**UNIT 2 ESTIMATE OF OTHER STRUCTURES**

**TWO MARKS**

1. **Write down about aqueduct. (April/May 2017)**

It is a water supply or navigable channel (conduit) constructed to convey water. In modern engineering, the term is used for any system of pipes, ditches, canals, tunnels, and other structures used for this purpose.

1. **Write the importance of soak pit. (April/May 2017)**

A soak pit, also known as a soak away or leach pit is a covered, porous-walled chamber that allows water to slowly soak into the ground. Pre-settled effluent from a Collection and Storage/Treatment or (Semi-) Centralized Treatment technology is discharged to the underground chamber from which it infiltrates into the surrounding soil.

1. **What are the types of culvert? (Nov/Dec 2012 )**
   1. Arch culvert
   2. Slab culvert
   3. Pipe culvert
   4. Box culvert
2. **What are the main components of culvert? (Nov/Dec 2016)**

1. Abutments

2. Wing walls

3. Arch

1. **What are factors to be considered in design of septic tank?** The following factors should be taken into consideration:

• Material should be water proof and corrosion resistant.

• Natural ventilation provided should be adequate

• A manhole should be provided to permit inspection and cleaning.

• Baffles should be limited to one at the inlet and one at the outlet.

• The escape of gas and sludge to effluent pipe should be avoided.

1. **Define lead. (Nov/Dec 2015)**

Lead is the crow flying horizontal distance from the centre of borrow pit to the centre of the earthwork at site, i.e centre of the area of excavation to the centre of placed earth.

1. **Define lift. (Nov/Dec 2015)**

Lift is the distance through which the excavated soil is lifted beyond a certain specified depth.

1. **What is the size of septic tank for 50 users?** 
   1. cum
2. **What is the size of septic tank for 25 users?** 
   * 1. cum
3. **An approach road 2Km.long is to be constructed. Work out the quantity of materials required i.e. stone metal and bricks. Data is given below.**

Length = 2 Km Metalled width = 3.60m Soiling of bricks = 10cm

Wearing coat of stone metal = 12 cm Solution

Quantity of bricks = 1 x 2 x 1000 x 3.60 x 0.10 = 720 cu.m No of bricks = 720.0 x 3.60 x 0.12 = 3,60,000

Stone metal = 1 x 2000 x 3.60 x 0.12 = 864 cu.m Bricks = 3, 60,000 Nos

1. **A cement concrete road (1:2:3) is to be constructed over the existing water bound macadam road .The thickness of slab =10cm.The length of the road is one km and the width 3.60m.Calculate the quality of cement concrete and the material required,**

Solution

Quality of cement concrete = 1 x 1000 x 3.60 x 0.10 = 360 cu.m

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1. **Define aqueduct. (Nov/Dec 2014)**

It is a water supply or navigable channel (conduit) constructed to convey water. In modern engineering, the term is used for any system of pipes, ditches, canals, tunnels, and other structures used for this purpose.

**13. Write the importance of soak pit. (Nov/Dec 2014, May/June 2013)**

A soak pit, also known as a soak away or leach pit is a covered, porous-walled chamber that allows water to slowly soak into the ground. Pre-settled effluent from a Collection and Storage/Treatment or (Semi-) Centralized Treatment technology is discharged to the underground chamber from which it infiltrates into the surrounding soil.

1. **Define mid-ordinate rule. (April/May2015, Nov/Dec 2015)**

In this method, the area to be integrated is to be split into rectangles of equal width, rather than into trapezia.

The area is divided into strips of equal width , h = (b – a)/n where n is the number of strip.

**15.** **List the main components of a sewer line. (April/May2015)**

Sewerage refers to the [infrastructure](http://en.wikipedia.org/wiki/Infrastructure) that conveys [sewage](http://en.wikipedia.org/wiki/Sewage). It encompasses components such as receiving [drains](http://en.wikipedia.org/wiki/Drainage), [manholes](http://en.wikipedia.org/wiki/Manhole), [pumping stations](http://en.wikipedia.org/wiki/Pumping_station), storm overflows, and screening chambers of the [combined sewer](http://en.wikipedia.org/wiki/Combined_sewer) or [sanitary sewer](http://en.wikipedia.org/wiki/Sanitary_sewer)

1. **The actual expenditure incurred in the construction of a school building which have a total length of main walls 140m is Rs.4.97lakhs.Estimate the approximate cost of a similar school building which will have 180m length of main walls**.

Total expenditure = Rs.4,97,000 Total length of main walls = 140m

Rate per m length of main wall = 4,96,000/140 = Rs.3550/- Length of main walls in the proposed building = 180m Approximate cost = 180 x 3550 = Rs.6,39,000/-

1. **Define estimate**.

An estimate is a computation or calculation of the quantities required and expenditure likely to be incurred in the construction of a work. The estimate is the probable cost of a work and is determined theoretically by mathematical calculation based on the plans and drawing and current rates.

1. **Write the recommendation for degree of accuracy in measurements.**

* Dimensions of works shall be measured to an accuracy of 0.01 m
* Thickness of R.C works shall be measured to an accuracy of 0.0005 m
* Areas of works shall be calculated to the nearest 0.01 m2
* Volumes of work shall be calculated to the nearest 0.01 m3
* Volumes of wood shall be calculated to the nearest 0.001 m3

1. **Briefly explain about revised estimate**

The estimate, which is prepared When any major change or alteration is made in the plan / structural arrangement, with or without affecting the estimate cost, and

When the estimated cost is likely to exceed by more than 5% during execution, due to increase in the cost of materials and labour or due to increase in the cost of materials and labour or due to alterations in the items of works to get the revised quantities /rates/ amount is called a revised estimate

1. **Calculate the quality of brickwork in an arch over a 1.80m span opening. The arch is 40cm.thick and the breath of a wall is 40 cm.**

Radius of the arch =1.8m Thickness of arch = 40 cm The breath of wall = 40cm Mean dia = 3.60+0.40 = 4 m Mean length of the arch

1. **Workout the quality of stone metal required for 2Km.Length for wearing coat of a 4m wide road. The thickness of the metal road required is 12cm loose.**

**Solution**

Quality of metal = 1 X 2 X 1000 X 4 X 0.12 = 960.00cu.m

|  |  |
| --- | --- |
| 1. **Briefly explain about bay method.** |  |
| This method is useful and is generally followed in case of | buildings having |

several bays. The cost of the typical bay is worked out and is then multiplied by the number of bays in that building. The extra cost for the end walls and difference in framing, if there is any, should be made, so as to arrive at the correct cost

**SIXTEEN MARKS**

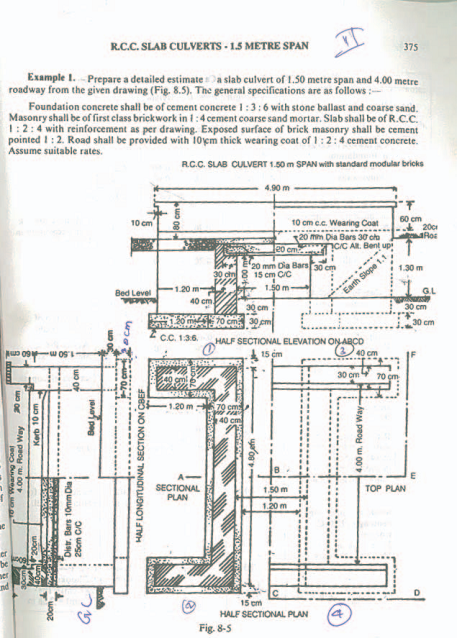
1. **Prepare a detailed estimate of a slab culvert (April/May 2017)**

**R.C.C Slab culverts – 1.5 Meters span**

Prepare a detailed estimate a slap culvert of 1.50 meter span and 4.00 meter roadwat from the given drawing. The general specification are as follows;-

Foundation concrete shall be of cement 1:3 : 6 with stone ballast and coarse sand. Masonry shall be of first class brickwork in 1:4 cement coarse sand mortar. Slab shall be of R.C.C pointed 1:2:4 with reinforced as per drawings. Exposed surface of brick masonary shall be cement pointed 1:2, road shall be provided with 10cm thick wearing coat of 1:2:4 cement concrete. Assume suitable rates.

