**SIDAMA ZONE WATER MINE AND ENERGY DEPARTMENT**

**BORETA WOYO WATER SUPPLY PROJECT STUDY & DESIGN REPORT**

**NOV, 2018 G.C**

**HAWASSA**

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## 

## Executive summery

This design report is about Boreta Woyo kebele water supply and sanitation project, which is located in Sidama zone, Bona zuriya woreda. consisting of distribution Line, pressure line, water points, 100m3 concrete Reservoir, Reservoir Valve chamber, electromechanical (pump & generator), generator and guard house, valve chamber for Network Road crossing and anchor blocks and trust blocks. The overall cost of this project is **6,361,933.55** Birr, including 15%VAT.

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# INTRODUCTION

## General

Water is one of the basic needs of life without it life cannot sustain. Ethiopia is endowed with good water potential and known to be the water tower of east Africa. However the need for potable water is not still scarified and the potential is not yet expected more over the sanitation any standard of the society is not developed. As result many people suffer from water born diseases.

The impact of this fact on the economic progress of the country is obvious for significant socio-economic development of the community an adequate supply of safe water is prerequisite.

A factor such as time and Energy saving in the collection of drinking water and a substation reduction in the incidence of deceases greatly contributes to development. Besides the time and energy loss by women in fetching water and be used to care for their children. Despite huge costs in incurs the development of water supply facilities is therefore of paramount importance and issue of priority to any community. Boreta woyo and the surounding community kebele are exposed to the problems mentioned above. To improve living standards and health condition of this town community preparing new water supply project proposal has been essential. So in this document the detailed study and design of the Boreta woyo kebele water supply with bill of quantities are included.

## *Back ground*

The intended drinking water source of the Boreta Woyo kebele is from spring in the kebele. Previously the community has no hygienic supply of water at the nearby. They use simply seasonal springs, river water and from neighboring kebeles by traveling large distance.

### Location and Accessibility

The project area, Boreta Woyo kebele,is located at about 20 km gravel road to Worancha Town. The geographic location of Boreta Woyo kebele site lies in 473442 and 726399 the average Elevation of the kebele is 2177 m.a.s.l Boreta Woyo kebele site is categories under “ Weyina dega” Climatic Zone.

### Administration and population

Boreta Woyo kebele is established traditionally and it was not master plan based. As Boreta Woyo kebele Administrative population and housing census currently the population of the village is 7254.

### Socio- Economic Survey

The major agricultural product of the area is coffee, Enset, maize, sugar cane and others. Boreta Woyo kebele has 1 junior (1-8) school, 1 health post, Protestant churches, and there are different religions catholic, orthodox also the ethnic groups are composed of mainly Sidama.

## 

## Goals of the project

Overall objective of this project would be:

* Establishment of sustainable Environmental service for people in water supply, sanitation and hygiene’s promotion thought its design period.
* Increasing Environment impact of ruler community in village including marginalized groups in decision making and management of water supply and sanitation services.

## *Objective of the project*

The objective of this project is to supply potable water for community living in Boreta Woyo and the surounding kebeles. This ensures a sustainable improvement in health condition.

To produce appropriate design of water supply system for the selected source & related structures.

# Population Projection and Water Demand

## *General*

A water supply scheme includes huge and costly structures which are difficult to replaced or increased in their capacities easily and conveniently. Hence all scenarios affecting the water supply system should have to thoroughly access before the system designed. One of the scenarios that have great impact on estimating the water demand of a particular project is the projection of the population sizes. Hence the planning of any water supply system has to base on forecast of population size, population growth rate and distribution.

## *Design period*

As of WHO recommendation and as large water supply projects in Ethiopia 20-25 years of a design period is provided for all design consideration. We take 20 years for design purpose.

## *Base population and population projection*

The use of reliable base population figure is very important for optimizing the project costs and sustaining the projects services. Here over and under estimation of the populations result in a higher investment cost and a lower service run period respectively. Hence it’s very important to initially get realistic base population figures not to come with the above mentioned problems.

## *Population growth*

The water supply system not has to be designed for the current resident requesting, but also for the future population, it will inevitably serve during the design period. According to CSA the rural population has an average of 3% growth rate of population increment.

## *Population projection*

For rural Keble’s like Boreta Woyo kebele the population forecasting method selected is Geometric progration.

According to Boreta Woyo kebele Administration the population of Boreta Woyo kebele in 2010E.C is about 7254.

Population forecasting for the design period

P1=Po (1+r) n, Growth rate 3%

**Table 1 population projection (2010 - 2031)**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Description | Growth  rate per year  (%) |  | | | | | |
|  |  | 2010 | 2011 | 2016 | 2021 | 2026 | 2031 |
| Population projection | 3 | 3654 | 3764 | 4363 | 5058 | 5864 | 6798 |

# EXISTING WATER SUPPLIES CONDITION

There is shortage of water in project site from actual production figure and the actual population figures obtained that the population provides with an average supply of less than 20 l/c/day. Before Boreta Woyo kebele community gets water from shallow wells, hand dug well, Rivers and small bays in rainy season. Also mostly this water is poor quality of hygiene infected by bacteria.

