UNIVERSITY COLLEGE LONDON

University of London

EXAMINATION FOR INTERNAL STUDENTS

For The Following Qualification:-

B.Sc.

ES2040: Quantity Surveying and Contract Procurement

COURSE CODE	:	**ENVS2040**
UNIT VALUE	:	**0.50**
DATE	:	**24-MAY-04**
TIME	:	**10.00**
TIME ALLOWED	:	**3 Hours**

TURN OVER

ENVS 2040 QUANTITY SURVEYING AND CONTRACT PROCUREMENT

Answer FOUR questions.
All questions carry equal marks.

QUESTION 1

A prospective client who is new to the property development process has asked your Project Management organisation for a brief report on whether to proceed with a development on a traditional or a design and build procurement basis.

Currently, the client's architect has produced an outline sketch scheme, comprising site plan, floor plans, elevations and a cross section for a traditionally constructed three storey office block sufficient to obtain planning permission and to secure short term development funding. The client's Quantity Surveyor has indicated that the project is likely to cost £1.5m.

Explain the essential report issues and discuss the likely recommendations.

(25 marks)

QUESTION 2

"Professional Quantity Surveyors are moving away from a passive role of receiving a complete design to measure and bill, towards a more active position within the design team. There is no doubt that experienced Quantity Surveyors bring a valuable talent to the design process, they can advise instantly on the relative costs of options under consideration and point out possible constructional difficulties" Tanya Ross.
Adapt or die Building, 1/9/2000 page 37.

Discuss.

(25 marks)

QUESTION 3

Take off the quantities for the concrete, formwork and reinforcement from ground floor to first floor level to the reinforced concrete framed Office Development Building on the attached drawing. The work to be measured therefore are the columns from the ground floor to first floor level, the first floor slab and the attached beams. Do not measure or make and adjustments for the staircase.

(25 marks)

Specification information

concrete – mix type 'D' to BS 5328, 20mm aggregate
formwork – finish type 'F'
reinforcement – bars, grade 460 to BS4449 as schedule
fabric, 3.049 kg/m^2 to BA4483.

QUESTION 4

Explain the purpose and significant features of the following within a Bill of Quantities.

a)	Preambles	(5 marks)
b)	Defined Provisional Sums	(5 marks)
c)	Undefined Provisional Sums	(5 marks)
d)	Prime Cost Sums for work by Nominated sub-contractors	(5 marks)
e)	General Attendance on Nominated sub-contractors	(5 marks)

QUESTION 5

A visit to the proposed construction site is an essential requirement for the contractor's tender team within any tender bidding process.

Such a visit should be written up in the form of a site visit report, which, will not only provide valuable and essential information to aid the estimating and pre-tender planning process, but will provide a formal record for future post-contract reference.

Describe the likely contents of such a report and explain how the information influences the construction methods and estimating decisions.

(25 marks)

QUESTION 6

The following is taken from a bill of quantities. Analyse a NET rate per m^2 for:-

> Formwork to isolated rectangular shaped beams, not exceeding 3m height to soffite (in 60 Nr beams) – $324m^2$.

(25 marks)

Data and information for Question 6

Isolated beams generally 300mm x 450mm deep x 4.5m long. The contractors method statement assumes 10 uses per shutter and with ALL adjustable steel props being required for 7 days and 50% of the props being required for a further 14 days.

19mm shuttering plywood		£140/10m^2
Sawn timber		£370/m^3
Nails		£1.50/kg
Weekly hire rates for adjustable steel props		30p/wk each
Shuttering carpenter		£11.00/hr
Labourer		£7.50/hr
Expected labour outputs	making shutter	0.98hrs/m^2
	oiling shutter	0.08hrs/m^2
	cleaning shutter	0.11hrs/m^2
	fixing shutter	0.65hrs/m^2
	striking shutter	0.29hrs/m^2

Candidates are to assume all other information required and to show these assumptions within their answers.

END OF PAPER

CANDIDATE IDENTIFIER ....

Item	Quantity Q	Rate R	Labour L	Materials M	Plant P	Total Values

04-C0419a-3-180

CANDIDATE IDENIFIER .....

