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	:	**13-MAY-03**
TIME	:	**10.00**
TIME ALLOWED	:	**3 Hours**

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TURN OVER

ENVS2040 QUANTITY SURVEYING AND CONTRACT PROCUREMENT

Answer FOUR questions
All questions carry equal marks

QUESTION 1

A University client has been advised by its Estates Division to use design and build as the procurement method for a new Halls of Residence, comprising, the construction of 120 student study bedrooms in 3 four storey high traditionally constructed identical buildings. Unable at present to make a final decision on the procurement method, the University has approached your Construction Project Management practice for a detailed independent report on the procurement method and its suitability for their proposed project.

Explain the essential report issues and discuss the likely recommendations.

(25 marks)

QUESTION 2

Cost plans are usually called for in the early design stages of the project when the architect is considering design alternatives in order to establish a cost target for the project. This process may take many forms, but the cost plan will almost certainly be prepared by elements and the cost expressed by square metre of gross floor area, in order to make comparisons between other similar schemes of different size, on a common basis.

Explain the process of preparing an elemental cost plan and appraise some of the cost planning issues likely to arise at this early design stage.

(25 marks)

QUESTION 3

Take off the quantities for the concrete, formwork and reinforcement to the first and second floor suspended floors and attached beams on the reinforced concrete framed building shown on the attached drawings. Adjust the suspended floor and attached beam measurements to take account of the staircase openings.

(25 marks)

QUESTION 4

a) Provisional sums are usually intended to meet the cost of work not determined or defined at the time of tendering. Clause A54 of SMM7 identitifes provisional sums as 'defined' or 'undefined'. Explain the terms 'defined work' and 'undefined work' and discuss the implications for the contractor at tender bidding stage.

(11 marks)

b)

i) Discuss the advantages that using a Prime Cost sum for nominated sub-contract work gives the architect and/or employer.

ii) SMM7 requires items of attendance to be added to prime cost sums for nominated sub-contract work which are required to be priced by the contractor at tender bidding stage. Explain the purpose of this requirement.

(14 marks)

QUESTION 5

The following item is taken from a bill of quantities for a reinforced concrete framed building:

> Type 'J' formwork to columns; isolated; plain rectangular; In 36 No .....167m^2

Analyse a nett unit rate per m^2 for the formwork to the columns.

(25 marks)

Data and information for Q5 above

The column sizes are 400mm x 400mm x 2.90m high and the method statement assumes 10 uses per column shutter mould on a 4 day cycle.

19mm shuttering plywood	£135/10m^2
sawn timber	£350/m^3
nails	£1.50/kg
weekly hire rates for adjustable steel props and column clamps	30p each per week
shuttering carpenter	£10.50/hr
labourer	£7.00/hr

Expected labour outputs	- making shutter	1.30hrs/m^2
	- oiling shutter	0.08hrs/m^2
	- cleaning shutter	0.11 hrs/m^2
	- fixing shutter	0.80hrs/m^2
	- striking shutter	0.40 hrs/m^2

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

QUESTION 6

As Contract Administrator, you are required to produce a report to the client on a main contractor's tender submitted for a contract based on the JCT 1998 Private Edition with Quantities.

Explain the particular elements of the tender documentation and the priced Bill of Quantities that you would check, highlighting the advice that you would give the client in dealing with any pricing anomalies, problems, errors etc. Explain also, the difficulties that might arise for the client should the contract be signed without these identified problems being agreed and corrected.

(25 marks)

END OF PAPER

E In situ concrete/Large precast concrete

E05 In situ concrete construction generally

E10 Mixing/Casting/Curing 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					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)		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	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
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	M2 The thickness range stated in descriptions excludes projections and recesses M3 The thickness range stated of coffered and troughed slabs is measured overall	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		S6 Requirement for beds to be laid in bays
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%				

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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 – 16.4.2.4 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	
15 Columns (nr) **16 Column casings (nr)**	**1 Attached to walls** **2. Isolated**	2 Irregular shaped, dimensioned diagram	m	**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

