATING

MATERIALS

Approval brands

The Contractor shall seek, in writing, approval from the Architect for all of the brands of paint he wishes to use.

Delivery

All paints, varnishes, distempers and other surface coatings shall be delivered in sound and sealed containers, labelled clearly by the manufacturer, the label or decorated container stating:-

(a) the type of product;
(b) the brand name, if any;
(c) the use for which it is intended;
(d) the manufacturer's batch number .

The label shall be a printed label, typewritten labels will not be accepted. The batch deliveries shall be dated and used strictly in order of delivery. No paints other than water based paints, and bituminous paint shall be delivered in containers exceeding 5 litre capacity.

Same maker's materials used for coating

While materials for the works may be obtained from several makers, undercoats and finishing coats for a particular surface must be obtained from the same maker (i.e. one maker's finishing coat must not be applied over another maker's undercoat).

Information and facilities to suppliers

The Contractor shall supply and paint manufacturers with all relevant details of the materials required to comply with the description in this Bill and the manufacturers shall be given every facility for inspecting the work during progress in order to ascertain that the materials are being used in accordance with their instructions and they are to be allowed to take samples of their products from the site if they so desire.

Storage

All materials shall be kept in a dry, clean store, protected from frost.

Remedying defects due to defective materials

All unsatisfactory materials shall be immediately removed from the site, and any work executed with such defective materials shall be made good by the Contractor at his own expense to the satisfaction of the Architect.

Knotting

Knotting shall comply with B.S. 1336.

Stopping

Stopping for:-

(a) plasterwork shall be a plaster based filler.
(b) concrete, rendering or brickwork shall be of similar material to the background and shall be finished with a similar texture.
(c) asbestos cement and asbestos based insulating board shall be a composition of asbestos filler and cement.
(d) internal woodwork, hardboard, fibreboard and plywood shall be putty complying with B.S. 544 and shall be tinted to match the colour of the undercoat.
(e) external woodwork shall be white lead paste complying with B.S. 2029 with or without the addition of red lead complying with B.S. 217, type 2 and gold size complying with B.S. 311 and shall be tinted to match the colour of the undercoat.
(f) clear finished woodwork shall be a stopping tinted to match the surrounding woodwork.

Linseed oil

Refined linseed oil shall comply with B.S. 242.
Raw linseed oil shall comply with B.S. 243.
Boiled linseed oil shall comply with B.S. 259.

White spirit

White spirit shall comply with B.S. 254.

Turpentine

Turpentine shall comply with B.S. 244 and 290, either Type 1 or Type 2.

Size

Size shall comply with B.S. 3357.

Emulsion paint

Emulsion paint (interior and/or exterior) shall be of a brand scheduled on the Approved List for Grade A paints. The first coat shall be thinned in accordance with the manufacturer's instructions.

Primer for alkaline surfaces

Primer for alkaline surfaces shall be a special primer obtained from the maker of the undercoat and finishing coat.

Primer for iron and steel work

Primer for iron and steel work shall be:-

(a) Lead based priming paint complying with B. S. 2523, Type B.
(b) Calcium plumbate priming paint complying with B. S. 3698, Type A.
(c) Metallic lead primer, containing not less than 30 per cent of metallic lead in the dried film.
(d) Metallic zinc paint, containing not less than 93 per cent of metallic zinc in the dried film.
(e) Zinc chromate priming paint in accordance with DEF. 1039.
(f) Red oxide/zinc chromate paint in accordance with DEF. 1035A.

Primer for zinc and galvanised steel

Primer for weathered or new zinc and galvanised surfaces shall be calcium plumbate paint, containing not less than 73 per cent of calcium plumbate in the pigment. The pigment/binder ratio shall be not less that 2:1.

Primer for internal woodwork, excluding the internal surfaces of external doors, windows and their frames

Primer for internal woodwork (other than the internal surfaces of external doors, windows and their frames) shall be an approved leadless grey priming paint which shall be compatible with the subsequent coats and obtained from the same maker.

Primer for external woodwork, including the internal surfaces of external doors, windows and their frames

Primer for external woodwork and the internal surfaces of external doors, windows and their frames shall be lead-based pink priming paint complying with B. S. 2521.

Lining Paper

Lining paper to be heavy grade W. 600

PREPARATION OF SURFACES

Approval

The preparation of all surfaces must be seen and approved by the Architect before any coatings are applied.

Stopping

Stopping referred to in the following clauses shall be the appropriate stopping described in clause 'Stopping' under materials.