E In situ concrete/Large precast concrete

E05 In situ concrete construction generally

E10 Mixing/Casting/Curing in situ concrete

INFORMATION PROVIDED

P1 The following information is shown either on location drawings under A Preliminaries/General conditions or on further drawings which accompany the bills of quantities:
(a) the relative positions of concrete members
(b) the size of members
(c) the thickness of slabs
(d) the permissible loads in relation to casting times

CLASSIFICATION TABLE

1 Foundations 2 Ground beams 3 Isolated foundations			m³	1 Reinforced 2 Reinforced > 5% 3 Sloping ≤ 15° 4 Sloping > 15° 5 Poured on or against earth or unblinded hardcore
4 Beds 5 Slabs 6 Coffered and troughed slabs 7 Walls 8 Filling hollow walls	1 Thickness ≤ 150 mm 2 Thickness 150 – 450 mm 3 Thickness > 450 mm			
9 Beams 10 Beam casings	1 Isolated 2 Isolated deep 3 Attached deep			1 Reinforced 2 Reinforced > 5%

MEASUREMENT RULES

M1 Concrete volume is measured net except that deductions are not made for the following:
(a) reinforcement
(b) steel sections of area ≤ 0.50 m²
(c) cast in accessories
(d) voids ≤ 0.05 m³ in volume (except voids in troughed and coffered slabs)

M2 The thickness range stated in descriptions excludes projections and recesses

M3 The thickness range stated of coffered and troughed slabs is measured overall

DEFINITION RULES

D1 Foundations include attached column bases and attached pile caps

D2 Isolated foundations include isolated column bases, isolated pile caps and machine bases

D3 Beds include:
(a) blinding beds
(b) plinths
(c) thickenings of beds

D4 Slabs include:
(a) attached beams and beam casings whose depth is ≤ three times their width (depth measured below the slab)
(b) column drop heads

D5 Coffered and troughed slabs include margins whose width is ≤ 500mm. Wider margins are included with ordinary slabs

D6 Walls include attached columns and piers

COVERAGE RULES

C1 Concrete is deemed to include finishing as struck from basic finish formwork or with a non-mechanical tamped finish unless otherwise required under worked finishes

SUPPLEMENTARY INFORMATION

S1 Kind and quality of materials and mix details

S2 Tests of materials and finished work

S3 Measures to achieve watertightness

S4 Limitations on method, sequence, speed or size of pouring

S5 Methods of compaction and curing

S6 Requirement for beds to be laid in bays

11 Columns 12 Column casings 13 Staircases		m³		M4 Columns are only measured as such when isolated and when their length on plan is ≤ four times their thickness	D7 Deep beams and beam casings are those whose depth (measured below the slab where attached) is > three times their width D8 Staircases include landings and strings		
14 Upstands					D9 Upstands exclude kickers		
15 Items extra over the in situ concrete in which they occur	1 Working around heating panels	m²		M5 The area measured is the system area			
	2 Monolithic finishes, thickness stated		1 Top surface sloping ≤ 15° 2 Top surface sloping > 15°		D10 Monolithic finishes include those which are cast onto concrete by lining formwork		
16 Grouting	1 Stanchion bases 2 Grillages	nr					
17 Filling	1 Mortices	nr					
	2 Holes, (nr)	m³					
	3 Chases > 0.01 m²	m³					
	4 Chases ≤ 0.01 m²	m					

E20 Formwork for in situ concrete

INFORMATION PROVIDED

P1 The following information is shown either on location drawings under A Preliminaries/General conditions or on further drawings which accompany the bills of quantities:
(a) the relative positions of concrete members
(b) the size of members
(c) the thickness of slabs
(d) the permissible loads in relation to casting times

CLASSIFICATION TABLE

1 Sides of foundations 2 Sides of ground beams and edges of beds 3 Edges of suspended slabs 4 Sides of upstands 5 Steps in top surfaces 6 Steps in soffits 7 Machine bases and plinths	1 Plain vertical 2 Dimensioned description	1 Height > 1.00 m	m²	1 Left in 2 Permanent	
		2 Height ≤ 250 mm 3 Height 250 – 500 mm 4 Height 500 mm – 1.00 m	m		
8 Soffits of slabs 9 Soffits of landings (nr)	1 Slab thickness ≤ 200 mm 2 and thereafter in 100 mm stages	1 Horizontal 2 Sloping ≤ 15° 3 Sloping > 15°	m²	1 Height to soffit ≤ 1.50 m 2 and thereafter in 1.50 m stages 3 Left in 4 Permanent	
10 Soffits of coffered or troughed slabs	1 Size of mould and profile, centres of mould, and slab thickness stated				
11 Top formwork				1 Left in 2 Permanent	

