



# UNIVERSITY OF RUHUNA

## Faculty of Engineering

End-Semester 3 Examination in Engineering: July 2017

Module Number: CE3301

Module Name: Building Planning and Cost Estimating

[Three Hours]

[Answer all questions]

[You may refer separately provided City of Colombo Development Plan when answering for Q1 and Q2]

Q1.

- a) Figure Q1 is the floor plan of a proposed house prepared to get approval based on the City of Colombo Development Plan. Specified building line is 8m away from the center of available roads. Low-tension electric line exists just above the boundary of the land adjacent to the road. You are required to check the following aspects related to the given plan to consider for the approval. Your answer should consist with the appropriate regulations to each of the requirement.
- Comply with the requirement of the building line.
  - Distance from the electric line to the building.
  - Minimum space requirements around the building.
  - If one or more of above requirements are not satisfied according to the City of Colombo Development Plan, give your suggestions to match with the regulations.
- [5.0 Marks]
- b) Other than the plan in Figure Q1, what are the other necessary documents to get the approval from the relevant local authority?
- [2.0 Marks]
- c) Who are the authorized persons to sign the above mentioned documents before submitting to the local authority?
- [3.0 Marks]

Q2.

- a) Assume that you are employed in a company undertaking land and housing development projects. The company has given an assignment to prepare a land sub-division plan for residential purpose. Company requirement is all the lots should be between eight panch (8.0 p) and fifteen panch (15.0 p). The land for proposed sub-division is shown in Figure Q2
- Sketch the sub-divided land according to the company's requirements.
  - What are the regulations referred for your sub-division?
- [6.0 Marks]
- b) Assume that you will be given another project after this project with a land extent of more than one hectare (1.0 ha). What are the additional regulation/s you have to consider for land sub-division?
- [2.0 Marks]

- c) Explain the occasions where turning circles are needed to provide within the subdivided plan.

[2.0 Marks]

Q3.

- a) Explain the following terms used in a BOQ.

- i Description
- ii Quantity
- iii Unit

[3.0 Marks]

- b) You are required to prepare a BOQ for the house plan shown in Figure Q1. Foundation details for the house are given in Figure Q3. Derive following to prepare the BOQ. Any assumptions you made should be clearly stated.

- i Centerline dimensions
- ii Take-off quantities of excavation work in foundation
- iii Take-off quantities of plinth plaster
- iv Take-off quantities of hard earth filling
- v Take-off quantities of ceiling (horizontal) inside the house.

[12.0 Marks]

Q4.

- a) Explain the procedure of deriving unit rates to use in a Bill of Quantities.

[2.0 Marks]

- b) Calculate the unit rates for the following work norms. You may use the price data given in the Table Q4.

- i Excavation in trenches for walls/column pits in ordinary soil from 0' 0" to 5' 0" deep  
Per cube  
2 ¼ days U/Sk labourer

- ii Mixing of concrete 1:2:4 (¾ ")  
Per cube  
Materials  
18 cwt cement (50 kg bags)  
0.5 cubes sand  
0.88 cubes ¾ metal  
1/3 day hire of mixer  
Water (120 gals)

Labour

- 1 day skilled labourer  
6 days U/Sk labours

- iii Reinforced Cement concrete in ground floor  
Per 0.45 cubes  
Materials  
0.45 cubes of concrete  
Add 10% for wastage  
1 day hire of vibrator

Labour

- 1 day mason
- 1 day carpenter
- 1 day U/Sk labourer (Vibrator)
- 3 days U/Sk Labourer