## Demand Assessment

In the design of any water supply project it is necessary to estimate the amount of water that is required to supply.

This involves determine the number of people to serve and their percapita water consumption along with analysis of the factors that may operate to affect consumption. The total water demand of the village calculated by considering the water requirement for public and domestic usage of water expected in the village. Analysis of water demand in the studied area is 20 l/c/d water demand analysis is done, based on per capita water demand.

Table Population projection and water demand analysis in B/ woyo village

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Description** | **Growth rate per year(%)** | **Year** | | | | |  |
| **2010** | **2011** | **2016** | **2021** | **2026** | **2031** |
| Population projection | 3 | 3654 | 3764 | 4363 | 5058 | 5864 | 6798 |
| Average per capital demand(l/c/d) |  | 25 | 25 | 25 | 25 | 25 |
| Average daily water demand(l/d) |  | 94091 | 109077 | 126450 | 146590 | 169938 |
| Maximum day demand(l/s) |  | 1.31 | 1.51 | 1.76 | 2.04 | 2.36 |
| Peak hourly demand(l/s) |  | 2.35 | 2.73 | 3.16 | 3.66 | 4.25 |
| Reservior capacity(m^3) |  | 31 | 36 | 42 | 49 | 57 |
| Adopted reservior capacity(m^3) |  | 50.00 | 50.00 | 50 | 50 | 50 |

# DESIGN OF THE SYSTEM

## *Water source requirement & Reservoir capacity*

### The Source is from Borehole at the Village

The water is pumped from the Borehole to 100m3 Reservoir at elevated area of Boreta Woyo kebele.

4.1.2Source requirement

**Table 3 water source requirement**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| year(E.C) | 2011 | 2016 | 2021 | 2026 | 2031 |
| peak hourly demand (l/s) | 2.35 | 2.73 | 3.16 | 3.66 | 4.25 |
| water production from existing source (l/s) | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 |

The total amount of source required satisfying the demand of Boreta Woyo kebele throughout the design period the reservoirs will be 4.25 l/s and the available source 1.5l/s and there should be need of extra source in the future.

### Reservoir capacity (R.c)

To equalize the pumping rate to supply and demand to allow uniform rate of pumping throughout the day the reservoir capacity of the system is estimated to be 1/3 average daily demand . We take 1/3 rule because we have no hourly consumption.

|  |
| --- |
| **R.c= 1/3\***169938**\*1/1000=57m3 take 50m3 fore design purpose.** |

Therefore adopt the standard 100m3 concrete reservoir.

# PUMP

## General

A pump may be defined as mechanical dives that will cause a fluid to flow or to be discharged at a higher elevation or higher or pressure pump are used in water works for the purpose of lifting raw water from surface sources and well sources.

### Pump capacity and power requirement

According to site report of Boreta Woyo kebele, the Borehole can be pumped at discharge rate of 1.5 l/sec.

Table 4 the work done by the pump and generator is calculated as follows.

|  |  |  |  |
| --- | --- | --- | --- |
| **Pump capacity and Power Requirement The work done by Pump and Generator Is Calculated as follows.** | | | |
| S.NO | TDH CALCULATION STEPES | DIMENSION | unit |
| 1 | pumping distance | 1358.50 | M |
| 2 | Discharge | 1.50 | L/S |
| 3 | ALLOWANCE | 15.00 | M |
| 4 | Pump position /Rizing main/ | 145.00 | M |
| 5 | DELIVERY HEAD(Elevation difference) | 167.00 | M |
| 6 | RESERVOIR HEIGHT | 3.00 | M |
| 7 | HL (IN DELEVERY PIPE ) | 14.71 | M |
| 8 | VELOCITY IN DELEVERY PIPE | 0.76 | M/S |
| 9 | DIAMETER OF DELEVERY PIPE | 50.00 | mm |
| 10 | DISCHARGE | 1.50 | L/S |
| 11 | MINOR HL | 0.74 | M |
| 12 | TDH | 345.44 | M |
| 13 | TDH take | 346.00 | m |
|  | **POWER OF SUBMESIBLE PUMP CALCULATION** |  |  |
| 1 | TDH | 346.00 | M |
| 2 | Discharge | 1.50 | L/S |
| 3 | efficiency of pump(E) | 60.00 | % |
| 4 | POWER OF PUMP=TDH\*Q | 7.83 | Kw |
| 102\*E |
|  | Pp take | 8.00 | Kw |
|  |  | 10.00 | kVA |
|  | **power supply (power of generator)=pg** |  |  |
| 1 | power of pump(Pp) | 8.00 | kw |
| 2 | Pg = \*1.85\*Pp | 14.80 | KW |
| 3 | Pg take | 16.00 | KW |
| 4 | Pg take | 20.00 | KVA |

***Therefore from the above table we can conclude that:-***

* Submersible Pump capacity Pp = 8Kw/10Kva Head (H)=346m & Discharge Q= 1.5 l/s
* Power of generator Pg = 16Kw/20KVA with all accessories.