MEASUREMENT RULES

M1 Except where otherwise stated, formwork is measured to concrete surfaces of the finished structure which require temporary support during casting

M2 Curved work is so described with the radii stated

M3 Passings of ground beams are not deducted from area of formwork

M4 Voids ≤ 5.00 m² irrespective of location are not deducted from the area measured

M5 Soffits of coffered or troughed slabs are measured as if to a plain surface

M6 The thickness stated of the coffered or troughed slabs is measured overall

M7 Top formwork is measured for surfaces sloping > 15° or where otherwise specifically required

DEFINITION RULES

D1 Plain formwork surfaces are those which contain no steps, rebates, pockets or other discontinuities

D2 Formwork left in is that which is not designed to remain in position but is nonetheless impossible to remove

D3 Permanent formwork is that which is designed to remain in position

D4 Foundations include bases and pile caps

D5 Edges of suspended slabs exclude those associated with attached beams at slab perimeters

D6 Formwork to soffits of slabs includes formwork to landings occurring at floor levels

D7 Soffits of coffered or troughed slabs include margins which are ≤ 500 mm wide

COVERAGE RULES

C1 Formwork is deemed to include adaptation to accommodate projecting pipes, reinforcing bars and the like

C2 Formwork is deemed to include all cutting, splayed edges and the like

SUPPLEMENTARY INFORMATION

S1 Kind and quality of materials and propping requirements for permanent formwork

