THE PAPUA NEW GUINEA UNIVERSITY OF TECHNOLOGY

THE DEPARTMENT OF ARCHITECTURE AND CONSTRUCTION MANAGEMENT

FIRST SEMESTER EXAMINATION

THIRD YEAR BACHELOR IN CONSTRUCTION MANAGEMENT

CM 310 – QUANTITY SURVEYING & ESTIMATING 3

Room:	L2
Date:	Tuesday 7th June, 2022
DURATION:	3 Hours
Time:	08:20 – 11:30 am

Instructions to Candidates

1. You have 10 minutes to read the paper. Do not begin writing during this time.
2. Fill in the Attendance Slip with your name and student I.D. number now
3. There are seven (7) pages to this exam paper including drawing attachment.
4. **There are three (3) Parts** to this exam and you are to **answer all questions**.
5. ALL ANSWERS MUST BE WRITTEN IN THE ANSWER BOOK (S) PROVIDED
6. Each question must be answered starting on a New Page.
7. Notes and Textbooks are not allowed in the Test Room.
   Only materials allowed and to be brought in by students are;
   - Calculators
   - Pens, biros and pencils

WRITE YOUR NAME AND IDENTIFICATION NUMBER CLEARLY ON THE FRONT PAGE. DO IT NOW!

TOTAL MARKS = 100 MARKS

PART A [15x4=60 marks]

Take of the quantities of the following items of work listed below from the drawing attached;

A. Excavate strip footing from natural ground level to reduce level..... M^3

B. Backfill beds ≥ 250mm thick with hardcore materials..... M^3

C. Backfill sides of strip footing ≥ 250mm thick with hardcore materials..... M^3

D. 25mPa reinforced concrete to strip footing and slab (1:2:4)..... M^3

E. F62 fabric mesh centrally placed in slab, fixed with tie wires..... M^2

F. Y12 reinforced bars in strip footing, fixed with tie wires ..... T

G. R10 reinforced bars in strip footing, 600mm centres, fixed with tie wires ..... T

H. 400 x 200 x 200mm thick concrete blockwall with outside joint pointed (1:4)..... M^2

I. 15mPa concrete filling to blockwall (1:3:6)..... M^3

J. 250 x 25 F11 HWD fascia boards fixed to roof framing..... M

K. 125 x 50 F11 HWD rafters and bottom chord (ties) fixed to roof framing..... M

L. 100 x 50 F11 HWD door and window framing..... M

M. 75 x 50 F11 HWD purlin @ 600mm centres fixed to roof framing..... M

N. 50 x 50 F11 HWD joists fixed to roof framing..... M^2

O. 12mm plysheet to ceiling, eaves and soffit linings.....

[15x2=30marks]

PART B

Buildup the unit rates for the listed items of work in Part A [10marks]

PART C

Create and complete the sample Bills of Quantities (BOQ) for the items of work

Data to build up the Unit Rates

Ground Works

Hand Excavation

Labour:
1 x Tradesman @ K5.00/hr assisted by 4 x Labourers @ K3.60/hr
Output: (refer to Table 1)
Profit and on-cost: 10%

Backfill

Materials:
Hardcore materials or similar delivered to site cost K50.00/m^3
Waste to materials, 10%
Labour:
1 x Tradesman @ K5.00/hr assisted by 4 x Labourers @ K3.60/hr
Output: (refer to Table 2)
Profit and on-cost: 10%

Concrete Works

Materials: (refer to Table 3)
40kg cement per tonne cost K300.00 includes delivery to site
Sand/m^3 cost K40.00 delivered to site
Aggregates/m^3 cost K50.00 delivered to site
Waste to all materials, 10%
Unloading + stacking, K2.00
Labour:
1 x Tradesman @ K5.00/hr assisted by 6 x Labourers @ K3.60/hr
Labour Output: (refer to Table 5)
Plant 10/7 mixer rate: K30.00/hr
Plant output: (refer to Table 5)
Profit and on-cost: 10%