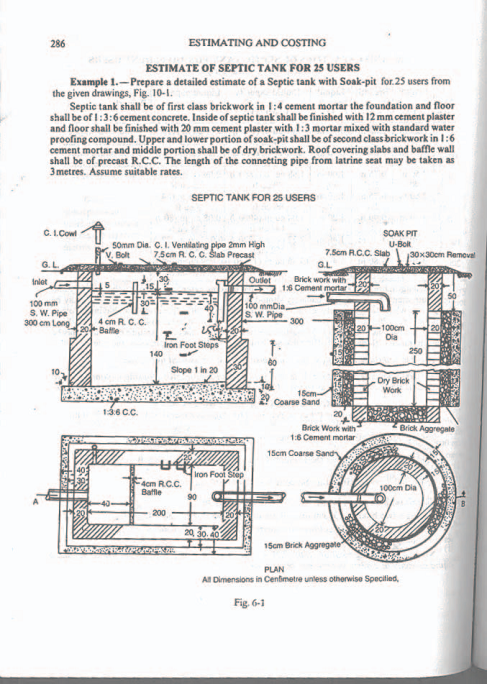
|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| S.No | Particulars of items of works | no | length m | breadth m | Height or Depth m | Quantity | Explanatory notes |
| 1. | **earth work excavation in foundation** | | | | | | |
|  | abutments | 2 | 5.10 | 0.70 | 0.60 | 4.28 |  |
|  | wings walls | 4 | 1.20 | 0.70 | 0.60 | 2.02 |  |
|  |  |  |  |  | total | 6.30 cu m |  |
| 2. | **cement concrete 1:3:6 in foundation with** | | | | | | |
|  | stone ballast – Abutment | 2 | 5.10 | 0.70 | 0.30 | 2.14 | ½ of earth work |
|  | wings walls | 4 | 1.20 | 0.70 | 0.30 | 1.01 | in excavation in item 1 |
|  |  |  |  |  | total | 3.15 cu m |  |
| 3. | I class brick work in 1:4 cement mortar | | | | | | |
|  | abutments | 2 | 4.80 | 0.40 | 1.50 | 5.76 | up to top of R.C.C slab |
|  | wings walls | 4 | 1.20 | 0.40 | 1.50 | 2.88 |  |
|  | parapets up to kerb | 2 | 4.70 | 0.40 | 0.30 | 1.113 | Above R.C.C slab up to kerb |
|  | parapet coping | 2 | 4.90 | 0.40 | 0.10 | 0.39 | Above kerb excluding coping |
|  |  |  |  |  | total | 11.57 |  |
| 4. | R.C.C work 1:2:4 in slab excluding steel and its bending but including centering shuttering shutting and binding steel | 1 | 4.80 | 2.10 | 0.20 | 2.016cu m | no deduction for volume of steel |
| 5. | steel bars including bending in R.C.C work 20 mm dia. Bars main straight bars 30 cm c/c | 17 | 2.38 | -- | -- | 40.46cu m | l = 2.10 – 2 side covers + 2 hooks = 2.10 – (2 x 4 cm) + (18 x 20 mm) = 2.38 m |
|  | main bent up bars 30 cm c/c  (no. = 4.80/.30= 16) | 16 | 2.54 | -- | -- | 40.64m | adding one depth 16 cm for two bent ups L= 2.38+.16=2.54m |
|  |  |  | total | 81.10m | @2.47 | kg m = 200.32k |  |
|  | 10 mm dia, bars distributing bottom bars 25 cm c/c | 9 | 4.90 | -- | -- | 44.10 m | L = 4.80 – 2 end covers + 3 hooks = 4.80 – (2 x 4cm) + (18 x 10mm) = 4.90m |
|  | total 63.70 m @ .62 kg = 39.49 kg | | | | | | |
| 6. | cement concrete 1:2:4 wearing coal | 1 | 4.00 | 2.30 | 0.10 | 0.92cu m | in between paraperts |
| 7. | cement pointing 1:2 in walls face wall from |  |  |  |  |  |  |
|  | 10 cm below G.L up to bottom of coping | 2 | 4.70 | -- | 2.10 | 19.74 |  |
|  | inner side of parapet excluding coping | 2 | 4.70 | -- | 0.80 | 7.52 | Hl = (20 + 10 + 50) = 0.80 mm |
|  | coping (inner edge, top, outer edge and outer and side) | 2 | 4.90 | 0.70 | -- | 6.86 | B = (10+40+10+10) cm = 0.70m |
|  | ends of parapet  ends of parapet  ends of coping | 4  4  4 | --  --  -- | 0.40  0.30  0.40 | 0.20  0.50  0.20 | 0.32  0.60  0.32 | Up to kerb above kerb edge and under side |
|  | total 35.36 | | | | | | |
|  | deduct rectangular opening ` | 2 | 1.50 |  | 1.30 | 3.90 | including 10 cm below G.L and edge of R.C.C slab |
|  | triangular portion below earth slope | 2 | (1/2 x 1.30 x 1.3) |  |  | 1.69 |  |
|  |  |  | total of deduction | | | 5.59 |  |
|  |  |  |  | net | total | 29.7 sq m |  |



1. Prepare a detailed estimate of a septic tank with soak pit

**(April/May 2017)**

Septic tank shall be of first class brickwork in 1:4 cement mortar the foundation and floor shall be of 1:3:6 cement concrete. Inside of septic tank shall be finished with 12 mm cement plaster and floor shall be finished with 20 mm cement plaster with 1: 3 mortar mixed with standard of water proofing compound. Upper and lower portion of soak – pit shall be of second class brickwork in 1:6 cement mortar and middle portion shall be of dry brickwork. Roof covering slabs and baffle wall shall be of present R. C. C. The length of the connecting pipe from latrine seat may be taken as 3 meters. Assume suitable rates.