## Inputs and Output(Possible suggested solutions)

### Project Inputs

The project costs **6,361,933.55** Eth birr

### Output(Possible Suggested Solutions)

For the purpose of supplying potable water to the community of Boreta Woyo kebele in the next 20 years the following suggested main points and mechanisms are indicated under. `

* Construction of higher altitude Reservoir with a capacity of 100m3.
* Pumping station should be supplied with one Generator house

(Standard hollow concert block Generator House should be

Constructed), Pump capacity Pp=8Kw/10Kva**,** Head (H) =346m,

Discharge Q=1.5l/s and Power of generator=Pg=16Kw/20KVA with all accessories

* Design of pressure main with length of 1358m and Diameter of50mmthat will lead up to 100m3 concrete reservoirs that will be constructed.
* A total of five, six fauceted water points are proposed to be constructed near by the settlement area and their location is indicated on the lay out drawing.
* The required distribution pipe network and water points should be constructed as per the detail design considerations specifications and drawings.
* The management of this project should be guided and administered under woreda water mine & energy supply office.

# 

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# HYDRAULIC CALCULATION

|  |
| --- |
| **The** |

6.1.Pressure Line from the Borehole to the Reservoir

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **IN.pt** | **St.pt** | **Pipe  Length** | **Pipe Dia (mm)** | **Velocity (m/s)** | **Discharge (l/sec)** | **Head loss(m)** | **Cum. HL** | **rH** | **Cum. rH** | **Node  Elv.** | **Remark** |
| BH | B | 150 | 50 | 0.76433 | 1.50 | 1.78655 | 1.79 | 10 | 10 | 2184.00 | New Line |
| B | B1 | 155 | 50 | 0.76433 | 1.50 | 1.8461 | 3.63 | 28 | 38 | 2212.00 |
| B1 | B2 | 130 | 50 | 0.76433 | 1.50 | 1.54834 | 5.18 | 14 | 52 | 2226.00 |
| B2 | B3 | 120 | 50 | 0.76433 | 1.50 | 1.42924 | 6.61 | 15 | 67 | 2241.00 |
| B3 | B4 | 215 | 50 | 0.76433 | 1.50 | 2.56072 | 9.17 | 38 | 105 | 2279.00 |
| B4 | B5 | 240 | 50 | 0.76433 | 1.50 | 2.85848 | 12.03 | 32 | 137 | 2311.00 |
| B5 | R | 225 | 50 | 0.76433 | 1.50 | 2.67983 | 14.71 | 30 | 167 | 2341.00 |

**Table 5 Hydraulic calculation of pressure main**

Altitude of reservoir 100m3 site above mean sea level= 2341m+3

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **IN.pt** | **St.pt** | **Pipe  L.th** | **P.Dia (mm)** | **V.cy (m/s)** | **D.g (l/sec)** | **H. loss (m)** | **Cum. HL** | **rh** | **Cum. rH** | **Free  Head** | **Node  Elv.** | **Location** |
| R | X | 150 | 75 | 1.1115 | 4.91 | 2.519 | 2.52 | -29 | -29 | 26.5 | 2312.0 |  |
| X | X1 | 100 | 75 | 1.1115 | 4.91 | 1.679 | 4.20 | -3 | -32 | 27.8 | 2309.0 |  |
| X1 | WP1 | 30 | 38 | 0.7216 | 0.82 | 0.419 | 4.62 | -6 | -38 | 33.4 | 2303.0 | Sintaro sire |
| X1 | X2 | 150 | 75 | 0.9263 | 4.09 | 1.749 | 5.95 | -18 | -50 | 44.1 | 2291.0 |  |
| X2 | X3 | 170 | 75 | 0.9265 | 4.09 | 1.983 | 7.93 | -30 | -80 | 72.1 | 2261.0 |  |
| X3 | P | 200 | 38 | 0.7218 | 0.82 | 2.795 | 10.73 | -28 | -108 | 97.3 | 2233.0 |  |
| P | P1 | 250 | 38 | 0.7218 | 0.82 | 3.494 | 14.22 | 21 | -87 | 72.8 | 2254.0 |  |
| P1 | wp2 | 200 | 38 | 0.7218 | 0.82 | 2.795 | 17.01 | -7 | -94 | 77.0 | 2247.0 | Gobena siraro |
| X3 | X4 | 200 | 63 | 1.0502 | 3.27 | 3.569 | 3.57 | -26 | -26 | 22.4 | 2235.0 | p break |
| X4 | X5 | 90 | 63 | 1.0502 | 3.27 | 1.606 | 5.18 | -18 | -44 | 38.8 | 2217.0 |  |
| X5 | X6 | 280 | 63 | 1.0502 | 3.27 | 4.997 | 10.17 | -21 | -65 | 54.8 | 2196.0 |  |
| X6 | X7 | 120 | 63 | 1.0502 | 3.27 | 2.141 | 12.31 | -28 | -93 | 80.7 | 2168.0 |  |
| X7 | X8 | 135 | 63 | 1.0502 | 3.27 | 2.409 | 14.72 | 11 | -82 | 67.3 | 2179.0 |  |
| X8 | St.pt | 60 | 38 | 0.7218 | 0.82 | 0.839 | 15.56 | -2 | -84 | 68.4 | 2177.0 | School tap |
| X8 | X9 | 175 | 50 | 1.2503 | 2.45 | 5.578 | 20.30 | -6 | -88 | 67.7 | 2173.0 |  |
| X9 | X10 | 80 | 50 | 1.2508 | 2.45 | 2.551 | 22.85 | -4 | -92 | 69.1 | 2169.0 |  |
| X10 | H.tp | 40 | 38 | 0.7218 | 0.82 | 0.559 | 23.41 | 18 | -74 | 50.6 | 2187.0 | Health tap |
| X10 | X11 | 75 | 50 | 0.8338 | 1.64 | 1.063 | 23.91 | 8 | -84 | 60.1 | 2177.0 |  |
| X11 | wp3 | 60 | 38 | 0.7218 | 0.82 | 0.839 | 24.75 | 7 | -77 | 52.2 | 2184.0 | Germa Nare |
| X11 | X12 | 430 | 38 | 0.7218 | 0.82 | 6.01 | 29.92 | -26 | -110 | 80.1 | 2151.0 |  |
| X12 | X13 | 440 | 38 | 0.7218 | 0.82 | 6.15 | 36.07 | 7 | -103 | 66.9 | 2158.0 |  |
| X13 | X14 | 85 | 38 | 0.7218 | 0.82 | 1.188 | 37.26 | -17 | -120 | 82.7 | 2141.0 |  |
| X14 | wp4 | 30 | 38 | 0.7218 | 0.82 | 0.419 | 37.68 | 6 | -114 | 76.3 | 2147.0 | Asefaw Butuna |