Reinforcement (concrete works)

Materials:
Cost to deliver F62 fabric mesh (size: 5.8m x 2.2m) includes delivery to site cost K350.00
Cost to deliver Y12 reinforcement bars includes delivery to site cost K450.00/Tonne
Cost to deliver R10 reinforcement bars includes delivery to site cost K400.00/Tonne
Tie wires, 12kg @ K25.00/5kg to F62 mesh, Y12 bars and R10 bars
75mm chairs (100pcs) @ K10.00/pkt to F62 mesh and Y12 reinforcement only
Unloading + stacking, K2.00 to all
Labour:
1 x Tradesman @ K5.00/hr assisted by 2 x Labourers @ K3.60/hr
Labour Output: (refer to Table 5)
Profit and on-cost: 10%

Masonry
Cost to deliver 100 blocks includes delivery to site cost K350.00
Waste to concrete blocks, 10%
Materials for mortar: (refer to Table 4)
40kg cement per tonne cost K300.00 includes delivery to site
Sand/m^3 cost K40.00 delivered to site
Waste to sand, 5%
Unloading + stacking, K2.00
1 x Blocklayer @ K5.00/hr assisted by 3 x Labourers @ K3.60/hr
Labour Output: (refer to Table 5)
Profit and on-cost: 10%

Filling in Masonry walls
Materials: (refer to Table 3)
Price of 40kg cement per tonne cost K300.00 includes delivery
Sand/m^3 cost K40.00 delivered to site
Aggregates/m^3 cost K50.00 delivered to site
Waste to all materials, 10%
Unloading + stacking, K2.00
Mortar required @ 0.03m^3/m^2
1 x Blocklayer @ K5.00/hr assisted by 3 x Labourers @ K3.60/hr
Labour Output: (refer to Table 5)
Profit and on-cost: 10%

Woodworks
Materials:
125 x 50 timber cost K850.00/100m includes delivery
100 x 50 timber cost K800.00/100m includes delivery
75 x 50 timber cost K750.00/100m includes delivery
50 x 50 timber cot K500.00/100m includes delivery
250 x 25 timber cost K450.00/100m includes delivery
12mm plysheet (size: 2.4m x 1.2m) cost K250.00/sheet includes delivery
Nails to fix at 2.5kg @ K30.00/10kg includes delivery
Waste to all materials, 10%
Unloading + stacking, K2.00
Labour:
1 x Tradesman @ K5.00/hr assisted by 2 x Labourers @ K3.60/hr
Labour Output: (refer to Table 5)
Profit and on-cost: 10%

TABLES

Table 1: Hours to excavate per M^3 by hand for Ordinary Soil

Depth stage (m)	To excavate and get out	To throw the soil out	To clear the sides	Totals Hours
≤1.0	2.4	0.0	0.0	2.4
> 1.0 to ≤2.0	2.4	1.4	1.4	5.2
> 2.0 to≤ 3.0	2.4	2.8	1.4	6.6
> 3.0 to ≤4.0	2.4	5.2	1.4	8.0

Table 2: Hours to backfill per M^3 by hand for Ordinary Soil

Beds	Hour
Filling hardcore in beds ≤ 250mm	1.15
Filling hardcore in beds > 250mm	1.30

Table 3: Approximate quantities of dry materials required per M^3 of fully compacted concrete

Nominal mixes By Volume (20mm Aggregates)	Cement (Tonnes)	Sand (m^3)	Aggregates (m^3)
1 : 3 : 6	0.22	0.45	0.90
1 : 2 : 4	0.32	0.43	0.86