|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| S.No | Particulars or items and details of workers | No | Length | Breadth | Height or Depth m | Quantity | Explanatory notes |
| 1. | **Earthwork in excavation** | | | | | | |
|  | Septic tank | 1 | 2.80 | 1.70 | 1.95 | 9.28 | Ht. = 140+30+20+5 = 1.95 m |
|  | soak – pit up to 3.00 m depth | 1 |  | X | 3.00 | 9.42 |  |
|  | Soak – pit lower portion | 1 |  | X | 0.20  Total | 0.30  19.00 cu m | Below dry brick work |
| 2. | **Cement concrete 1:3:6** | | | | | | |
|  | Floor and foundation | 1 | 2.80 | 1.70 | 0.20 | 0.95 |  |
|  | slopping floor | 1 | 2.00 | 0.90 | 0.05 | 0.09 | Average thickness |
|  |  |  |  |  | Total | 1.04cu m | 10+0/2 = 5 cm |
| 3. | **First class brickwork** in 1: 4 cement mortar in septic tank Long walls | | | | | | |
|  | 1st step | 2 | 2.60 | 0.30 | 0.60 | 0.94 |  |
|  | 2nd step | 2 | 2.40 | 0.20 | 1.15 | 1.10 |  |
|  | Short walls  1st step | 2 | 0.90 | 0.30 | 0.60 | 0.32 |  |
|  | 2nd step | 2 | 0.90 | 0.20 | 1.15 | 0.42 |  |
|  |  |  |  |  | Total | 2.78cu m |  |
| 4. | **2nd class brickwork** in 1:6 cement mortar in soak pit | | | | | | |
|  | Upper portion | 1 | (π x 1.200 | X 0.20 | 0.50 | 0.38 | L mean circus |
|  | Lower portion | 1 | (π x 1.200) | X 0.20 | 0.20 | 0.15 |  |
|  |  |  |  |  | Total | 0.53cu m |  |
| 5. | **2nd class dry brick work in soakpit** | 1 | (π x 1.20 | X 0.20 | 2.50 | 1.88cu m |  |
| 6. | **Precast R.C. work** finished smooth including steel reinforcement complete laid in position | | | | | | |
|  | Roof cover slab of septic tank | 1 | 2.40 | 1.30 | 0.075 | 0.234 | 7.5 cm thickness |
|  | Roof cover slab of soak – pit | 1 |  | X | 0.075 | 0.115 |  |
|  | Baffle wall in septic tank | 1 | 1.00 | 0.04 | 0.45 | 0.018 |  |
|  |  |  |  |  | Total | 0.367cu m |  |
| 7. | **12 mm cement plaster** 1:3 with standard water proofing component in septic tank | | | | | | |
|  | Long walls | 2 | 2.00 | - | 1.70 | 6.80 |  |
|  | Short walls | 2 | 0.90 | - | 1.70 | 3.06 | Inner face |
|  |  |  |  |  | Total | 9.86sq m |  |
| 8. | **20 mm cement plaster** 1:3 with standard water proofing compound | | | | | | |
|  | Floor of septic tank | 1 | 2.00 | 0.90 | - | 1.80sq m |  |
| 9. | **50 mm size brick aggregate ----** | | | | | | |
|  | Outer side of soak – pit | 1 | (πx 1.55) | X15 | 2.50 | 1.84 | L = mean circum |
|  | At bottom of soak – pit | 1 |  | X | 0.20 | 0.16 |  |
|  |  |  |  |  | Total | 2.00cu m |  |
| 10. | **Coarse sand outer side of** soak – pit | 1 | (π x 1.85) | X 1.5 | 2.50 | 2.18 cu m | L = mean circum |
| 11. | **Iron foot steps of 16 mm** dia. Bar | 4 | - | - | - | 4 nos |  |
| 12. | **100 mm dia, S. W. Pipe** laying and joining with 1:3 cement mortar complete | | | | | | |
|  | inlet end from latrine to septic tank | 1 | 3.00 | - | - | 3.00 |  |
|  | Outer end from septic tank to soak – pit | 1 | 3.30 | -- | - | 3.30 |  |
|  |  |  |  |  | Total | 6.30r m |  |
| 13. | S.W. Tec 100 mm dia. With one leg of 40 cm | 1 | - | - | - | 1 no |  |
| 14. | S.W. Bend 100 mm dia | 1 | - | - | - | 1 no |  |
| 15. | 50 mm dia C.I. ventilating pipe | 1 | 2.00 | - | - | 2.00 rm |  |
| 16. | 50 mm dia. C. I cowl ate top of ventilating pipe | 1 | - | - | - | 1 no |  |

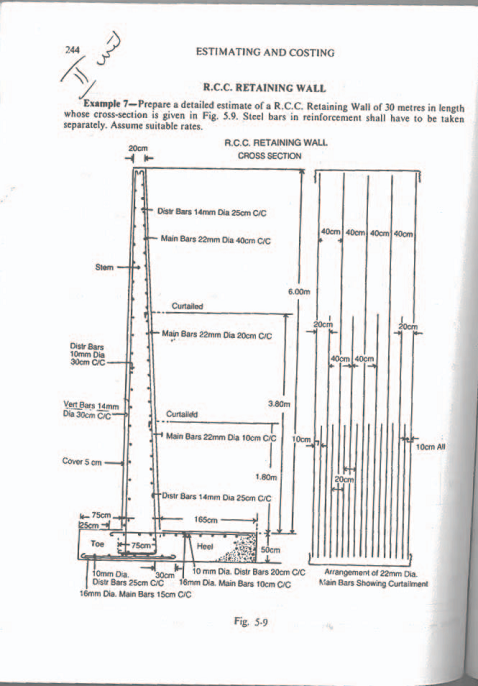
**Details of measurements and calculation of Quantities (Ex,1)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| S.No` | Particulars of items of work | Quantity | Unit | Rate  Rs P | per | Amount  Rs P |
| 1. | Earthwork in excavation | 19.00 | Cum | 350.00 | %cu m | 66.50 |
| 2. | Cement concrete 1: 3: 6 in foundation and floor with brick aggregate | 1.04 | Cu m | 300.00 | /cu m | 959.10 |
| 3. | 1st class brick work in 1: 4 cement mortar | 2.78 | Cu m | 345.00 | /cu m | 959.10 |
| 4. | 2nd class dry brick work in 1: 6 cement mortar | 0.53 | Cu m | 310.00 | /cu m | 164.30 |
| 5. | 2nd class dry brick work | 1.88 | Cu m | 130.00 | /cu m | 244.40 |
| 6. | precast R.C.C work including steel reinforcement finished complete | 0.367 | cu m | 675.00 | /cu m | 247.73 |
| 7. | 12 mm cements plaster 1:3 with standard water proofing compound | 9.86 | sq m | 150.00 | /sq m | 88.74 |
| 8. | 20mm cement plaster 1:3 with standard water proofing compound | 1.80 | sq m | 15.00 | /sq m | 27.00 |
| 9. | 50mm size brick aggregate laid in position | 2.00 | cu m | 100.00 | /cu m | 200.00 |
| 10. | coarse sand laid in position | 2.18 | cu m | 80.00 | /cu m | 174.40 |
| 11. | iron foot step | 4 | no | 2.00 | /no | 8.00 |
| 12 | 100mm dia. S>W> piper laid position complete with joining 1:1 cement mortar | 6.30 | m | 27.00 | /m | 170.10 |
| 13. | S.W. Toe 100 mm dia with one leg of 40 cm long | 1 | no | 15.00 | /no | 15.00 |
| 14. | S.W. Bend of 100 mm dia | 1 | no | 8.00 | /no | 8.00 |
| 15. | 50 mm dia C.I ventilating pipe finted in position | 2.00 | m | 10.00 | /rm | 20.00 |
| 16. | 50mm dia. C.I cowl fixed in position | 1 | no | 6.00 | /no | 6.00 |
| Total add 5% (3% for contingencies and 2% for workcharged Establishment | | | | | | 2711.27  135.56 |
| Grand total cost foer septic tank including soak Pit for 25 users | | | | | | 2846.83  2847.00 |

