Architectural Project Management 2
7210

CAMEROON GENERAL CERTIFICATE OF EDUCATION BOARD

Technical and Vocational Education Examination

JUNE XXXX **ADVANCED LEVEL**

Specialty Name (Specialty Code)	**ARCHITECTURAL DRAFTMANSHIP CE-AD(F4 BE)**
Subject Title	**Architectural Project Management**
Paper No.	**2**
Subject Code No.	**7210**

Three hours

INSTRUCTIONS TO CANDIDATES

This paper is made up of two sections A and B.

Candidates are expected to answer three questions in section A and two questions in section B.

All questions carry equal marks.

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You are reminded of the necessity for good English and orderly presentation in your answers.

You are advised to read carefully through the question paper, before you begin your answers.

SECTION A: SITE MANAGEMENT

QUESTION ONE: EARTH WORK **(20 marks)**

For the site striping and mass excavations (2620.5m^3), the enterprise has at its disposal a hydraulic shovel of capacity 1150l, tippers (15t). This shovel does 120 cycles in an hour. The shovel and the tippers are rented at 6000 FRS and 3000 FRS respectively. The durations for travelling is 3mins, that of return is 2.5mins and that of offloading is 1.5mins.The bulking coefficient of soil is 1.18 and the density of the bulked soil is 1.15. A working day takes 8 hours.

Calculate:

a) Define the term bulk soil **(1 mark)**

b) The volume of bulked soil. **(3 marks)**

c) The cycle time of three tippers. **(6 marks)**

d) The daily output. **(6 marks)**

e) The duration of the work **(4 marks)**

QUESTION TWO: PLANNING **(20 marks)**

After the detail study of the work, a portion of the planning was brought out as follows:

Proceeding activity	Activities to be done	Duration	Nº of workers	Ranking
F	A	2	4	
D	B	5	5	
I	C	9	4	
H,A	D	5	5	
I	E	6	9	
_	F	3	3	
_	G	8	7	
G	H	6	3	
D	I	2	2	
B	J	5	4	
C,L,J	K	4	3	
M	L	2	3	
B	M	10	4	

a) Establish the ranking of the activities. **(2 marks)**

b) Construct the PERT **(6 marks)**

c) Come out with the critical path **(2 marks)**

d) Determine the duration of the project. **(2 marks)**

e) Transcribe the PERT into a GANNT **(8 marks)**

QUESTION THREE: CONCRETING **(20 Marks)**

The volume of a reinforced concrete (RC) structure is 13.64m^3 and lean concrete (LC) is 0.62m^3.

-the reinforced concrete is batched at (800/400) gravel/sand, 400Kg/m^3 of cement, volumic weight of iron 72kN/m^3 and 15m^2/m^3 of wood.

- LC is batch at (700-500) gravel/sand and 300KG/m^3 of cement.

COST OF MATERIALS	OTHER INFORMATIONS
1m^3 of gravel=8200FRS	Site expenses=8% dry price
1m^3 of sand=4500 FRS	General expenses=20%realisation cost
Cement in bags of 50 kg = 4200 FRS	taxes=10.99%cost price
1kg of rods=700 FRS	Benefits=15% cost price
1m^2 of wood=310 FRS	

WORK REQUIRED

CALCULATE:

1) The dry price **(5 marks)**
2) The cost of realization **(5 marks)**
3) The cost price **(5 marks)**
4) The selling price **(5 marks)**

QUESTION FOUR: **(20 MARKS)**

(a) Define the following: **(5 marks)**

(i) Planning

(ii) PERT

(iii) Commanding task

(iv) Accompany task

(v) Lost formwork

(b) How can accidents be avoided on the site? **(2 marks)**

(c) Is waste of time a voluntary act? Justify your answer with three examples. **(3 marks)**

(d) List four consequences of waste of time to a construction firm. **(4 marks)**

(e) A team of three masons realize 54 cubic meters of concrete in a working day of eight hours.

(i) Calculate the cumulative time consumed by the three workers. **(2 marks)**

(ii) Calculate the unit time (h/m3). **(1 mark)**

(iii) Calculate the output (m3/h) **(1 mark)**

(iv) The unit time envisaged from the beginning was .98h/m3.calculate the coefficient of productivity.