Table 4: Approximate quantities of dry materials required per M^3 of mortar

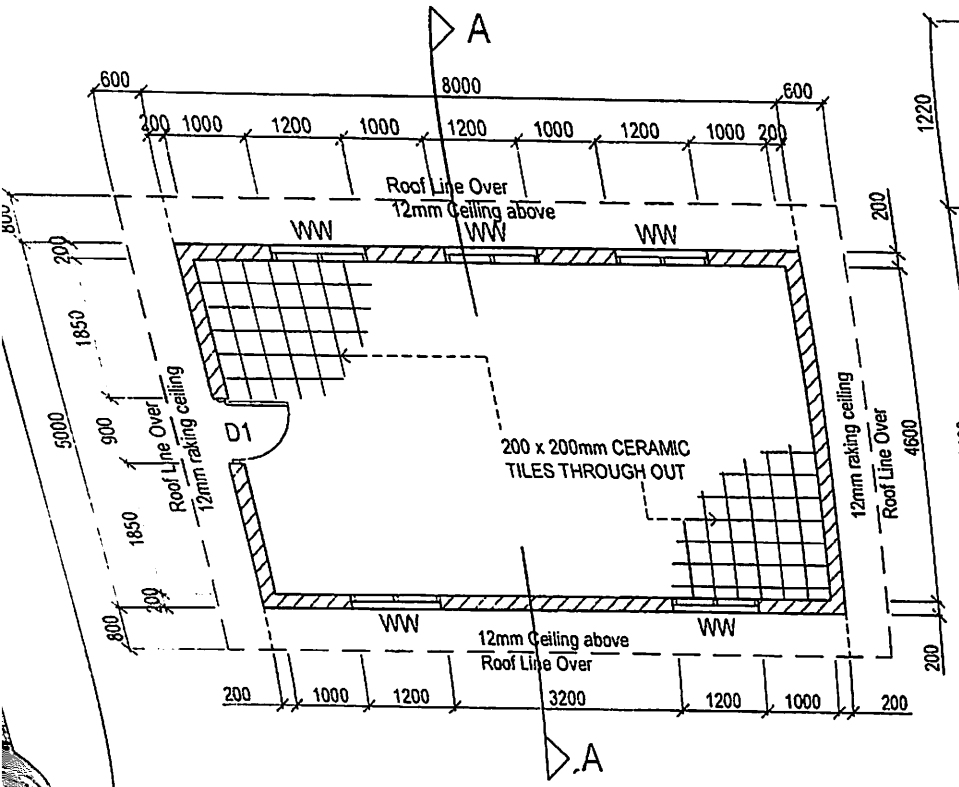
Composition By Volume	Cement (Tonnes)	Sand (m^3)
1:3	0.50	1.00
1:4	0.40	1.12

Table 5: Labour / Plant Outputs

Concrete works	Outputs	Woodwork	Outputs
Mixing	K5.20/hr	125 x 50	0.24hr/m
Transporting	K4.40/hr	75 x 50	0.27hr/m
Placing	K5.50/hr	250 x 25	0.20hr/m
10/7 mixer (plant)	$4m^3$/hr	12mm plysheet	$0.20hr/m^2$

Masonry works	Outputs	Filling in blocks	Output
Laying of blocks	$0.8m^2$	Corefilling	$1.2m^2$/hr
Pointing of blocks	$2.5m^2$		

Reinforcement	Outputs
F62 fabric mesh	$0.06hr/m^2$
Y12 bars	60hr/T
R10 bars	70hr/T

