THE PAPUA NEW GUINEA UNIVERSITY OF TECHNOLOGY

THE SCHOOL OF ARCHITECTURE AND CONSTRUCTION MANAGEMENT

FIRST SEMESTER EXAMINATION

THIRD YEAR BACHELOR IN CONSTRUCTION MANAGEMENT

CM310 – QUANTITY SURVEYING & ESTIMATING III

Room:	ST1
Date:	Friday 31st May, 2024
DURATION:	3 Hours
Time:	08:20 – 11:00 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 / part 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 [10 x 5 marks] [50 Marks]

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

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

B. Backfill sides of strip footing and 250mm thick bed with hardcore materials.....M^3

C. 20mPa reinforced concrete to strip footing and slab (1:2:4)..... M^3

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

E. R10 bars in strip footing, 600mm centres with 100mm cog ends, fixed with tie wires.....T

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

G. 15mPa concrete filling to concrete blockwall (1:3:6)..... M^2

H. 125 x 50 F11 HWD rafters and ties fixed each way to roof framing.....M

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

J. 12mm plysheet to suspended ceiling, eaves and soffit linings..... M^2

PART B [10 x 4 marks] [40 Marks]

Buildup the unit rates for the listed items of work in Part A

PART C [10 x 1 mark] [10 Marks]

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

End of Exam

DATA to build up the Unit Rates

Ground Works
Machine Excavation for strip footing in loose granular soil
JCB Backhoe rate @ K1000.00/8hr.day (wet hire + operative) for 3 hours use
10m^3 Dump Truck rate @ K800.00/8hr.day (wet hire + operative) for 3 hours use
JCB Backhoe bucket size @ 0.28m^3
Difficulty Multiplier @ 1
Output: (refer to Table 1)
Profit and on-cost: 10%

Backfilling
Materials:
Hardcore materials or similar delivered to site cost K30.00/m^3 includes delivery cost
Waste to materials, 10%
Plant:
Wacker Packer @ K50.00/8hr.day
Output: (refer to Table 2)
Labour:
1 x Tradesman @ K5.00/hr assisted by 2 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 cost to site
Sand/m^3 cost K40.00 includes delivery cost to site
Aggregates/m^3 cost K50.00 includes delivery cost to site
Waste to all materials, 10%
Unloading + stacking, K1.00
Labour:
Labours – Mixing, Transporting and Placing (Refer to Table 5)
Labour Output: (refer to Table 5)
Plant 10/7 mixer rate: K30.00/hr
Plant 10/7 output: (refer to Table 5)
Profit and on-cost: 10%

Reinforcement (concrete works)
Materials:
Cost to deliver Y12 reinforcement bars at K450.00/Tonne includes delivery cost to site
Cost to deliver R10 reinforcement bars at K400.00/Tonne includes delivery cost to site
Tie wires, 12kg @ K25.00/5kg to Y12 bars and R10 bars
75mm chairs @ K10.00/pkt to Y12 bars
Unloading + stacking, K1.00
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%

Masonry
Materials:
Cost to deliver 100 blocks at K350.00 includes delivery cost to site
Waste to concrete blocks, 10%
Materials for mortar: (refer to Table 4)
40kg cement per tonne cost K300.00 includes delivery cost to site
Sand/m^3 cost K40.00 includes delivery cost to site
Waste to mortar materials, 10%
Unloading + stacking, K1.00
Mortar specification: $64m^2$ of masonry wall will require $1m^3$ of mortar
Labour:
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/Corefilling in Masonry walls
Materials: (refer to Table 3)
Price of 40kg cement per tonne cost K300.00 includes delivery cost to site
Sand/m^3 cost K40.00 includes delivery cost to site
Aggregates/m^3 cost K50.00 includes delivery cost to site
Waste to all materials, 10%
Unloading + stacking, K1.00
Corefilling specification: $100m^2$ of masonry wall will require $13m^3$ of corefilling
Labour:
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 cost to site
100 x 75 timber cost K800.00/100m includes delivery cost to site
75 x 50 timber cost K750.00/100m includes delivery cost to site
50 x 50 timber cost K500.00/100m includes delivery cost to site
250 x 25 timber cost K450.00/100m includes delivery cost to site
12mm plysheet (size: 2.4m x 1.2m) cost K250.00/sheet includes delivery cost to site
Nails to fix at 2.5kg @ K30.00/10kg includes delivery cost to site
Bolts to fix at K1.50 each includes delivery cost to site
Waste to all materials, 10%
Unloading + stacking, K1.00
Labour:
1 x Tradesman @ K5.00/hr assisted by 2 x Trade Assistants (TA) @ K4.50/hr
Labour Output: (refer to Table 5)
Profit and on-cost: 10%