**BILL OF QUANTITY**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **`** | **BILLS OF QUANTITIES AND SPECIFICATIONS** | | | | |
|  | **FOR** | | | | |
|  | **BORETA WOYO KEBELE WATER SUPPLY AND SANITATION PROJECT** | | | | |
|  | **TOTALPRICE SUMMARY** | | | | |
| **It. No** | **Description** | **Unit** | **Qty** | **Unit Price** | **Total Cost** |
| A | Supply and Installation of Pipes and Fittings | Ls | 1 | 3,146,700.80 | 3,146,700.80 |
| B | Construction of Water Points with Six Faucet | No. | 6 | 55,136.25 | 330,817.50 |
| C | Construction of Valve Chambers In Net - Work | No. | 6 | 5,185.86 | 31,115.18 |
| D | Construction Of 50mcu Reservoir | No. | 1 | 348,639.10 | 348,639.10 |
| E | Constraction of Valve Chamber for Reservoir | No. | 1 | 6,999.25 | 6,999.25 |
| F | Supply And Installation Of Electro Mechanical Equipment | No. | 1 | 1,372,130.00 | 1,372,130.00 |
| G | Construction of Generator and Guard House In HCB | No. | 1 | 158,430.00 | 158,430.00 |
| H | Construction of Anchor Block for Pipe Support | No. | 6 | 3,002.20 | 18,013.20 |
| I | Construction of Trust Block for Pipe Support | No. | 10 | 2,556.20 | 25,562.00 |
| J | Construction of Road crossing Structure | No. | 1 | 75,650.00 | 75,650.00 |
| K | pressure beeak tank | No. | 1 | 18,059.10 | 18,059.10 |
|  | **Total** | | | | **5,532,116.13** |
|  | **VAT (15%)** | | | | **829,817.42** |
|  | **Total including VAT (15%)** | | | | **6,361,933.55** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Project: - Boreta Woyo Kebele Water Supply and Sanitation Project** | | | | | |
| **Location: - Sidama Zone, Bona zuriya Woreda** | | | | | |
| **Title: Bill of Quantity and Specification for supply and installation of Pipes and fitting Works** | | | | | |
| **It. No** | **Description** | **Unit** | **Quantity** | **Unit price** | **Total Price** |
| **A** | **Supply and installation of Pipes and fitting Works** |  |  |  |  |
| ***1*** | ***Earth Works*** |  |  |  |  |
| **1.1** | Trench excavation for pipe laying  (0.6\* 0.8) \* 5958 | M3 | 2526.24 | 50 | 126312 |
| **1.2** | Trench excavation in hard formation (0.6\* 0.8) \* 600m | M3 | 288 | 150 | 43200 |
| **1.3** | Back fill over the pipe with selected soil type inspected by site Engineer | M3 | 2814.24 | 70 | 196996.8 |
| ***2*** | ***Supply and laying of different  size of GI medium class-B pipes(Techinical sepecification fulfiling IS 1239 (Part) or BS :1387 or equivalent weight and wall thickness*** |  |  |  |  |
| 2.1 | 3” | m | 627 | 716 | 448,932.00 |
| 2.2 | 2 1/2” | m | 907.5 | 580 | 526,350.00 |
| 2.3 | 2” | m | 1721 | 520 | 894,920.00 |
| 2.4 | 11/2” | m | 2007.5 | 400 | 803,000.00 |
| ***3*** | ***Supply and Install different size fittings European standard/Class-B/*** |  |  |  |  |
| ***3.1*** | ***A)    Union*** |  |  |  |  |
| **3.1.1** | 3” | No | 7 | 400 | 2800 |
| **3.1.2** | 2 1/2” | No | 13 | 300 | 3900 |
| ***3.1.2*** | 2” | No | 16 | 250 | 4000 |
| ***3.1.3*** | 11/2” | No | 22 | 200 | 4400 |
| **3.2** | ***B) Nipples*** |  |  |  | 0 |
| **3.2.1** | 3” | No | 14 | 580 | 8120 |
| **3.2.2** | 2 1/2” | No | 26 | 440 | 11440 |
| **3.2.3** | 2” | No | 32 | 390 | 12480 |
| **3.2.4** | 11/2” | No | 44 | 310 | 13640 |
| ***3.3*** | ***C)    Reducer*** |  |  |  |  |
| ***3.3.1*** |     3”- 2 1/2'' | No | 1 | 400 | 400 |
| ***3.3.2*** |     3 ”- 11/2'' | No | 2 | 320 | 640 |
| ***3.3.3*** |     21/2 ”- 2'' | No | 1 | 260 | 260 |
| ***3.3.4*** |     2 1/2''-11/2" | No | 3 | 250 | 750 |
| ***3.3.5*** |     2 ''-11/2" | No | 1 | 200 | 200 |