S2 Basic finish where not at the discretion of the Contractor

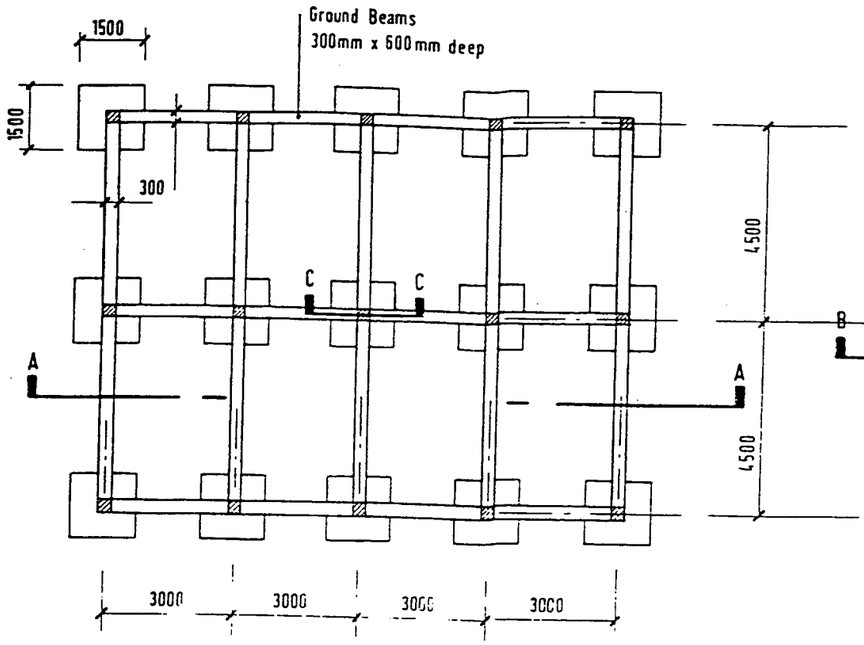
E20 continued

CLASSIFICATION TABLE					MEASUREMENT RULES	DEFINITION RULES	COVERAGE RULES	SUPPLEMENTARY INFORMATION
12 Walls		1 Vertical 2 Battered	m²	1 Height > 3.00 m above floor level 2 Interrupted 3 To one side only, wall thickness and background to other side stated 4 Left in 5 Permanent to both sides 6 Permanent to one side only, wall thickness and background to other side stated	M8 Voids ≤ 5.00 m² irrespective of location are not deducted from the area measured for walls M9 The area measured for walls whose height is > 3.00 m includes the area below 3.00 m high M10 The area of wall kickers is not deducted	D8 Walls include isolated columns and column casings whose length on plan is > four times their thickness		
13 Beams (nr) 14 Beam casings (nr)	1 Attached to slabs 2 Attached to walls 3 Isolated	1 Regular shaped, shape stated	m²	1 Height to soffit ≤ 1.50 m 2 and thereafter in 1.50 m stages 3 Left in 4 Permanent	M11 Passings of subsidiary beams or other projections are not deducted from areas of formwork but such intersections are deemed to constitute the commencement of an additional member M12 Formwork to edges of suspended slabs associated with attached beams at slab perimeters is included with the measurement of the formwork to such beams M13 Recesses, nibs or rebates which occur in beam or column formwork measured in accordance with 13 – 16.1.2.4 are included in the measurement of such formwork	D9 Where a downstand beam is formed by temporary formwork but the slab is supported by permanent formwork the downstand beam is regarded as an isolated beam D10 Regular shaped includes rectangular, circular, hexagonal or other definable regular shape	C3 Formwork to beams, columns and casings is deemed to include ends	
		2 Irregular shaped, dimensioned diagram	m					
15 Columns (nr) 16 Column casings (nr)	1 Attached to walls 2. Isolated			1 Height > 3.00 m above floor level 2 Left in 3 Permanent				
17 Recesses (nr) 18 Nibs (nr) 19 Rebates (nr)	1 Dimensioned description		m	1 Extra over the formwork in which they occur 2 Left in 3 Permanent	M14 Recesses, nibs and rebates are only measured as extra over on superficial items of formwork		C4 Formwork to recesses is deemed to include ends	
20 Extra over a basic finish for formed finishes	1 Slabs 2 Walls 3 Beams 4 Columns 5 Others, stated		m²			D11 Formed finishes are those where a finish other than a basic finish is required		S3 Details of formed finishes

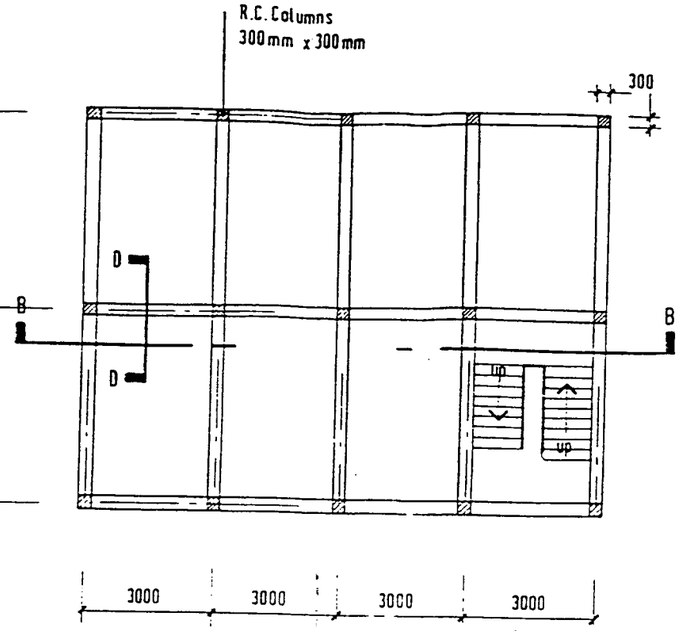
21 Wall kickers 22 Suspended wall kickers			m	1 Left in 2 Permanent	M15 Formwork to wall kickers is measured along the centre line of the wall and is deemed to include both sides			S4 Height where specifically required
23 Wall ends, soffits and steps in walls 24 Openings in walls	1 Plain 2 Dimensioned description	1 Width > 1.00 m	m²					
		2 Width ≤ 250 mm 3 Width 250 – 500 mm 4 Width 500 mm – 1.00 m	m					
25 Stairflights (nr)	1 Width of stairflight stated, waist and risers described	1 String, width stated	m	1 Left in 2 Permanent 3 Junction with wall	M16 Lengths of stairflights are measured between top and bottom nosings M17 Widths are measured overall		C5 Formwork to stairflights is deemed to include soffits, risers and strings	
		2 String, dimensioned diagram						
	2 Dimensioned diagram							
26 Mortices 27 Holes	1 Girth ≤ 500 mm 2 Girth 500 mm – 1.00 m 3 and thereafter in 1.00 m stages	1 Depth ≤ 250 mm 2 Depth 250 – 500 mm 3 Depth 500 mm – 1.00 m 4 Depth > 1.00 m depth stated	nr	1 Rectangular 2 Circular 3 Irregular shape, dimensioned description 4 Left in 5 Permanent		D12 Mortices include pockets D13 Holes are those ≤ 5.00 m²		
28 Complex shapes		1 Dimensioned description	nr	1 Left in 2 Permanent				
		2 Dimensioned diagram						