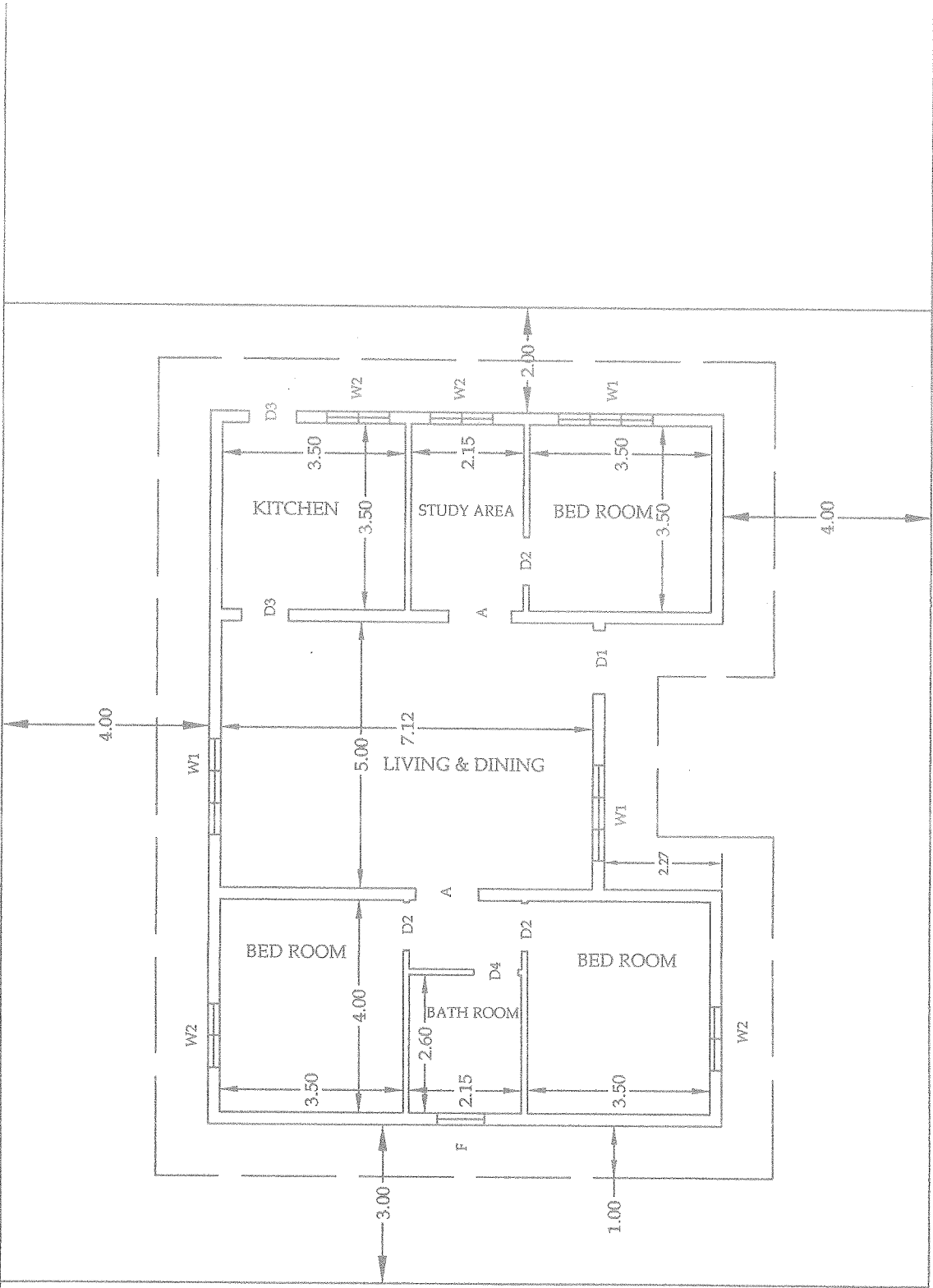
[7.0 Marks]

- c) Your father has decided to buy a plasticelled water tank for your house to prevent the interruption of water supply. Now his idea is to construct a place for the water tank. As an engineering student you are asked to undertake this job. You think that water tank can be placed on a slab with supporting four columns. Column height above ground level is 2.8m and the details are shown in Figures Q4 (a) and Q4 (b). The foundation, columns and slab consist of 1:2:4(20) concrete. Assume all the steel requirements and formworks have already been estimated. It is required to estimate the cost of the job.
- i Determine the quantities of excavation work, concrete work of columns including foundation and slab.
  - ii Calculate the total cost of the job. You may use the data and answers from above part (c).