| ***3.4*** | ***D)    Tee*** |  |  |  | 0 |
| ***3.4.0*** | 3” | No | 2 | 320 | 640 |
| ***3.4.1*** | 21/2” | No | 3 | 300 | 900 |
| ***3.4.2*** | 2” | No | 2 | 280 | 560 |
| ***3.4.3*** | 11/2” | No | 3 | 200 | 600 |
| **3.5** | ***E) Gate Valve*** |  |  |  | 0 |
| **3.5.1** | 3” Filanged | No | 2 | 5400 | 10800 |
| **3.5.2** | 2 1/2” | No | 3 | 350 | 1050 |
| **3.5.3** | 2” | No | 1 | 320 | 320 |
| **3.5.4** | 1 1/2” | No | 7 | 300 | 2100 |
| **3.6** | ***G)Elbow 90 Degree bends*** |  |  |  | 0 |
| **3.6.1** | 3” | No | 2 | 300 | 600 |
| **3.6.2** | 2 1/2” | No | 4 | 280 | 1120 |
| **3.6.3** | 2” | No | 2 | 260 | 520 |
| **3.6.4** | 1 1/2” | No | 4 | 250 | 1000 |
| ***4*** | ***Synthetic Paint*** | Kg | 50 | 250 | 12500 |
| ***5*** | ***Synthetic Fiber*** | Kg | 45 | 250 | 11250 |
|  | |  | | --- | | **TOTAL** | | | | | **3,146,701** |
| **Project: - Boreta Woyo Kebele Water Supply and Sanitation Project** | | | | | |
| **Location: - Sidama Zone, Bona zuriya Woreda** | | | | | |
| **Title:-Bills of Quantities for Construction of Generator and Guard House in *HCB*** | | | | | |
| **S. No** | **Description** | **Unit** | **Qty** | **Unit Price** | **Total Price** |
| **H** | **Construction of Generator and Guard House In HCB** |  |  |  |  |
| **1** | **Earth work** |  |  |  |  |
| 1.1 | Site clearing to an averaged depth 0f 20cm to remove top soil and grubbing | m2 | 54.0 | 20 | 1,080 |
| 1.2 | Excavation for foundation trench to a depth of notexceeding 100cm below stripped ground level | m3 | 26.8 | 50 | 1,340 |
| 1.3 | Back filling around a foundation with good dry filling material from the site | m3 | 5.5 | 70 | 385 |
| 1.4 | Back filling under a hard core with good and approved selected materials a round the site well rammed and compacted in layers not exceeding 20cm | m3 | 6.7 | 200 | 1,340 |
| 1.5 | Cart away surplus excavated matrial to a distance of 100m | m3 | 26.8 | 20 | 536 |
| 1.6 | Placing 25 cm thick basaltic or equvialent stone hard core well rolled andconsolidated and blinded with crushed stone | m2 | 27.0 | 150 | 4,049 |
| **2** | **Masonry work** |  |  |  | - |
| 2.1 | Construction of 50cm thick basaltic or equivalent masonry foundation wall to a depth of 70cm below stripped ground level blended and joined in cementmortar of mix (1:30 | m3 | 13.4 | 1,100 | 14,740 |
| 2.2 | Construction of 50cm thick basaltic or equivalent masonry foundation wall to a height of 35cm above ground level blended and joined in cementmortar of mix (1:3) | m3 | 4.5 | 1,100 | 4,950 |
| 2.3 | Pointing the exposed external wall surface of the foundation wall with cement mortar 1:3 | m2 | 8.8 | 120 | 1,056 |
| 2.4 | 100cm wide semi - dressed stone pavement around generator house | m2 | 8.8 | 150 | 1,320 |
| 2.5 | Ponting of stone pavement | m2 | 8.8 | 120 | 1,056 |
| 2.6 | Construction of semi- circular 30cm diameter drainage ditch as per drawing | ls | 1.0 | 300 | 300 |
| 2.7 | Plastering all exposed surfacs of cloumn, ground and upper tie beam , window and door lintel | m2 | 15.5 | 150 | 2,325 |
| **3** | **Concrete work** |  |  |  | - |
| 3.1 | Placing 50mm thick lean concrete of Grade C-10 with minimum cement content of 150kg/m3 of concrete over the hard core | m3 | 2.1 | 2,500 | 5,250 |
| 3.2 | Casting 15cm thick reinforced concrete for Generator seat (Basement) with Grade C-20 Concrete with minimum cement content of 320kg/m3cost includes supply and installation of Re-bar anda pproved anchor bolts and form work fixing | m3 | 1.0 | 3,500 | 3,430 |