(2 marks)

SECTION B QUANTITIES AND COSTS

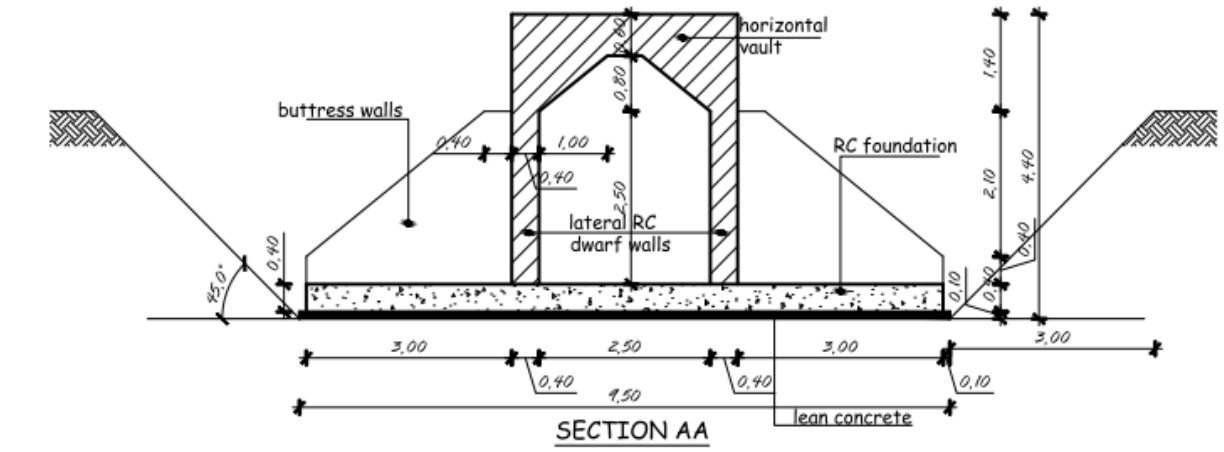
QUESTION FIVE: **(20 MARKS)**

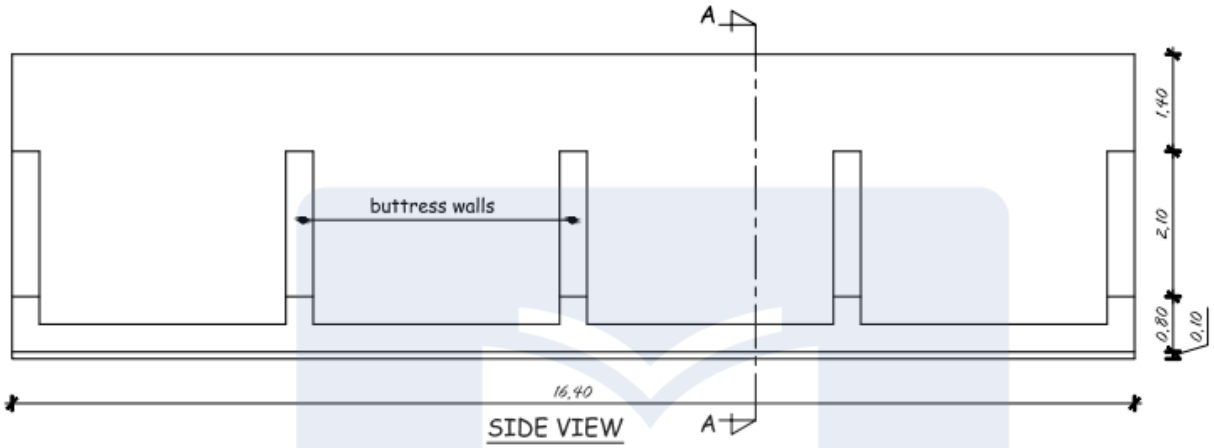
Project Description

The local council of a community decides to construct a box culvert in order to reduce flood during the rainy season. The box culvert which is represented on **figure below** is having a total length of 16.4m. It is made of the following components:

- A reinforced concrete foundation slab, laid on a 10cm thick lean concrete that overlaps on both ends by 10cm;
- Two lateral reinforced concrete dwarf walls;
- A horizontal vault at the upper part to serve as a deck for the culvert

- The culvert is also supported with buttress walls of 40cm thick and spaced at 4.00m center to center along the length so as to ensure stability.
- The structure is buried up to the vault.
- Excavation is done to a depth of -3.00m and the sides battered at an angle of $\alpha = 45^0$
- Take the bulking coefficient of the soil to be 1.3