[6 Marks]

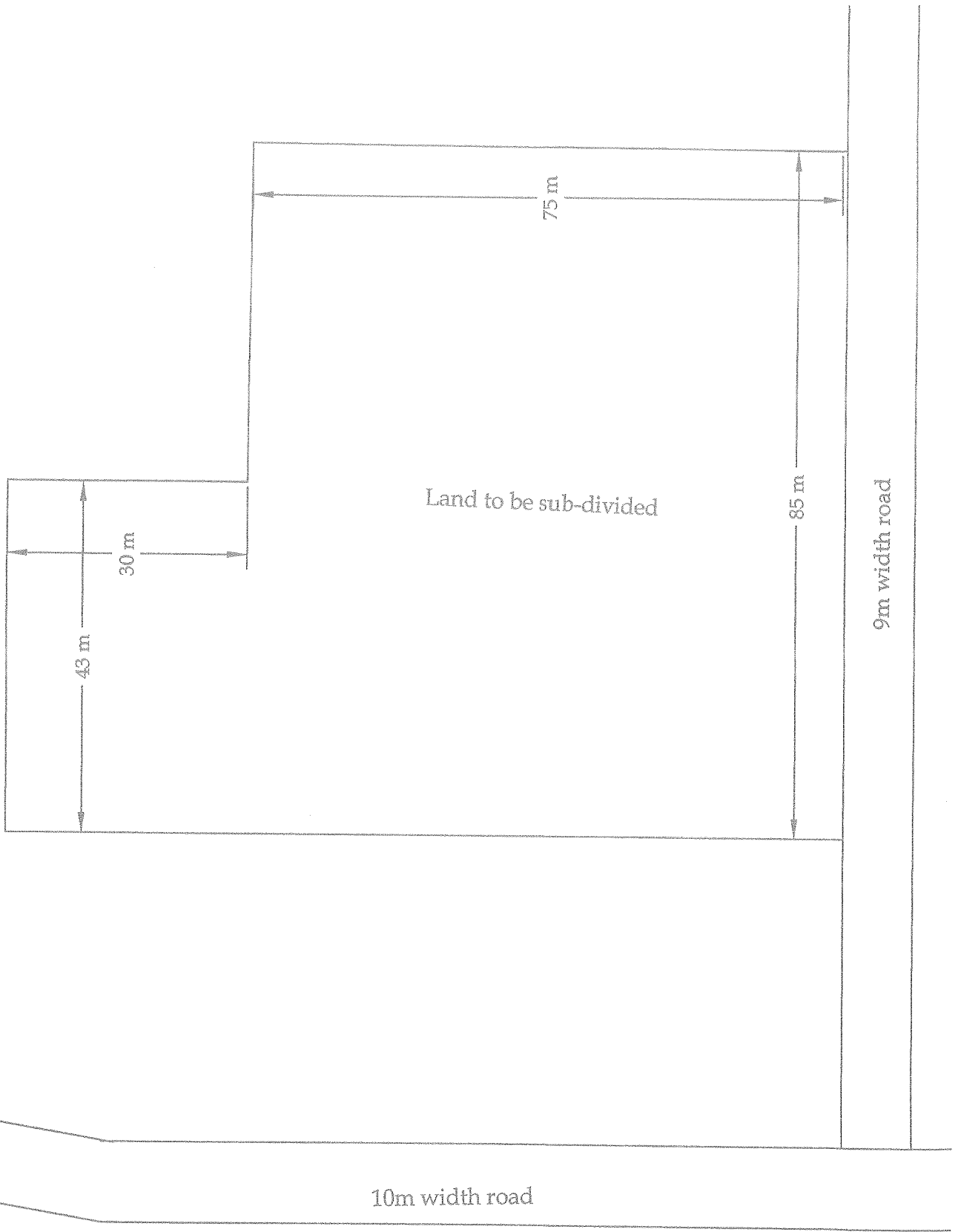
Q5.

- a) Explain the steps involved in price adjustment procedure in contracts.  
[2.0 Marks]
- b) "Most of the preliminary items of a contract are considered as non-adjustable elements". Do you agree with this statement? Give reason/s.  
[2.0 Marks]
- c) The data given in the Table Q5 (a) includes the General Contract data and the details of interim claims No 1, and 2. Table Q5 (b) gives input percentages and price indices of construction inputs. Calculate the price adjustment for claim No. 2.  
[6.0 Marks]