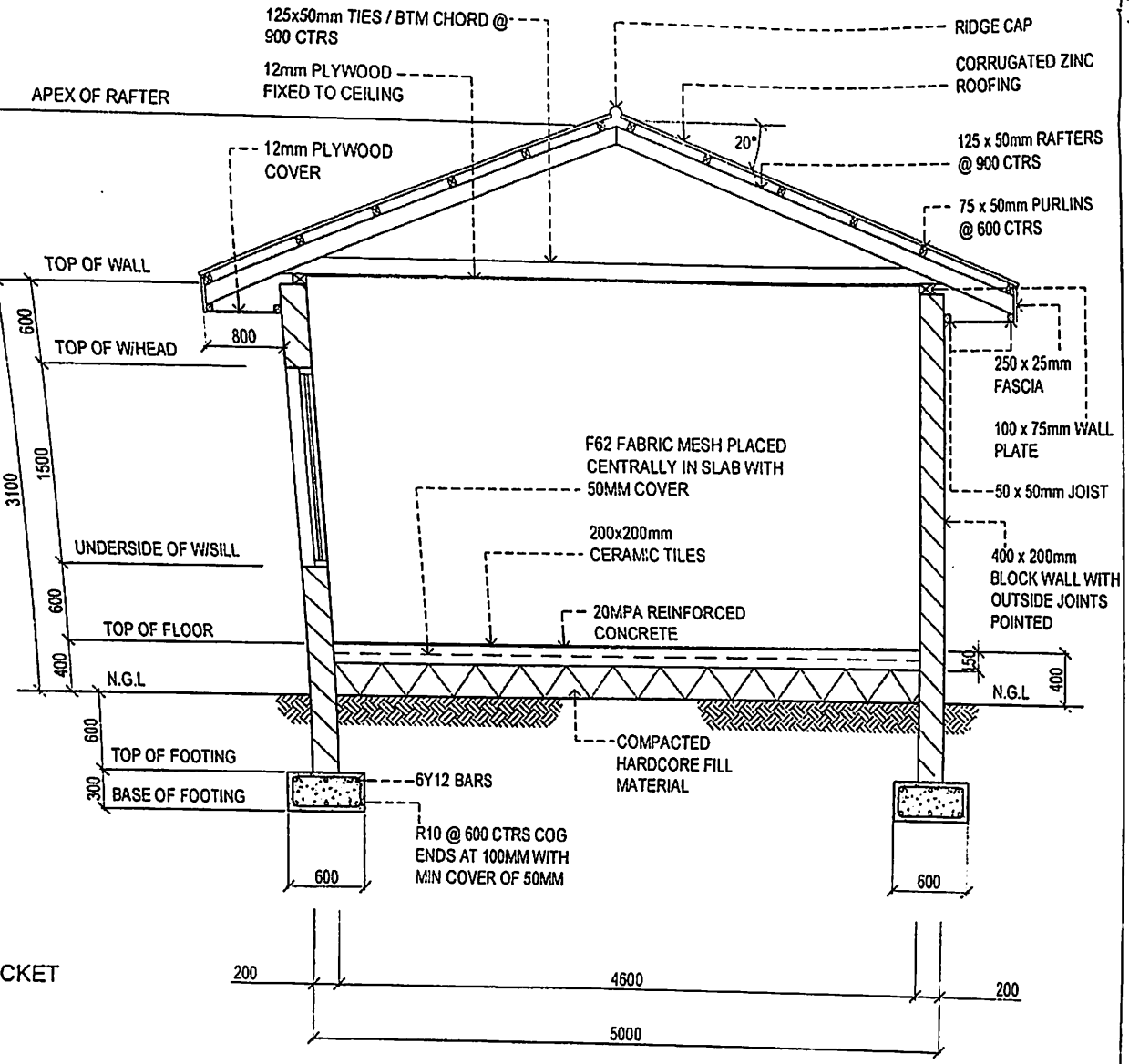


D1 = SIMPLE FLUSH DOOR IN 100x50mm HW FRAME. DOOR SIZE 2100x900mm

WW = 100x50mm WINDOW FRAMES FIXED TO TO THE WALL DIRECTLY WITH 10No SOCKET BLADES LOUVRE FRAMES

FLOOR PLAN

SCALE 1:100



SECTION A-A

SCALE 1:50

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PROJECT TITLE:	LECTURER:	COURSE STREAM:
EXAM DRAWING	MR. POMOSO	CONSTRUCTION MANAGEMENT