TABLES for your outputs

Table 1: Machine Hours Output to excavate per M^3

Excavation	Bucket Size	Loose granular (small)		Compact organic soil		Soft cohesive		Firm cohesive and compact granular (large)	
	(m^3)	(m^3/hour)	(hour/m^3)	(m^3/hour)	(hour/m^3)	(m^3/hour)	(hour/m^3)	(m^3/hour)	(hour/m^3)
Trenches	0.06	2.5	0.4	2	0.5	1.6	0.63	1.4	0.71
	0.12	4	0.25	3	0.33	2	0.50	1.8	0.56
	0.19	6	0.17	5	0.2	4	0.25	4	0.25
	0.28	9	0.11	8	0.13	7	0.14	6	0.17

Table 2: Hours to backfill per M^3 for Ordinary Soil (for Plant and Labour)

Strip footing and Bed	**Hour/M^3**
Filling hardcore to strip footing and bed	1.15

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

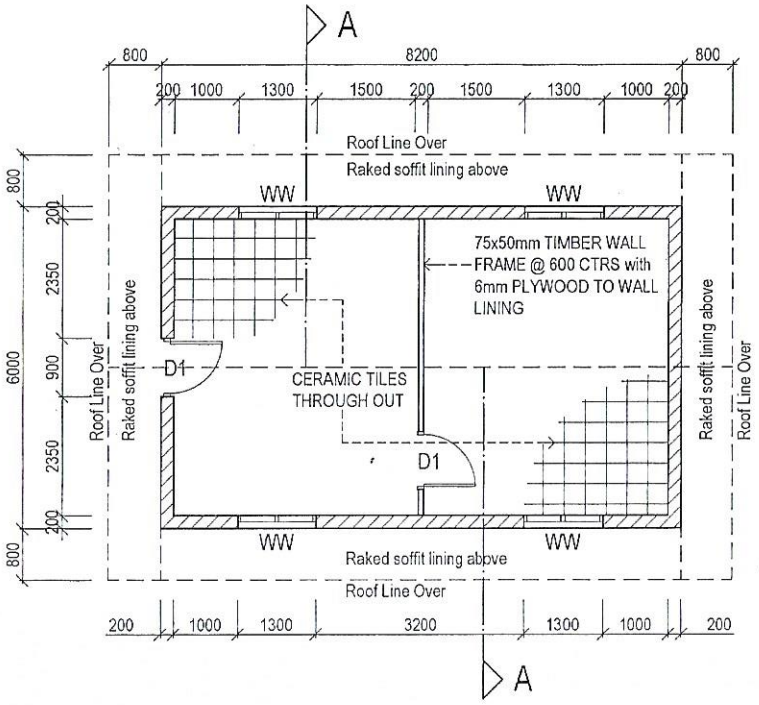
Concrete works	Outputs
Mixing	K5.20/hr
Transporting	K4.40/hr
Placing	K5.50/hr
10/7 concrete mixer (plant)	$4m^3/hr$

Masonry works	Outputs
Laying and pointing of blocks	$0.\ 80m^2$

Reinforcement	Outputs	Density
F62 fabric mesh	$0.06hr/m^2$	
Y12 bars	60hr/T	0.89kg/M
R10 bars	70hr/T	0.62kg/M

Woodwork	Outputs
125 x 50	0.24hr/m
100 x 75	0.30hr/m
75 x 50	0.27hr/m
50 x 50	0.23hr/m
250 x 25	0.20hr/m
12mm plysheet	$0.20hr/m^2$