All Dimensions are in meters  
Not to scale

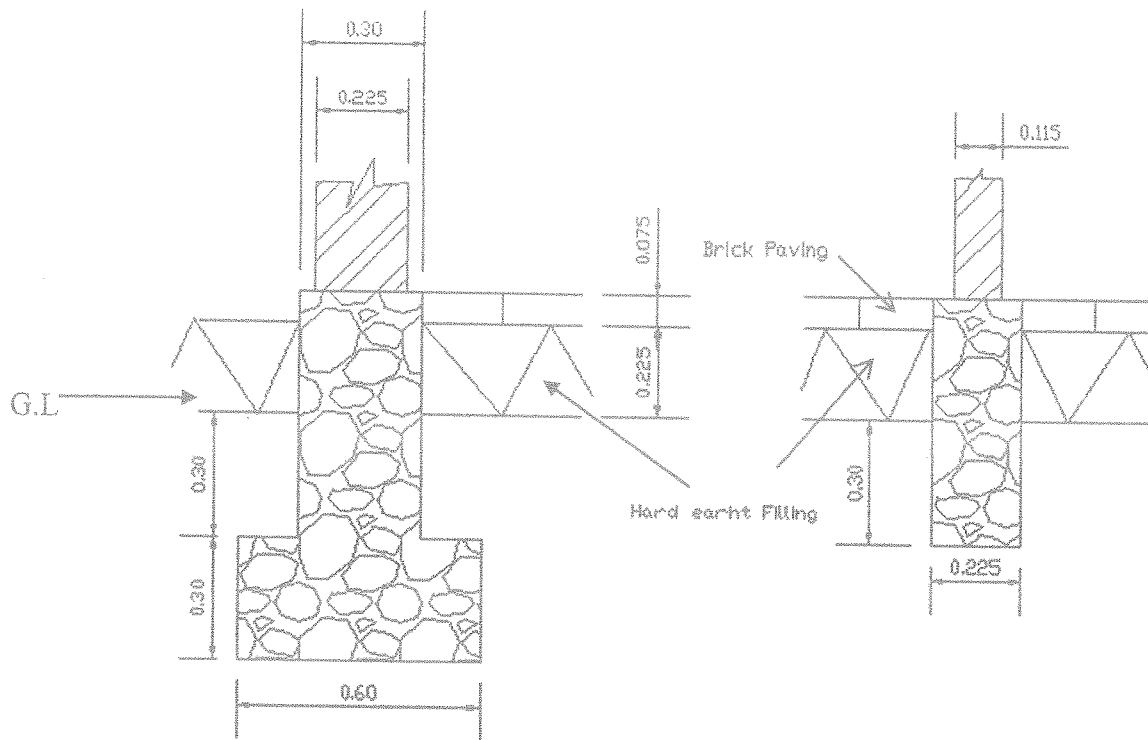
Figure Q1: Floor Plan



Not to scale

Figure Q2: Land to be Sub-divided





All dimensions are in meters  
Not to scale

Figure Q3: Foundation Details

Table Q4: Cost Data for Unit Rate Analysis (transport included)

Resource	Price (Rs.)
Cement bag (50 kg)	920.00
Sand 1 cube	9500.00
Metal 1 cube	6500.00
1000 ltrs Plastishells water tank	10000.00
Mixer day	4500.00
Vibrator day	4000.00
Reinforcement (steel) for the job	18000.00
Formwork	5000.00
Water	Free of charge
Mason 8 hour day	1200.00
Carpenter 8 hour day	1200.00
Unskilled labour 8 hour day	1000.00