E30 Reinforcement for in situ concrete

INFORMATION PROVIDED					MEASUREMENT RULES	DEFINITION RULES	COVERAGE RULES	SUPPLEMENTARY INFORMATION
P1 The following information is shown either on location drawings under A Preliminaries/General conditions or on further drawings which accompany the bills of quantities: (a) the relative positions of concrete members (b) the size of members (c) the thickness of slabs (d) the permissible loads in relation to casting times								S1 Kind and quality of materials S2 Details of tests S3 Bending restrictions
CLASSIFICATION TABLE								
1 Bar	1 Nominal size stated	1 Straight 2 Bent 3 Curved	t	1 Horizontal, length 12.00 – 15.00 m 2 and thereafter in 3.00 m stages 3 Vertical, length 6.00 – 9.00 m 4 and thereafter in 3.00 m stages	M1 The weight of bar reinforcement excludes surface treatments and rolling margin M2 The stage lengths in the fourth column are the lengths before bending	D1 Horizontal bars include bars sloping < 30° from horizontal D2 Vertical bars include bars sloping > 30° from horizontal	C1 Bar reinforcement is deemed to include hooks and tying wire, and spacers and chairs which are at the discretion of the Contractor	
		4 Links						
2 Spacers and chairs	1 Dimensioned description		t		M3 Spacers, chairs and special joints are measured only where they are not at the discretion of the Contractor			
3 Special joint	2 Nominal size and type stated		nr					
4 Fabric	1 Mesh reference and weight per m² stated		m²	1 Bent 2 Strips in one width, width stated	M4 The area measured for fabric excludes laps. M5 Voids ≤ 1.00 m² in area are not deducted		C2 Fabric reinforcement is deemed to include laps, tying wire, all cutting and bending, and spacers and chairs which are at the discretion of the Contractor C3 Bent fabric reinforcement is deemed to include that wrapped around steel members	S4 Minimum laps



Foundation Plan 1:100



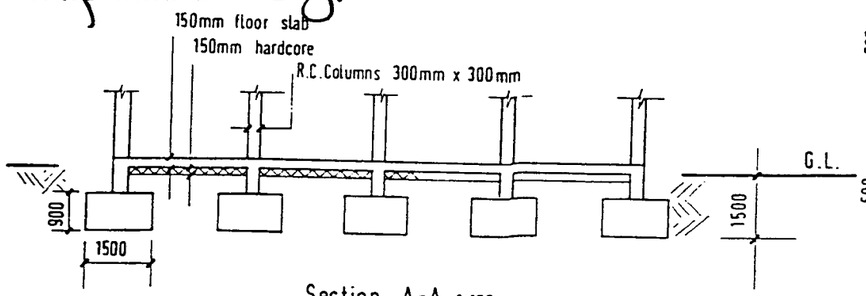
Floor Plan 1:100

Foundations

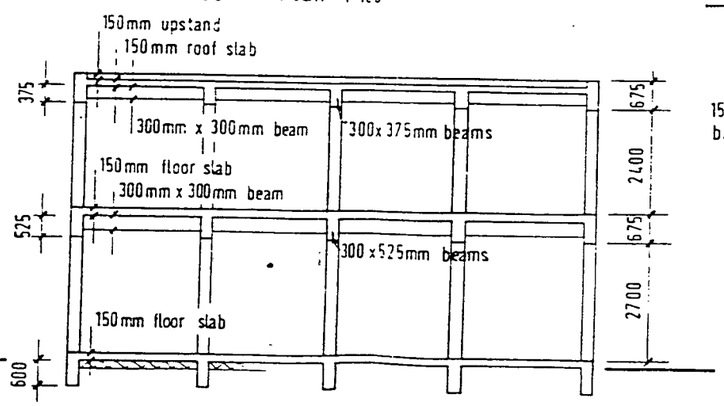
Type 'A' concrete in column bases & ground beams