You are required to Calculate:

a) The volume of bulked earth excavated **(3 marks)**

b) The volume of lean concrete **(2 marks)**

c) The volume of reinforced concrete (foundation slab, buttress walls, dwarf walls and vault) **(10 marks)**

d) The total volume of reinforced concrete **(1marks)**

e) The area of formwork for the internal surface of the culvert **(4marks)**

QUESTION SIX: MATERIALS AND PRICE STUDIES: **(20 Marks)**

(a) Establish the bill of materials for the following materials: sand gravel, cement, steel rods, and water for $1m^3$ of lean concrete and $78m^3$ of reinforced concrete using the table1 below **(5 marks)**

Table 1 showing materials for $1m^3$ of concrete

Designation	Sand (litres)	Gravel (litres)	Cement (Litres)	Steel (kg)	Water (Litres)
Lean concrete	400	800	250	-	150

Reinforced concrete	400	800	350	100	150

- Relate density of gravel: 2.45
- Relative density of sand : 2.60

b) STUDY OF PRICE **(15 marks)**

Technical Information:

PRICE OF MATERIALS	
Sand	7.500f/tone
Gravel	16.000frs/tone
Cement	95.000frs/tone
Steel	520.000frs/m^3
water	420frs/m^3

UNIT TIME	
Concreting	1.8h/m^3
Tying and laying of reinforcement	120h/ton

Hypothesis:

- Salary of average worker: 2000f/day
- Daily working hours : 8hours
- Estimate loss of materials :
  - Steel: cement ; water 5%
  - Formwork timber; aggregates; 3%
- Coefficient of adjudication k= 1.6
- General allowances; benefits and other payment are global estimate to be 21% of the dry price
- Value added TAX (vat) = 19.25% of SP.

WORK REQUIRED

i) Calculates the dry price for the structure **(7 marks)**

ii) Calculate the selling price (SP) **(4 marks)**

ii) Calculate the selling price with tax (SPWT) **(4 marks)**

QUESTION SEVEN **(20 MARKS)**

The figure 1 below represents the plan and section of a swimming pool to be constructed. A loader whose capacity is 900litres is used with trucks of 20tons. The loader does 90rot/hour. Consider that a lorry runs at a speed of 40Km/h and 60Km/h when loaded and when empty respectively. A working day starts from 7:30 Am to 4:30 Pm with a break of 1hour daily. No overtime .The offloading time is 2 minutes. Density of soil is 1.2 and the dumping site is at 12km away.

WORK REQUIRED

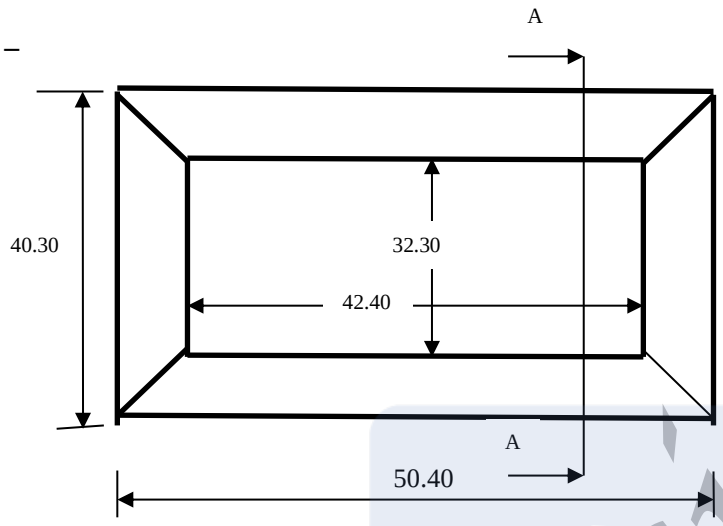
a. Calculate the volume of the excavation **(5 marks)**

b. Calculate the volume of the excavated earth if the soil bulks by 20% **(2 marks)**

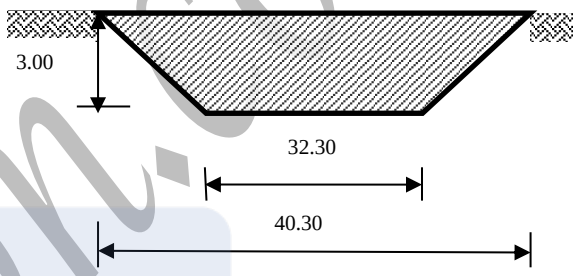
c. Determine the loading time. **(5 marks)**

d. Determine the cycle time. **(4 marks)**

e. Determine the required number of Lorries and draw the graph for a cycle of lorry. **(4 marks)**



PLAN: figure 1



SECTIONAA