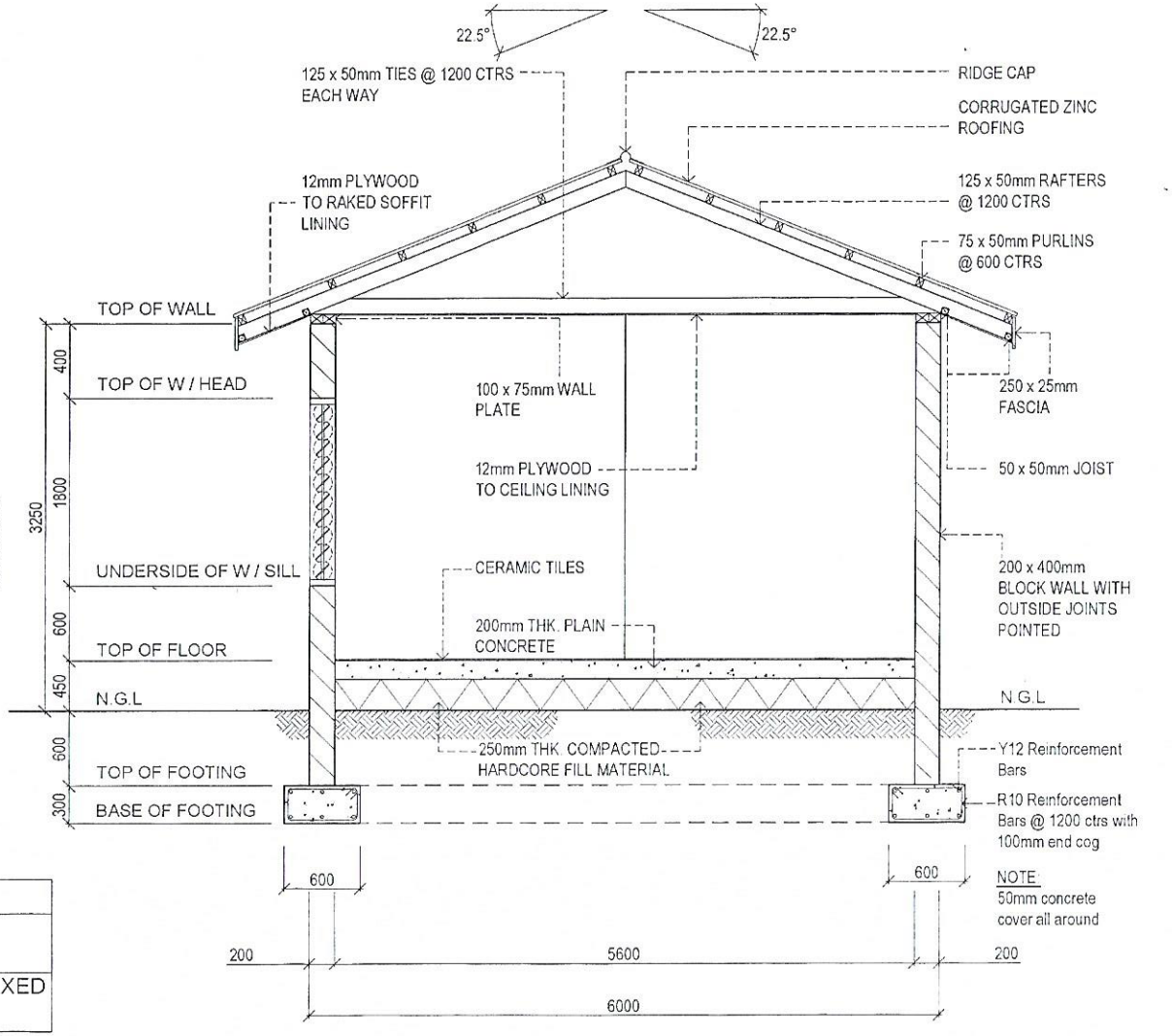
Filling in blocks	Output
Corefilling	$1.20m^2/hr$



DOORS / WINDOW SCHEDULE	
D1	SOLID CORE DOOR IN 100 x 50mm HWD FRAME. DOOR OPENING IS 2100 x 900mm
WW	100 x 50mm (2 x BAY) WINDOW FRAMES FIXED TO THE WALL

FLOOR PLAN

SCALE 1:100



SECTION A-A

SCALE 1:50