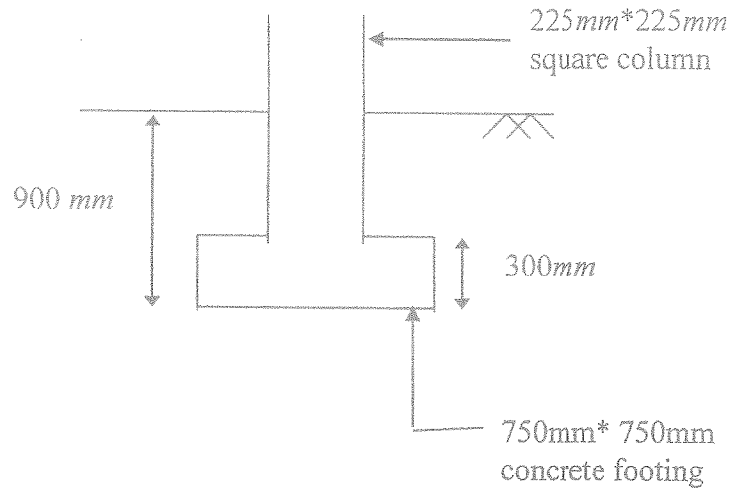


Figure Q4 (a): Foundation details for water tank structure

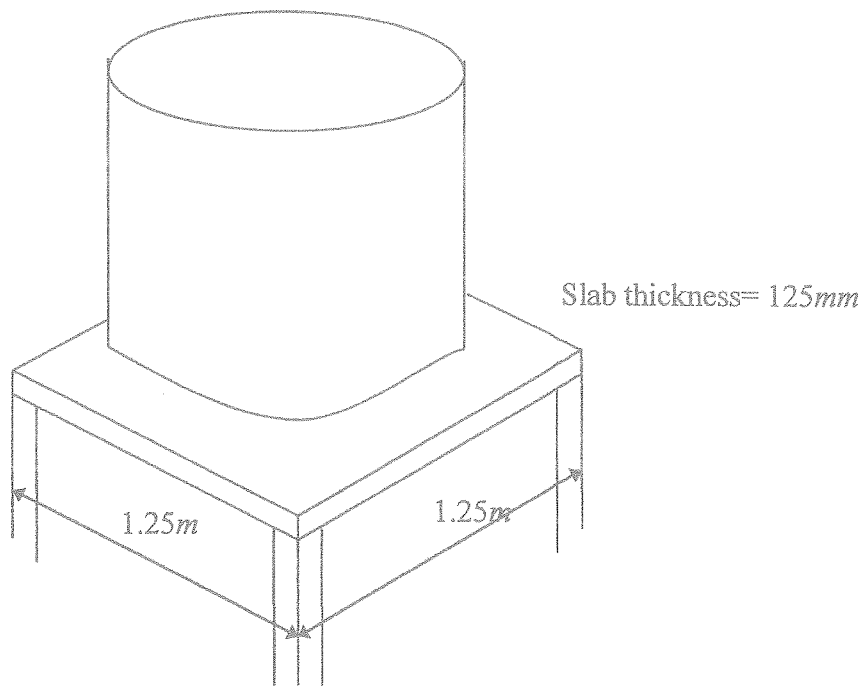


Figure Q4 (b): Slab details for water tank structure



Table Q5(a) : Data for Price Adjustment

Contract Data	
Total Contract Sum	Rs. 128,327,653.33
Date of Closing Bids	01- February- 2016
Date of commencement of work	05-April-2016
Claim No. 1	
Date of submission	15-May-2016
Value of certified work done (cumulative)	Rs. 2,775,915.75
Cost of material at site	Rs. 175,000.00
Value of non-adjustable Element (cumulative)	Rs. 65,000.00
Claim No. 2	
Date of submission	05-July-2016
Value of certified work done (cumulative)	Rs. 5,845,275.35
Cost of material at site	Rs. 125,000.00
Value of non-adjustable Element (cumulative)	Rs. 105,000.00

Table Q5(b) : Input Percentages and Price Indices of Construction Inputs

Input	Input %	Price indices in 2016						
		Jan	Feb	Mar	Apr	May	Jun	Jul
Cement	12.82	525.3	525.3	515.5	490.8	490.8	490.8	490.8
Rubble	3.76	639.6	639.6	639.6	639.6	647.6	647.6	647.6
Metal	1.79	361.9	361.9	361.9	361.9	363.3	363.3	363.3
Sand	6.20	2371.7	2470.2	2478.1	2478.1	2537.2	2537.2	2537.2
Brick	9.56	416.2	421.2	421.2	421.2	421.2	421.2	428.0
R/f steel	4.26	558.0	558.0	558.0	558.0	558.0	558.0	558.0
Asbestos roof	4.98	460.3	461.5	461.5	460.3	462.8	462.8	463.0
PVC pipe	2.00	778.0	778.0	778.0	778.0	778.0	778.0	778.0
Wall paint	3.34	661.5	661.5	661.5	661.5	665.5	665.5	660.0
Floor tile	2.05	231.7	231.7	233.2	233.2	233.2	235.4	235.4
Wall tile	1.35	944.8	944.8	945.1	945.1	945.1	947.2	947.2
Electrical fittings	3.43	212.3	212.3	214.4	214.4	214.4	214.4	214.4
Skilled Labour	18.57	445.9	462.9	481.7	481.7	481.7	486.4	486.4
Unskilled labour	15.88	494.6	513.9	542.8	542.8	542.8	550.0	550.0