Type 'B' concrete in ground floor slab

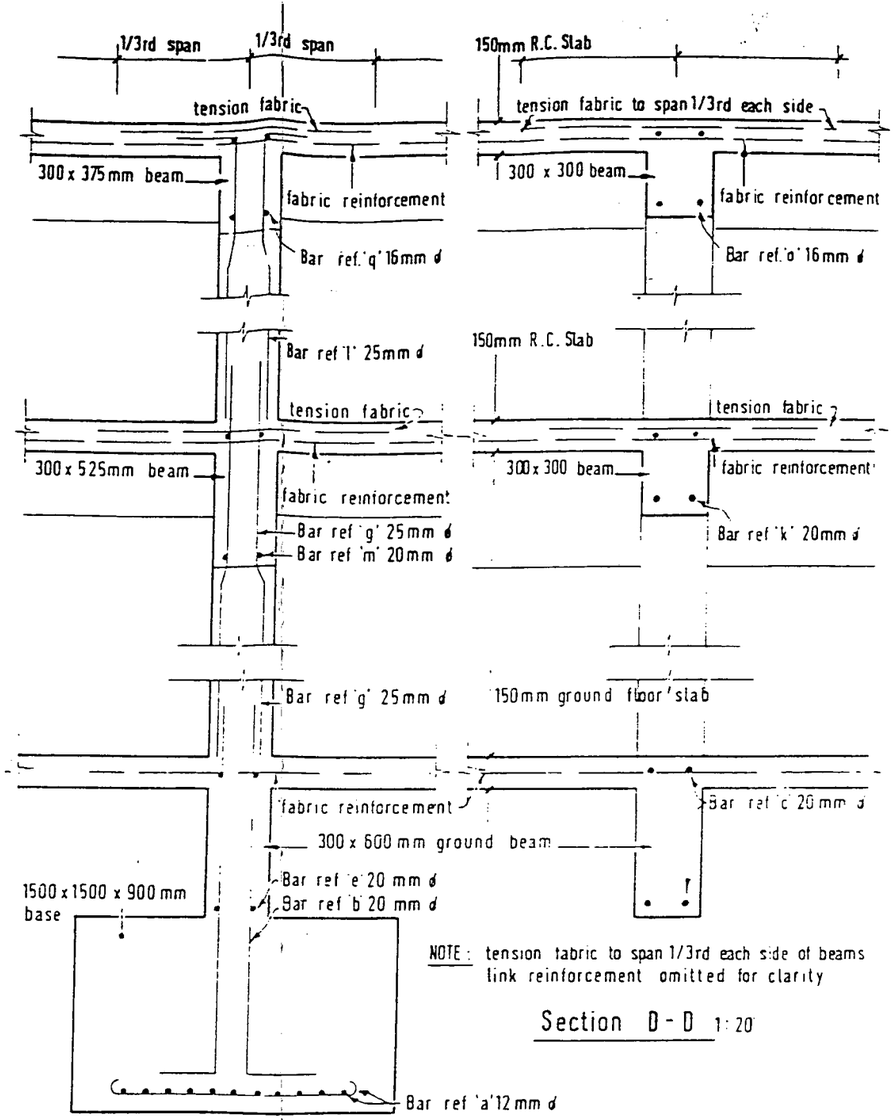
All formwork to be Type 'C'



Section A-A 1:100



Section B-B 1:100



NOTE: tension fabric to span 1/3rd each side of beams link reinforcement omitted for clarity

Section D-D 1:20

Typical sections through OFFICE BLOCK.

Section C-C 1:20

Reinforced concrete framed building. Reinforcement Schedule

Ref	Nº	Dia	Length	Shape (Not to Scale)	Remarks
a	300	12mm	1550		Pad foundation
b	60	20 mm	2475		starter bar
c	20	20 mm	9575		ground beams
d	155	6 mm	1950		ground beam links
e	12	20mm	13000	spliced	ground beams
f	123	6mm	1950		ground beam links
g	60	25mm	4050		columns ground to 1st
h	150	6mm	1050		column links ground to 1st floor
i	60	25mm	3225		columns 1st to roof

Ref	Nº	Dia	Length	Shape (Not to Scale)	Remarks
j	135	6 mm	1050		column links 1st floor to roof
k	20	20mm	9575		1st floor beams
l	155	6mm	1800		1st floor beam links
m	12	20mm	13000	spliced	1st floor beams
n	123	6mm	1350		1st floor beam links
o	20	16 mm	9500		roof beams
p	155	6mm	1475		roof beam links
q	12	16 mm	12·900	spliced	roof beams
r	123	6mm	1350		roof beam links

Fabric reinforcement

Ground floor slab - Structural mesh weighing 3·727 kg/m²

First floor slab + Roof slab including tension reinforcement - Structural mesh weighing 3·049 kg/m²

Superstructure

Type 'D' concrete in columns, beams & suspended floors

All formwork to be Type 'F'

OFFICE DEVELOPMENT

Reinforced concrete framed building

MHD	December		
1:100 1:20			

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