1. **Prepare a detailed estimate of R.C.C Retaining wall** **(May/June 2014, Nov/Dec 2016)**

**R.C.C Retaining Wall**

Prepare a detailed estimate of a R.C.C retaining Wall of 30 meters in length whose cross – section is given. Steel bars in reinforcement shall have to be taken separately. Assume suitable rates.



|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| S.No | Particulars of items and details of works | No. | Length | Breadth | Height or Depth m | Quantity |
| 1. | **R. C. C work 1:2:4** excluding steel and its bending but including centering and shutting and biniding steel | | | | | |
|  | Base slap (Toe and Heet) | 1 | 30.00 | 3.00 | .50 | 45.00 |
|  | Stem | 1 | 30.00 | 60+20  2 | 6.00  Total | 72.00  117.00 cu m |
| 2. | **Steel bars** including bending in reinforcement  **Stem – Right mode**  **22 mm dia. Bars -----** | | | | | |
|  | 22 mm Dia. Main bars @ 40 cm c/c(full height) | 76 | 7.53 | -572.28 m | 75 | L = 6.50 m- top cover + 2 hooks +7.5 (18 x 0.02)+ 75 = 7.53 m |
|  |  | | | | | |
|  | 22 mm Dia. Main bars up to 1.80 m. Ht. @ 20 cm c/c (remaining bars) | | | | | |
|  | 150 3.33=499.50 m L=7.53 – 4.20 = 3.33m | | | | | |
|  | No. | | | | | |
|  | Total of 22 mm Dia. Bars 1456.53 m@ 2.98 kg = 4340.46 kg | | | | | |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Particulars of items | No | L  m |  | Explanatory Notes |
| **14 mm Dia. Bears** | | | | |
| 14mm Dia. Distributing bars right side of stem @ 25 mm c/c | 27 | 31.52 | = 851.04 m | L = 30.00 = - 2 covers +2 overlaps + 6 hooks = 30.00 – 10+(2 x 40 x 0.14)+(6 x 9 x 0.014) = 31.52 m |
|  | | | | |
| 14 mm Dia. Vert, bars left side of stem @ 30 cm c/c | 101 | 6.63 | = 669.63 m | L = 6.50 – Top and bottom converts + 2 hooks  = 6.50 – (0.5+0.7)+ (18 x .014) = 6.63 m |
|  | | | | |
| Total of 14mm Dia bars = 1520.67m | | | | |
| **10mm Dia. Bars `** | | | | |
| 10 mm Dia. Distributing bars left side stem @ 30cm c/c | 22 | 31.06 | = 687.28m | L = 30.00 – 2 covers + 2 overlaps x 6 hooks  = 30.00 – 10 + 2 x 40) = 31.06m  (Assuming two joints) |
| **Base slab---** | | | | |
| 10 mm dia. Distributing bars at top (heel) @ 20 cm c/c | 13 | 31.06 | = 403.78 | Length same as above |
|  | | | | |
| Total of 10 Dia. Bars mm = 1304.52 m @ 0.625 kg = 808.80 kg | | | | |

R.C.C. Retaining Wall

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Particulars of items | No | Lm |  | Explanatory notes |
| **16 mm Dia. Bars** | | | | |
| 16 mm Dia. Main bars at bottom (Toe) @ 15 cm c/c | 200 | 1.89 | = 378.00m | L = .75+.60)+.30 - .05+(18 x 0.16) = 1.89 m |
|  | | | | |
| 16mm Dia, main bars at top (heel) @ 10 cm c/c | 300 | 2.74 | = 822.00 m | L = (1.65 + .60 + .25) - .05 +(18 x .016) = 2.74 m |
|  | | | | |
| Total of 16 Dia bars mm = 1200.00m @ 1.58 kg. = 1896 kg  Grand total of all bars = 8884.46 kg = 88.845 q | | | | |

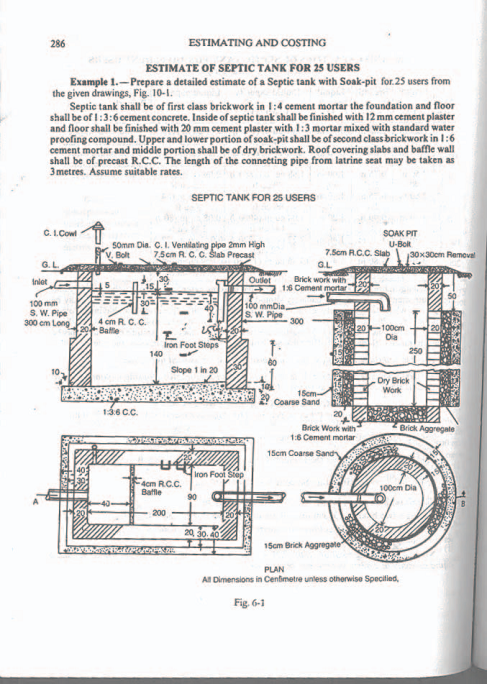
1. **Prepare a detailed estimate of a septic tank with soak pit for 25 users**

**(May/June 2014, 2013)**

**Estimate of specific tank for 25 users**

Prepare a detailed estimate of a septic tank with Soak – pit for 2.5 users from the given drawings

Septic tank shall be of first class brickwork in 1:4 cement mortar the foundation and floor shall be of 1:3:6 cement concrete. Inside of septic tank shall be finished with 12 mm cement plaster and floor shall be finished with 20 mm cement plaster with 1: 3 mortar mixed with standard of water proofing compound. Upper and lower portion of soak – pit shall be of second class brickwork in 1:6 cement mortar and middle portion shall be of dry brickwork. Roof covering slabs and baffle wall shall be of present R. C. C. The length of the connecting pipe from latrine seat may be taken as 3 meters. Assume suitable rates.