| 3.3 | Placing 15cm thick mass concrete of Grade C-20 with minimum cement content of 320kg/m3 of concrete over the lean concrete | m3 | 5.4 | 2,500 | 13,500 |
| 3.4 | C-20 reinforced concrete for ground tie beam and machine foundation | m3 | 1.5 | 2,500 | 3,675 |
| 3.5 | C-20 reinforced concrete for upper tie beam and lintel | m3 | 1.6 | 2,500 | 4,000 |
| 3.6 | C-20 reinforced concrete for column | m3 | 0.4 | 2,500 | 1,100 |
| 3.7 | Reinforcment bar as per construction drawing | kg | 288.0 | 55 | 15,840 |
| 3.8 | Supply, cut, bend and fixing in position sawn wooden form works of equivalent properly erected and strutted with posts and clings having tight joint notto bleed | m2 | 40.4 | 500 | 20,200 |
| **4** | **Wall and roofing** |  |  |  | - |
| **4.1** | **Wall work** |  |  |  | - |
| 4.1.1 | 20cm thick hollow concrete block wall | m2 | 46.6 | 350 | 16,293 |
| 4.1.2 | 15cm hollow concrete block wall | m2 | 6.7 | 300 | 2,010 |
| 4.1.3 | Pointing of internal and external wall surface | m2 | 122.0 | 150 | 18,300 |
| **4.2** | **Roofing work** |  |  |  | - |
| 4.2.1 | Supply and fix a G-32 G.1 corrugated iron sheets with roof nail having washer fixed to purling of smooth round DN 60mm eucalyptus tree fixed on trusses members made of DN 150mm round eucalyptus tree spaced @ 125cm | m2 | 34.2 | 80 | 2,736 |
| 4.2.2 | Supply and fix 25\*250mm fascial board to purlins | m | 24.0 | 30 | 720 |
| **5** | **Doors and windows** |  |  |  | - |
| 5.1 | Supply and fix metal frame door double leaf type with cylinderical lock door size 1.50\*2.10m | pcs | 1.0 | 1,500 | 1,500 |
| 5.2 | Supply and fix metal door size 0.8\*2.10m | pcs | 1.0 | 1,200 | 1,200 |
| 5.3 | Supply and fix metal window size 1.20\*1.00m | pcs | 2.0 | 750 | 1,500 |
| 5.4 | Supply and fix metal window size 1.00\*1.00m | pcs | 1.0 | 700 | 700 |
| 5.5 | Supply and fix mesh wire for insect netting and ventilation as design 75cm high | m2 | 10.0 | 100 | 1,000 |
| **6** | **Fencing work** |  |  |  | - |
| 6.1 | Fencing around the compound (10\*10m) with 10cm well seasond Tid post stand to the height of 2m above ground level with 0.5m deep concrete foundation and bracing diagonals at the corner.The fence shall be constructed with 3mm barbed wire horizontally every 0.2m below 1m and 0.4m above 1m with two way diagonal bracing. | m2 | 100.0 | 100 | 10,000 |
| 6.2 | The door shall be corrugated iron sheet 2m\*1m including tabular post and pad lock with all accesseries | ls | 1.0 | 1,000 | 1,000 |
|  | **Total sum** |  |  |  | **158,430.00** |
| **Project: - Boreta Woyo Kebele Water Supply and Sanitation Project** | | | | | |
| **Location: - Sidama Zone, Bona zuriya Woreda** | | | | | |
| **Title:- Material requirement and cost estimate of Electromechanical equipments** | | | | |  |
| **It. No** | **Description** | **Unit** | **Quantity** | **Unit Price** | **total price** |
| **G** | **SUPPLY AND INSTALLATION OF ELECTRO MECHANICAL EQUIPMENT** |  |  |  |  |
| **1** | **Supply and Installation of Submersible Pump** |  |  |  |  |
| **1.1** | Supply & Installation of submersible pump-3 with complete set with having |  |  |  |  |
| **1.2** | Supply & Installation of submersible pump with complete set with having | No | 1 | 500,000.00 | 500,000.00 |
| **Q = 1.5l/sec** |
| **H = 346m** |
| **Pp = 8kw** |
| **Efficiency not less than 65%** |
|  | with its full autotransformer switch board |  |  |  |  |
|  | including the following accessories and specification:- |  |  |  |  |
|  | Cable length =100m |  |  |  |  |