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

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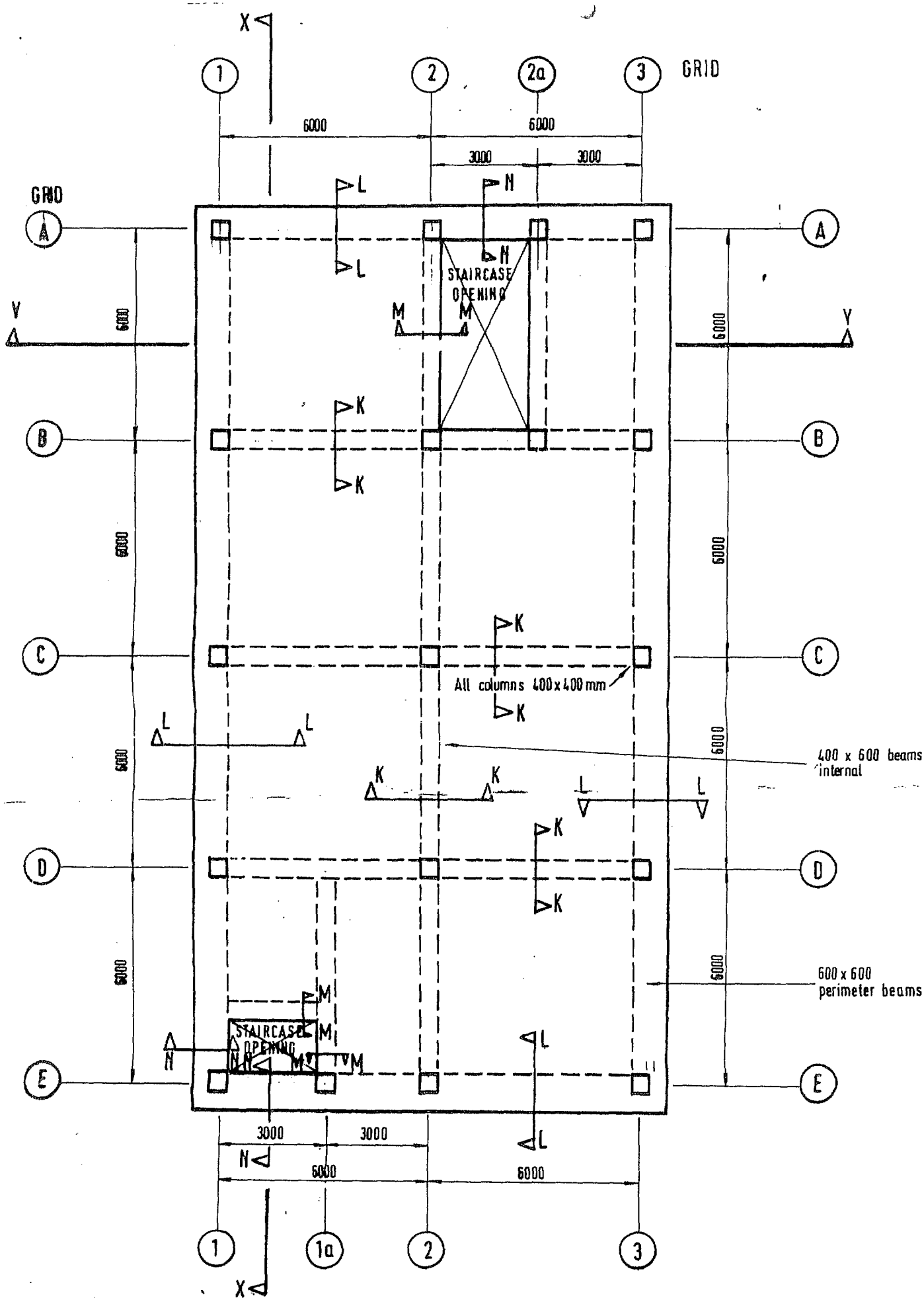