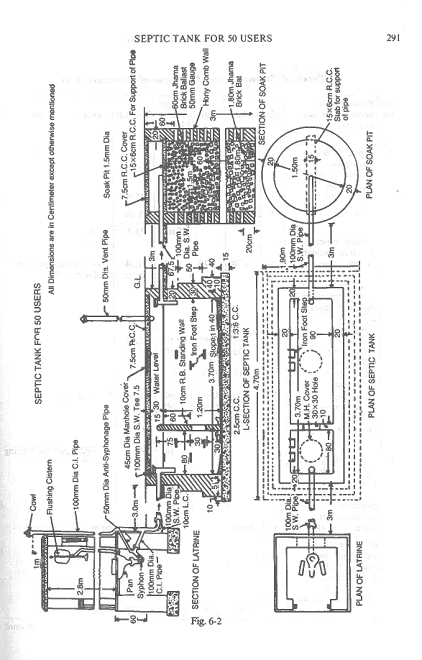


|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| S.No | Particulars or items and details of workers | No | Length | Breadth | Height or Depth m | Quantity | Explanatory notes |
| 1. | **Earthwork in excavation** | | | | | | |
|  | Septic tank | 1 | 2.80 | 1.70 | 1.95 | 9.28 | Ht. = 140+30+20+5 = 1.95 m |
|  | soak – pit up to 3.00 m depth | 1 |  | X | 3.00 | 9.42 |  |
|  | Soak – pit lower portion | 1 |  | X | 0.20  Total | 0.30  19.00 cu m | Below dry brick work |
| 2. | **Cement concrete 1:3:6** | | | | | | |
|  | Floor and foundation | 1 | 2.80 | 1.70 | 0.20 | 0.95 |  |
|  | slopping floor | 1 | 2.00 | 0.90 | 0.05 | 0.09 | Average thickness |
|  |  |  |  |  | Total | 1.04cu m | 10+0/2 = 5 cm |
| 3. | **First class brickwork** in 1: 4 cement mortar in septic tank Long walls | | | | | | |
|  | 1st step | 2 | 2.60 | 0.30 | 0.60 | 0.94 |  |
|  | 2nd step | 2 | 2.40 | 0.20 | 1.15 | 1.10 |  |
|  | Short walls  1st step | 2 | 0.90 | 0.30 | 0.60 | 0.32 |  |
|  | 2nd step | 2 | 0.90 | 0.20 | 1.15 | 0.42 |  |
|  |  |  |  |  | Total | 2.78cu m |  |
| 4. | **2nd class brickwork** in 1:6 cement mortar in soak pit | | | | | | |
|  | Upper portion | 1 | (π x 1.200 | X 0.20 | 0.50 | 0.38 | L mean circus |
|  | Lower portion | 1 | (π x 1.200) | X 0.20 | 0.20 | 0.15 |  |
|  |  |  |  |  | Total | 0.53cu m |  |
| 5. | **2nd class dry brick work in soakpit** | 1 | (π x 1.20 | X 0.20 | 2.50 | 1.88cu m |  |
| 6. | **Precast R.C. work** finished smooth including steel reinforcement complete laid in position | | | | | | |
|  | Roof cover slab of septic tank | 1 | 2.40 | 1.30 | 0.075 | 0.234 | 7.5 cm thickness |
|  | Roof cover slab of soak – pit | 1 |  | X | 0.075 | 0.115 |  |
|  | Baffle wall in septic tank | 1 | 1.00 | 0.04 | 0.45 | 0.018 |  |
|  |  |  |  |  | Total | 0.367cu m |  |
| 7. | **12 mm cement plaster** 1:3 with standard water proofing component in septic tank | | | | | | |
|  | Long walls | 2 | 2.00 | - | 1.70 | 6.80 |  |
|  | Short walls | 2 | 0.90 | - | 1.70 | 3.06 | Inner face |
|  |  |  |  |  | Total | 9.86sq m |  |
| 8. | **20 mm cement plaster** 1:3 with standard water proofing compound | | | | | | |
|  | Floor of septic tank | 1 | 2.00 | 0.90 | - | 1.80sq m |  |
| 9. | **50 mm size brick aggregate ----** | | | | | | |
|  | Outer side of soak – pit | 1 | (πx 1.55) | X15 | 2.50 | 1.84 | L = mean circum |
|  | At bottom of soak – pit | 1 |  | X | 0.20 | 0.16 |  |
|  |  |  |  |  | Total | 2.00cu m |  |
| 10. | **Coarse sand outer side of** soak – pit | 1 | (π x 1.85) | X 1.5 | 2.50 | 2.18 cu m | L = mean circum |
| 11. | **Iron foot steps of 16 mm** dia. Bar | 4 | - | - | - | 4 nos |  |
| 12. | **100 mm dia, S. W. Pipe** laying and joining with 1:3 cement mortar complete | | | | | | |
|  | inlet end from latrine to septic tank | 1 | 3.00 | - | - | 3.00 |  |
|  | Outer end from septic tank to soak – pit | 1 | 3.30 | -- | - | 3.30 |  |
|  |  |  |  |  | Total | 6.30r m |  |
| 13. | S.W. Tec 100 mm dia. With one leg of 40 cm | 1 | - | - | - | 1 no |  |
| 14. | S.W. Bend 100 mm dia | 1 | - | - | - | 1 no |  |
| 15. | 50 mm dia C.I. ventilating pipe | 1 | 2.00 | - | - | 2.00 rm |  |
| 16. | 50 mm dia. C. I cowl ate top of ventilating pipe | 1 | - | - | - | 1 no |  |

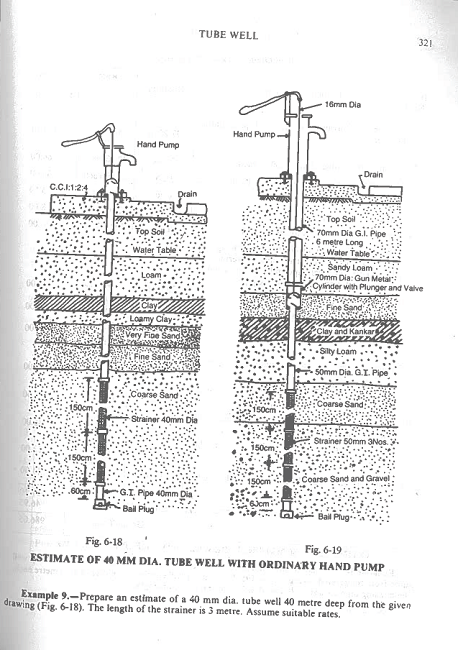
**Details of measurements and calculation of Quantities (Ex,1)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| S.No` | Particulars of items of work | Quantity | Unit | Rate  Rs P | per | Amount  Rs P |
| 1. | Earthwork in excavation | 19.00 | Cum | 350.00 | %cu m | 66.50 |
| 2. | Cement concrete 1: 3: 6 in foundation and floor with brick aggregate | 1.04 | Cu m | 300.00 | /cu m | 959.10 |
| 3. | 1st class brick work in 1: 4 cement mortar | 2.78 | Cu m | 345.00 | /cu m | 959.10 |
| 4. | 2nd class dry brick work in 1: 6 cement mortar | 0.53 | Cu m | 310.00 | /cu m | 164.30 |
| 5. | 2nd class dry brick work | 1.88 | Cu m | 130.00 | /cu m | 244.40 |
| 6. | precast R.C.C work including steel reinforcement finished complete | 0.367 | cu m | 675.00 | /cu m | 247.73 |
| 7. | 12 mm cements plaster 1:3 with standard water proofing compound | 9.86 | sq m | 150.00 | /sq m | 88.74 |
| 8. | 20mm cement plaster 1:3 with standard water proofing compound | 1.80 | sq m | 15.00 | /sq m | 27.00 |
| 9. | 50mm size brick aggregate laid in position | 2.00 | cu m | 100.00 | /cu m | 200.00 |
| 10. | coarse sand laid in position | 2.18 | cu m | 80.00 | /cu m | 174.40 |
| 11. | iron foot step | 4 | no | 2.00 | /no | 8.00 |
| 12 | 100mm dia. S>W> piper laid position complete with joining 1:1 cement mortar | 6.30 | m | 27.00 | /m | 170.10 |
| 13. | S.W. Toe 100 mm dia with one leg of 40 cm long | 1 | no | 15.00 | /no | 15.00 |
| 14. | S.W. Bend of 100 mm dia | 1 | no | 8.00 | /no | 8.00 |
| 15. | 50 mm dia C.I ventilating pipe finted in position | 2.00 | m | 10.00 | /rm | 20.00 |
| 16. | 50mm dia. C.I cowl fixed in position | 1 | no | 6.00 | /no | 6.00 |
| Total add 5% (3% for contingencies and 2% for workcharged Establishment | | | | | | 2711.27  135.56 |
| Grand total cost foer septic tank including soak Pit for 25 users | | | | | | 2846.83  2847.00 |