|  | Cable size= 3\*25mm2 |  |  |  |  |
|  | Electrode cable length = 160m | m | 160 | 350 | 56,000.00 |
|  | Electrode cable size=2\*1.5mm2 with two electrodes |  |  |  |  |
| **2** | **Supply and Install Diesel Generator** |  |  |  |  |
| **2.1** | Supply and install a compatible generator with complete set and accessories ( accessories include swich board,cable electrode,etc) with having, power of  **Ps = 16kw**  & **Efficiency not less than 65%** | No | 1 | 800,000.00 | 800,000.00 |
| **3.2** | **Supply and install fittings** |  |  |  |  |
| **3.2.1** | **Elbow** |  |  |  |  |
|  | ɸ=3" | pcs | 2.00 | 400.00 | 800.00 |
| **3.2.2** | **Union** |  |  |  |  |
|  | ɸ=3" | pcs | 1.00 | 350.00 | 350.00 |
| **3.2.3** | **Water meter flanged** |  |  |  |  |
|  | ɸ=3" | pcs | 2.00 | 5,000.00 | 10,000.00 |
| **3.2.4** | **Gate valve** |  |  |  |  |
|  | ɸ=3" | pcs | 2.00 | 780.00 | 1,560.00 |
| **3.2.5** | **Check valve** |  |  |  |  |
|  | ɸ=3" | pcs | 2.00 | 600.00 | 1,200.00 |
| **3.2.6** | **Nipples** |  |  |  |  |
|  | ɸ=3" | pcs | 4.00 | 180.00 | 720.00 |
| **3.2.8** | **Bolts and nuts** | set | 20.00 | 75.00 | 1,500.00 |
|  | **Total sum** |  |  |  | **1,372,130.00** |
| **Project: - Boreta Woyo Kebele Water Supply and Sanitation Project** | | | | | |
| **Location: - Sidama Zone, Bona zuriya Woreda** | | | | | |
| ***Title: - Bills of Quantities for water point construction with six faucted*** | | | | | |
| **It. No.** | **Description** | **Unit** | **Quantity** | **Unit Price** | **Total Price** |
| **B** | CONSTRUCTION OF WATER POINTS |  |  |  |  |
|  | WITH SIX FAUCETS |  |  |  |  |
| **1** | Earth work |  |  |  |  |
| 1.1 | Site clearing to an average depth of 20cm to remove the top vegetated soil | m2 | 25 | 20 | 500.00 |
| 1.2 | Excavation for foundation to a depth of 40 cm | m3 | 6 | 50 | 300.00 |
| 1.3 | Cart away the excavated surplus material to a distance not less than 100m | m3 | 14 | 20 | 280.00 |
| 1.4 | placing 25cm thick hardcore of basaltic or equivalent material well rolled, compacted and blinded with crushed stone | m3 | 4 | 250 | 1,000.00 |
| **2** | **Masonry work** |  |  |  | - |
| 2.1 | Construction of masonry wall for six faucet water point embedded in 1:3 cement sand mortar mix | m3 | 1.35 | 1100 | 1,485.00 |
| **3** | **Concrete work** |  |  |  | - |
| 3.1 | Casting 50mm thick lean concrete of 1:3:6 mix ratio(minimum cement content of 150kg/m3) | m3 | 20.06 | 1200 | 24,072.00 |
| 3.2 | Mass concrete (1:3:6) mix below foundation wall | m3 | 3 | 2500 | 7,500.00 |
| 3.3 | Construction of water point cap with concrete of 1:2:3 mix ratio as per the design drawing | m3 | 0.90 | 2200 | 1,980.00 |
| 3.4 | Smooth and well strutted zigba form work | m2 | 19.43 | 75 | 1,457.25 |
| **4** | **Plumbing Works** |  |  |  | - |
| **4.1** | **Pipe supply and connecting work** |  |  |  | - |
| 4.1.1 | GS pipe Ø= 11/2" | m | 6 | 400 | 2,400.00 |
| 4.1.2 | GS pipe Ø= 1" | m | 6 | 300 | 1,800.00 |
| 4.1.3 | GS pipe Ø= 3/4" | m | 3 | 150 | 450.00 |
| **4.2** | **Fitting supply and connecting work** |  |  |  | - |
| 4.2.1 | 900 elbow Ø=11/2" | Pcs | 6 | 50 | 300.00 |
| 4.2.2 | Gate valve Ø=11/2" | Pcs | 1 | 80 | 80.00 |
| 4.2.3 | Water meter Ø=11/2" | Pcs | 1 | 1200 | 1,200.00 |
| 4.2.4 | Union Ø=11/2" | Pcs | 1 | 50 | 50.00 |
| 4.2.5 | Union Ø=1" | Pcs | 2 | 45 | 90.00 |
| 4.2.6 | Nipples Ø=11/2" | Pcs | 6 | 50 | 300.00 |
| 4.2.7 | Nipples Ø=1" | Pcs | 4 | 45 | 180.00 |
| 4.2.8 | Tee Ø=11/2" | Pcs | 1 | 50 | 50.00 |
| 4.2.9 | Cross tee Ø=1" | Pcs | 2 | 50 | 100.00 |