FIRST FLOOR & SECOND FLOOR PLANS

SCALE 1:100

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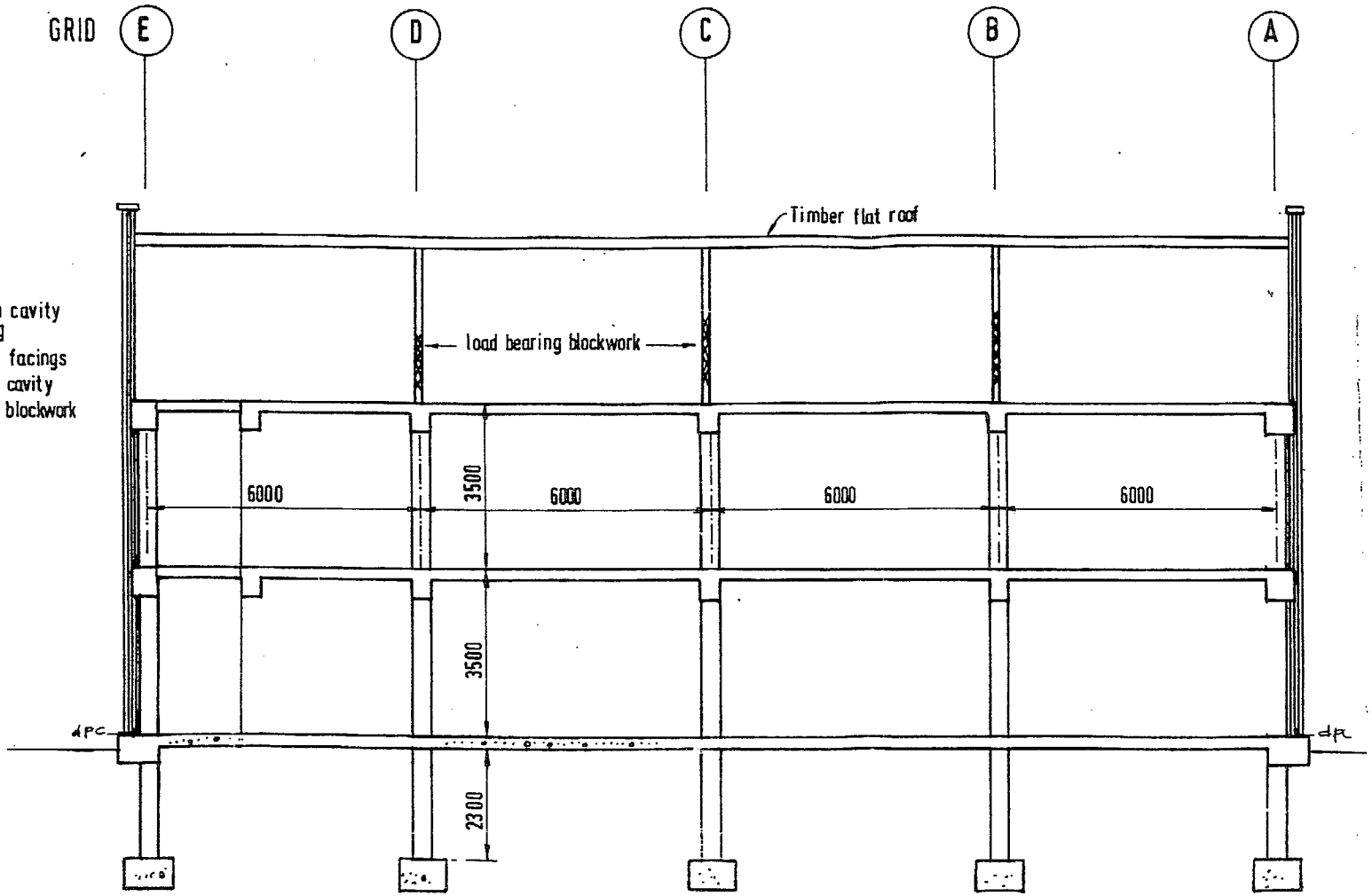


SECTION X-X
SCALE 1:100

Reinforced Concrete to have crushing strength of 30 N/mm^2 at 28 days.

20mm max aggregate size.