1. **Prepare a detailed estimate of a septic tank with soak pit for 50 users** **(Nov/Dec 2015, Nov/Dec 2012)**



|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| S.NO | Particulars of items and details of works | No | Length | Breadth | Height or Depth m | Quantity | Explanatory notes |
| 1. | septic tank and soak pit  soak pi | 1  1 | 4.70 | 1.90  x 3.00 | -  total | 8.50  23.91 cu m | cu m |
| 2. | Cement concrete 1:3:6 in foundation of septic tank | 1 | 4.70 | 1.90 | 0.15 | 1.34 cu m | Floor taken separately under item? |
| 3. | t – class brick work in 1:4 cement mortar in septic tank – long walls |  |  |  |  |  |  |
|  | 1st footing  2nd footing  3rd footing up to top | 2  2  2 | 4.50  4.30  4.10 | 0.40  0.30  0.20 | 0.40  0.50  0.675 | 1.44  1.29  1.11 |  |
|  | Short walls  1st footing  2nd footing  3rd footing up to top | 2  2  2 | 4.50  4.30  4.10 | 0.40  0.30  0.20 | 0.40  0.50  0.675  Total | 0.29  0.27  0.24  4.64cu m | no detection for bearing of slab |
| 4. | R.B work in partition wall with 1:3 cement mortar in septic tank including reinforcement complete work | 1 | 0.90 | 0.10 | 1.35 | 0.122 | cu m |
| 5. | R.C.C work in septic tank and soak – pit including reinforcement complete work slab cover of septic tank | 1 | 3.90 | 1.10 | 0.075 | 0.322 |  |
|  | slab cover of soak pit  R.C.C support of pipe in soak pit | 1  1 | 1.70 | x  0.15 | 0.075  0.06  total | 0.170  0.015  0.507cu m |  |
| 6. | 12mm plastering inside septic tank with 1:2 cement mortar mixed with water proofing compound  long walls | 2 | 3.70 | -- | 1.50 | 11.10 |  |
|  | short walls  partition walls both sides  partition walls top | 2  2  1 | 0.90  0.90  0.90 | -  -  - | 1.50  1.35  0.10  Total | 11.10  2.70  2.43  0.09  16.32 | sq m |
| 7. | C.C. floor 1:2:4:5cm average thickness | 1 | 3.70 | 0.90 | - | 3.33 | sq m |
| 8. | II class brickwork in 1:6 cement mortar in soak – pit (Honey comb wall as solid) | 1 | π x 1.70 | x 20 x | 300 | =3.20 cu m | mean circumference |
| 9. | Jhama brick ballast 10 mm size inside soak – pit (upper layer) | 1 |  | x 0.60 | -- | 1.06cu m |  |
| 10. | Jhama brick bats inside soak – pit(lower layout) | 1 |  | x 1.80 | -- | 3.18 cu m |  |
| 11. | C. I Manhole cover 45 cm Dia. Over septic tank | 2 | -- | -- | -- | 2 nos |  |
| 12 | iron foot steps septic tank | 8 | -- | -- | -- | 8 Nos |  |
| 13. | sanitary works – W.C Indian pattern 50 cm while glazed pan with 135 litre C.I Flushing cistern (E.L.C) with brackets and 32mm Dia. G.I telescopic flush pipe painted two coats and with chain foot supply and fixing | 1 | -- | -- | -- | 1 set v | Flushing cistern telescopic pipe foot rests etc. each may also be taken as separate items. |
| 14 | S.W (stone ware) pipe 100 mm dia. Lad over 10 cm. L.C. including digging laying jointing testing etc. complete connecting septic tank connecting septic tank with soak pit | 1  1 | 3.00  4.00 | --  -- | --  --  total | 3.00  4.00  7.00 m |  |
| 15 | S.W. Tee 100 mm dia. At the inlet and outlet of septic tank | 2 | - | -- | -- | 2nos |  |
| 16. | C.I Heavy soil pipe 100mm dia. Connecting latrine seat, vent pipe including fixing with lead jointing | 1 | 5.00 | -- | -- | 5.00m |  |
| 17. | C. I. Heavy soil pipe 50mm dia. Complete with lead joining connecting latrine pan with vent pipe  vent pipe for septic tank | 1  1 | 0.60  3.00 | --  -- | --  --  total | 0.60  3.00  3.60 |  |
| 18. | C.I Cowl 100 mm dia in latrine | 1 | -- | -- | -- | 1 No |  |
| 19 | C.I Cowl 50 mm dia for septic tank vent pipe | 1 | -- |  | -- | 1 No |  |
| 20. | 250 litre G.I tank of 20 B.W.G sheets with 45cm dia. Raised hinged cover with locking arrangement and filtered with 15 mm dia brass ballcock supplying and fixing in position complete | 1 | -- | -- | -- | 1 No |  |
| 21. | 15 mm dia G.I pipe with filtering including digging laying, clamping complete  connecting G.I tank with water main | 1 | 15.00 | -- | -- | 15.00 | l = 10.00 + .60 + 2.80 + 1.00+60 extra = 15.00 m |
|  | connecting Flushing cistern from G.I tank | 1 | 2.00 | -- | --  total | 2.00  21.50 m | top on outside wall |
| 22. | 15mm dia. Brass stop – cock (one for G.I tank and one for flushing cistern) supplying and fixing | 2 | -- | -- | -- | 2 nos |  |
| 23. | 15mm dia. Brass bib cock supplying and fixing | 1 | -- | -- | -- | 1 no |  |
| 24. | brass ferrule 6mm dia supplying and fixing | 1 | -- | -- | -- | * 1. no. |  |