Plaster, rendering, concrete and brickwork

All plaster or mortar splashes, etc., shall be removed from plaster, rendering, concrete and brickwork by careful scraping, all holes, cracks etc., shall be stopped and the whole of the surfaces shall be brushed down to remove dust and loose material. In addition all traces of mould oil shall be removed from concrete surfaces by scrubbing with water and detergent and rinsing with clean water to remove all detergent. When efflorescence has occurred or is suspected painting shall be d ferred for a period as required by the Architect. Old distempered ceilings and oil painted wall surfaces shall be thoroughly washed and cleaned down and all loose scales etc. removed with glass-paper, all old nail heads, plug holes etc. shall be stopped. All cracks shall be scraped out and afterwards filled with stopping, faced up and rubbed down to an even surface.

Lead and copper

Lead and copper surfaces shall be washed with soap and water, roughed with abrasive paper and washed with white spirit.

Aluminium

Aluminium surfaces shall be washed with white spirit and either carefully roughed with abrasive paper or treated with etchingssolution in accordance with the maker's instructions.

Iron and steel

Before fixing, all rust and scale shall be removed from iron and steel surfaces by wire-brushing, scraping hammering, flame cleaning, etc.

Zinc and galvanised surfaces

Zinc and galvanised surfaces shall be washed with white spirit.

Woodwork to be painted

Before fixing woodwork, all surfaces which will be visible after fixing shall be rubbed down and all knots and resin pockets shall be scorched back and coated with knotting. After priming and fixing, all nail holes and other imperfections shall be stopped and the whole surface shall be rubbed down and all dust brushed off. All previously painted woodwork shall be washed with soap and water, well rinsed with clean water, and rubbed down with waterproof abrasive paper before re-painting. All crevices, cracks, holes, blisters etc. whall be scraped out. primed and made good with hard stopping, faced up and rubbed down to an even surface.

Woodwork to receive clear finish

All holes and other imperfections in surfaces to receive a clear finish shall be stopped and the whole surface shall be rubbed down and all dust brushed off.

WORKMANSHIP

Manufacturer's instructions

All materials shall be used strictly in accordance with the instructions issued by the manufacturer's concerned.

Brush work

Unless otherwise described all coatings shall be applied by brush. Written permission must be obtained from the Architect for the application of coatings by spray or roller where not so described and if permission is granted such application shall not result in extra cost to the Employer.

Priming of joinery

Joinery shall be delivered to the site unprimed and is to be protected from rain and damp during transit. It is to be stored in clean, dry, ventilated structures and no primer shall be applied while the timber is in any way damp. The stores and drying room shall be of adequate size to allow for proper working space and for the proper coating and storage of primed work. Primers shall be applied as soon as possible after inspection and acceptance of the joinery by the Architect.

Condition of priming

If, by the time that the work is to receive the first undercoat, the priming coat has in any way deteriorated or has been damaged, the affected portions - or the whole, if necessary - shall be rubbed down and re-primed. In the case of articles primed at works the priming shall be touched up where required with a similar primer.

Rubbing down

All undercoats for oil paints and clear finishes shall be rubbed down to a smooth surface with abrasive paper and all dust removed before the succeeding coat is applied.

Differing colours of undercoats

Each succeeding coat of priming and undercoating paint shall be sufficiently different in colour as to be readily distinguishable.

Painting in unsuitable conditions

No coatings shall be applied to surfaces affected by wet, damp, foggy or frosty weather or other unsuitable conditions, or to any surface damp with moisture. If it is desired to proceed with painting when the temperature is below 4°C (40°F) the permission of the Architect must be obtained.

Protection of wet surfaces

Adequate care must be taken to protect surfaces while still wet, by the use of screens and "wet paint" signs where necessary.

Damage to adjoining surfaces

Care must be taken when storing materials, preparing surfaces or painting, etc., not to damage or stain other work. The Contractor shall remove all such stains, make good and touch up.

Cleanliness

All brushes, tools and equipment shall be kept in a clean condition and surfaces shall be clean and free from dust during painting. Painting shall not be carried out in the vicinity of other operations which might cause dust. The Contractor shall provide a suitable moveable receptacle into which are to be placed all the liquids, slop washings, etc., which are on no account to thrown down any of the gullies, manholes, sinks, lavatories, W.C.'s or any other sanitary fittings. All solid refuse or inflammable residues must be remov from the site or burned.

Removal of ironmongery, etc.

All surface fixed ironmongery, fittings etc., except hinges shall be removed before painting and refixed on completion.

Protection

All painted and decorated surfaces shall be protected until completion.