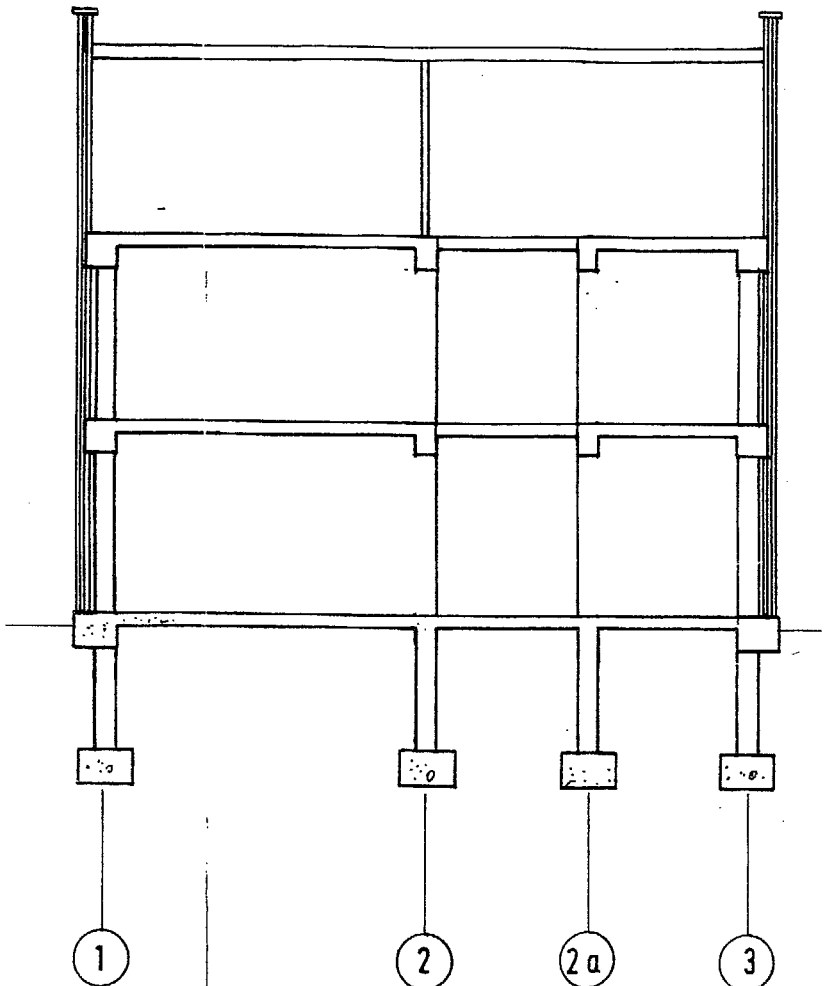
Floors to be finished with tamped surface.

Surface finish of concrete to be left as struck for subsequent plastering.

Reinforcement to be supplied by firm approved by the Architect.

	BEAMS/SLABS	COLS
32mm HT bars	9000	3500 Kg
20mm HT bars	14000	- Kg
16mm HT bars	3400	- Kg
10mm M S links	800	500 Kg

Formwork
substructure type 'Y'
superstructure type 'J'



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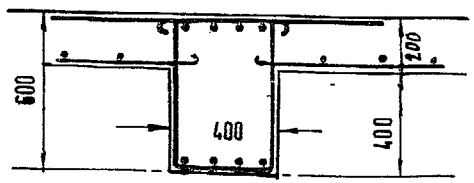
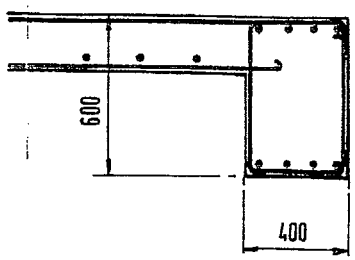


DETAIL K
SCALE 1:20



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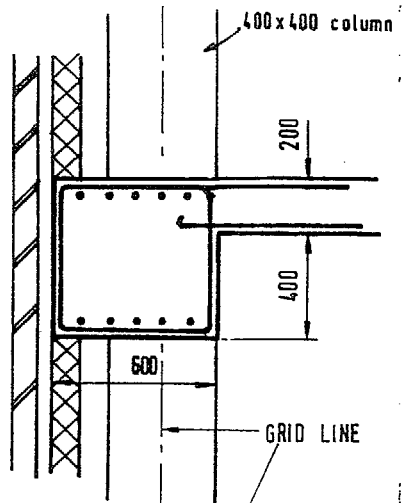

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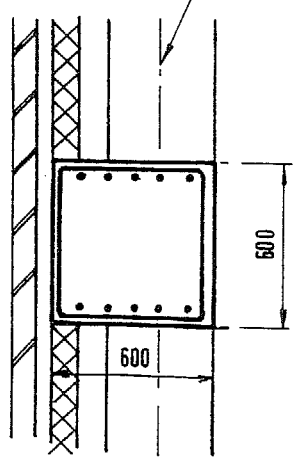

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