1. Prepare a detailed estimate of a 40 mm dia. tube well (fig 6.18) 

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| S.No | Particulars of items | quantity | Rate  Rs P | amount  Rs P |
| 1 | 40 mm dia Galvanised iron (G.I) pipe including sockets (20 cm above G.L) | 37.20 m | 8.50 per rm | 316.10 |
| 2 | 40 mm dia strainer 2 nos 1.50m each | 2 nos | 42.00 each | 84.00 |
| 3 | hand pump ordinary (no 4 Hand pump) | 1 no | 35.00 each | 35.00 |
| 4 | bail plug | 1 no | 5.50 each | 5.50 |
| 5. | sockets 4nos. Extra | 4nos | 2.00 each | 8.00 |
| 6. | transport of materials to site of work | I. S | 10.00 I.S | 10.00 |
| 7. | sinking – Boring with 60mm dia, casing type including water arrangements lowering the 40mm dia. Tube well pipe and strainer including jointing and with drawing casing pipe | | | |
|  | (i) 0 to 20 metre | 20.00 m | 7.00 per r m | 140.00 |
|  | (ii) Below 20m to 30 m | 10.00 m | 11.00 per rm | 110.00 |
|  | (iii) Below 30m to 40m | 10.00 m | 15.50 per rm | 155.00 |
| 8. | inserting coarse sand surrounding the strainer including supply of sand | 1 no | 11.00 each | 11.00 |
| 9. | Fixing and erection of hand pump in position including supply if sand | 1 no | 5.50 each | 5.50 |
| 10. | cement concrete platform and foundation surface finished smooth | 1 no | 35.00 each | 35.00 |
| 11. | cement concrete drain 2 metre long finished smooth | 2.00 m | 6.50 per r m | 13.00 |
| 12 | Pumping out water till clear water is obtained | 1 no | 1.00 each | 11.00 |
| total add 5% for contingencies and Workcharged Establishment 939.10  46.95  Grand total 986.05 | | | | |

1. **Prepare a detailed estimate of a 50 mm dia. tube well (fig 6.19)**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| S.No | Particulars of items | | quantity | | rate  Rs P | amount  Rs P | |
| 1 | 50mm dia galvanised iron (G.I) pipe | | 94.00m | | 11.50 per rm | 1081.00 | |
| 2. | 70mm dia G. I housing pipe | | 6.00 | | 23.00 per rm | 138.00 | |
| 3. | 50 mm dia strainer 3 nos 1.50 m each | | 3 nos | | 55.00 each | 165.00 | |
| 4. | 74 mm dia gun metal cylinder with value and plunger | | 1 nos | | 100.00 each | 100.00 | |
| 5. | head pump with extra length of 16 mm dia connecting rod | | 1no | | 45.00 each | 45.00 | |
| 6 | bail plug | | 1no | | 7.50 each | 7.50 | |
| 7. | sockets 4 nos extra | | 4no | | 2.50 each | 10.00 | |
| 8. | transport of materials to site of work | | 1 job | | 20.00 LS | 20.00 | |
| 9. | Sinking – Boring with 70 mm dia casting pipe including water arrangements, lowering the 50 mm dia tube well pipe and strainer including jointing and withdrawing of casing pipe | | | | | | |
|  | (i) 0 to 20 metre  (ii) Below 20 m to 35 m  (iii) Below 35 m to 50 m  (iv) Below 50 m to 65 m  (v) Below 65 m to 80 m  (vi) Below 80m to 95 m  (vii) Below 95 m to 100 m | 20 m  15 m  15 m  15 m  15 m  15 m  5 m | | 7.50 per r m  11.00 per rm  15.50 per r m  20.00 per r m  24.00 per r m  28.50 per r m  33.00 per r m | | | 150.00  165.00  232.50  300.00  360.00  427.50  165.00 |
| 10. | inserting coarse sand surrounding the strainer including supply of sand | 1 job | | 20.00 L.S | | | 20.00 |
| 11. | fixing and erecting hand pump in position including holding down bolts | 1 job | | 10.00 L.S | | | 10.00 |
| 12. | cement concerte platform and foundation surface finished smooth | 1job | | 30.00 L.S | | | 30.00 |
| 13. | cement concrete drain 3 meter long finished smooth | 3.00 m | | 9.00 per r m | | | 27.00 |
| 14. | pumping out water till clear water is obtained | 1 job | | 15.00 L. S | | | 15.00 |
|  | Total  Add 5% for contingencies and workcharged establishment  Grand total | | | | | | 3468.50  173.42  3641.92 |

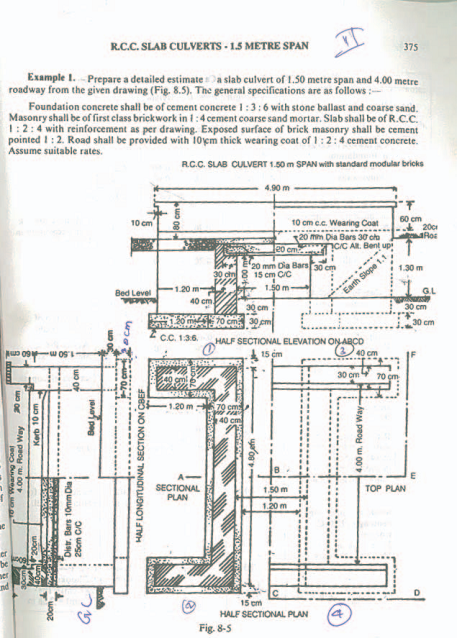
1. **Prepare a detailed estimate of a slab culvert (Nov/Dec 2015, Nov/Dec 2016)**

**R.C.C Slab culverts – 1.5 Meters span**

Prepare a detailed estimate a slap culvert of 1.50 meter span and 4.00 meter roadwat from the given drawing. The general specification are as follows;-

Foundation concrete shall be of cement 1:3 : 6 with stone ballast and coarse sand. Masonry shall be of first class brickwork in 1:4 cement coarse sand mortar. Slab shall be of R.C.C pointed 1:2:4 with reinforced as per drawings. Exposed surface of brick masonary shall be cement pointed 1:2, road shall be provided with 10cm thick wearing coat of 1:2:4 cement concrete. Assume suitable rates.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| S.No | Particulars of items of works | no | length m | breadth m | Height or Depth m | Quantity | Explanatory notes |
| 1. | **earth work excavation in foundation** | | | | | | |
|  | abutments | 2 | 5.10 | 0.70 | 0.60 | 4.28 |  |
|  | wings walls | 4 | 1.20 | 0.70 | 0.60 | 2.02 |  |
|  |  |  |  |  | total | 6.30 cu m |  |
| 2. | **cement concrete 1:3:6 in foundation with** | | | | | | |
|  | stone ballast – Abutment | 2 | 5.10 | 0.70 | 0.30 | 2.14 | ½ of earth work |
|  | wings walls | 4 | 1.20 | 0.70 | 0.30 | 1.01 | in excavation in item 1 |
|  |  |  |  |  | total | 3.15 cu m |  |
| 3. | I class brick work in 1:4 cement mortar | | | | | | |
|  | abutments | 2 | 4.80 | 0.40 | 1.50 | 5.76 | up to top of R.C.C slab |
|  | wings walls | 4 | 1.20 | 0.40 | 1.50 | 2.88 |  |
|  | parapets up to kerb | 2 | 4.70 | 0.40 | 0.30 | 1.113 | Above R.C.C slab up to kerb |
|  | parapet coping | 2 | 4.90 | 0.40 | 0.10 | 0.39 | Above kerb excluding coping |
|  |  |  |  |  | total | 11.57 |  |
| 4. | R.C.C work 1:2:4 in slab excluding steel and its bending but including centering shuttering shutting and binding steel | 1 | 4.80 | 2.10 | 0.20 | 2.016cu m | no deduction for volume of steel |
| 5. | steel bars including bending in R.C.C work 20 mm dia. Bars main straight bars 30 cm c/c | 17 | 2.38 | -- | -- | 40.46cu m | l = 2.10 – 2 side covers + 2 hooks = 2.10 – (2 x 4 cm) + (18 x 20 mm) = 2.38 m |
|  | main bent up bars 30 cm c/c  (no. = 4.80/.30= 16) | 16 | 2.54 | -- | -- | 40.64m | adding one depth 16 cm for two bent ups L= 2.38+.16=2.54m |
|  |  |  | total | 81.10m | @2.47 | kg m = 200.32k |  |
|  | 10 mm dia, bars distributing bottom bars 25 cm c/c | 9 | 4.90 | -- | -- | 44.10 m | L = 4.80 – 2 end covers + 3 hooks = 4.80 – (2 x 4cm) + (18 x 10mm) = 4.90m |
|  | total 63.70 m @ .62 kg = 39.49 kg | | | | | | |
| 6. | cement concrete 1:2:4 wearing coal | 1 | 4.00 | 2.30 | 0.10 | 0.92cu m | in between paraperts |
| 7. | cement pointing 1:2 in walls face wall from |  |  |  |  |  |  |
|  | 10 cm below G.L up to bottom of coping | 2 | 4.70 | -- | 2.10 | 19.74 |  |
|  | inner side of parapet excluding coping | 2 | 4.70 | -- | 0.80 | 7.52 | Hl = (20 + 10 + 50) = 0.80 mm |
|  | coping (inner edge, top, outer edge and outer and side) | 2 | 4.90 | 0.70 | -- | 6.86 | B = (10+40+10+10) cm = 0.70m |
|  | ends of parapet  ends of parapet  ends of coping | 4  4  4 | --  --  -- | 0.40  0.30  0.40 | 0.20  0.50  0.20 | 0.32  0.60  0.32 | Up to kerb above kerb edge and under side |
|  | total 35.36 | | | | | | |
|  | deduct rectangular opening ` | 2 | 1.50 |  | 1.30 | 3.90 | including 10 cm below G.L and edge of R.C.C slab |
|  | triangular portion below earth slope | 2 | (1/2 x 1.30 x 1.3) |  |  | 1.69 |  |
|  |  |  | total of deduction | | | 5.59 |  |
|  |  |  |  | net | total | 29.7 sq m |  |



1. **Explain report on estimate fix construction of a culvert**. **(May/June 2014,May/June 2013, Nov/Dec 2012)**

**Report on Estimate for Construction of a Culvert:**

The estimate has been prepared for the construction of an arch culvert of 3m span in 15 km-300 m on Lucknow –Daulatpur road. The road at this point is flooded almost every year during the rainy reason, causing flood and damages in the area. During the last inspection the Executive Engineer has asked to prepare an estimate and this estimate has been prepared in compliance of E.E’s letter no ………….dated …………….. the cost of construction will be met from 50 civil work special repairs.

The culvert has been designed for I.R.A Class a loading. The catchment area has been determined from the 2.5 cm (1‛) map of the area, which comes to 1200 acres, and the water

way has been calculated by the Talbot formula a –cA 3 4 , where a = waterway in sq. ft , a=



Catchment area in acres, and c= constant and has been taken as 0.2. All calculation and design have been enclosed with the estimate.

The soil has been tested and has been found to be good, and ordinary spread foundation will be sufficient. The foundation shall be of cement concrete 1:4:8 and abutments, wing walls and parapets shall be of brick masonary in 1:5 cement mortar, the arch work shall be of brick masonry in 1:3 cement mortar. Exposed surfaces shall be cement pointed 1:2. all works shall be as per detailed P.W.D Specifications.

The estimate has been prepared at P.W.D Schedule of Rates. A statement of materials, cement, bricks, coal, etc., required for the construction , has been enclosed with he estimate. The work shall be executed on contract by inviting tenders and the work shall be started after the rainy season and shall be completed within four month’s time.

The estimate amounting to Rs. 15,000.00 is submitted for sanction and allotment of

Fund.

1. **What are the features consist in a project or scheme of work? (May/June 2014)**

**The project or scheme of major work consist of the following works:-**

* Preliminary investigation, Reconnaissance, Preliminary survey, trial boring, soil testing etc.
* Preparation of preliminary estimate and obtaining administrative approval
* Selection of site or alignment
* Surveying –Plane table survey, leveling, contouring, etc.,
* Preparation of survey plan, plotting of levels and contours, preparation of longitudinal section, cross section etc., as may be required,
* Working out the requirements – number, type and size of buildings of different categories. Water-way for bridges and culverts, capacity of channels (canals distributories, minor, etc). width and type of road etc, as the case may be,
* Marking formation line of road or formation line of bed of channels in the L-section drawing cross sections of road channels, etc. as the case may be ,
* Designing – structural design and calculations, basis of deign, etc.,
* Planning, preparation of drawings- Plan , elevation, sections, detailed drawings, etc.,
* Preparation of Layout plan, Site plan or Index plan. In case of irrigation project and Road project the alignment is marked on the Shajra maps showing the different plots of land to be acquired. For irrigation project , the area served by different outlets and channels are marked on the Shajra map
* Preparation of general specification of the different building of works, and preparation of Detailed specifications of each item of works.
* Working out the Analysis of rates of different items of work. Usually, the rates are taken as per printed Schedule of Rates and Analysis of rates are prepared only for non-scheduled items,
* Preparation of Detailed estimate and abstract of cost of each building or each work
* preparation of general abstract of cost for the whole project. 10 per cent of the whole estimate cost is provided for departmental charges.
* Preparation of rent statement or return (revenue income) and comparing the total amount of capital cost with the return,
* Working out the requirement of important materials and preparing a statement of important materials as cement, steel brick, coals, etc. which are to be arranged by the department,
* Phasing of the project – Big projects are constructed in phases – 1st phase, 2nd phase, 3rd phase etc.,
* Estimate for temporary accommodation for office, store sheds, staff quarters, accommodation for workmen (labour huts) arrangements for temporary water supply and sanitary works and public health work, approach roads, etc. should also be prepared under separate head. Temporary accommodation and Prelimarny works,
* The main estimate should also include the cost of land, Development of land – Levelling and dressing, Cost of roads, Cost of water supply works, Cost of sewer and sewer works, cost of surface drains ad storm water drains. Cost of Electrification external services, Cost of Arboriculture, Cost of Preliminary investigation and surveying etc. Estimate for those works may be prepared in detail if possible, but as all the details of the work are not known at the time of preparing the estimate they are estimated on area basis of the whole project area at the rate of per unit (Rupees per hectare of Rupees per acre) or comprehensive to give a clear idea and picture of the whole project.
* Technical Report of project – Report should be concise but comprehensive to give a clear idea and picture of the whole project. The report should given the brief history of the work, reference to administrative approval necessity justifying the most suitability of the project, availability of materials and labour, agency for the work costof each phase of work, time required for the completion of each phase of work and also of the whole work, the total cost of the whole project.