| 4.2.10 | Reducer Ø= 11/2" - Ø=1" | Pcs | 2 | 50 | 100.00 |
| 4.2.11 | Reducer Ø= 1" - Ø=3/4" | Pcs | 6 | 45 | 270.00 |
| 4.2.12 | Coupling Ø= 3/4" | Pcs | 6 | 25 | 150.00 |
| 3 | Faucet Ø=3/4" | Pcs | 6 | 50 | 300.00 |
| **5** | **Micellnious and Finishing works** |  |  |  | - |
| 5.1 | Construction of HCB common walled valve chamber for gate valve and water meter. Price includes supply and fixing anit rust painted and lockable metal valve chamber size 1m\*1m with angle iron frame and proper installation of fittings and pointing of HCB | no. | 1 | 1200 | 1,200.00 |
| 5.2 | 12mm thick plastering of all exposed surface of concrete and masonry wall with cement mortar mix of 1:3 | m2 | 20 | 75 | 1,500.00 |
| 5.3 | 5mm pouring of cement screed placing for floor finish of water points | m2 | 11.28 | 150 | 1,692.00 |
| **6** | **Fencing work** |  |  |  | - |
| 6.1 | Fencing around the compound (6\*6m) with 10cm well seasoned Tid post stand to the height of 2m above ground level with 0.5m deep concrete foundation and bracing diagonals at the corner. The fence shall be constructed with 3mm barbed wire horizontally every 0.1m bellow 1m and 0.2m above 1m with two ways diagonal bracings | m2 | 36 | 100 | 3,600.00 |
| 6.2 | Supply and fix corrugated iron sheet door of size 2m\*1m with tabular post including pad lock | ls | 1 | 750 | 750.00 |
|  | **Total for one water point** |  |  |  | **55,136.25** |
| **Project: - Boreta Woyo Kebele Water Supply and Sanitation Project** | | | | | |
| **Title:- Material requirement and cost estimate of Pipe and fittings for Road crossing** | | | | | |
| **It. No** | **Description** | **Unit** | **Quantity** | **Unit Price** | **Total price** |
| 1 | **Earth Work** |  |  |  |  |
| 1.10 | excavation for Gravel crossing pipes (0.6\* 1.5) \* 25m | M3 | 45.00 | 520.00 | 23,400.00 |
| 1.20 | Back fill over the pipe with selected soil type inspected by site Engineer | M3 | 45.00 | 50.00 | 2,250.00 |
| ***2.00*** | ***Supply and laying of GI medium class-B pipes for gravel crossing*** |  |  |  | - |
| *2.10* | ***Φ=6''*** | m | 50.00 | 1,000.00 | 50,000.00 |
|  | **Total cost** | Birr |  |  | **75,650.00** |
| **Project: - Boreta Woyo Kebele Water Supply and Sanitation Project** | | | | | |
| **Location: - Sidama Zone, Bona zuriya Woreda** | | | | | |
| **Title: Bill of Quantities and specification for construction of Anchor blocks & Trust blocks for Pipe Support** | | | | | |
| **It. No** | **Description** | **Unit** | **Qty** | **Unit Price** | **Total price** |
| **I** | **Constrution of Anchor Block for Pipe Support** |  |  |  |  |
| **2** | **Earth works** |  |  |  |  |
| 1.1 | 2.cm thick site clearing (2m\*1.4m) | m3 | 0.56 | 20.0 | 11.20 |
| 1.2 | Foundation excavation depth of  50cm (1.6m\*0.1) | m3 | 0.8 | 50.0 | 40.00 |
| 1.3 | cart away the excavated material | m3 | 0.8 | 20.0 | 16.00 |
| 1.4 | 20 cm hard core filling | m2 | 0.2 | 150.0 | 30.00 |
| 1.5 | Filling back the area around the mat foundation after construction | m3 | 0.3 | 200.0 | 60.00 |
| **2** | **concrete work** |  |  |  | - |
| 2.1 | Construct anchor block with 1:2:4 concrete the height of anchor blocks depends on the site condition. | m3 | 0.3 | 2,700.0 | 810.00 |
| 2.2 | reinforcement for concrete |  |  |  | - |
|  | 10 mm dia at 20 cm c/c for mat foundation | kg | 5 | 58.0 | 290.00 |
|  | 10mm for column of the Anchor 2 in number | kg | 4 | 58.0 | 232.00 |
|  | 6mm stirrup | kg | 2 | 58.0 | 116.00 |
|  | black/tie wire 1.5mm thick | kg | 1.5 | 30.0 | 45.00 |
| 2.3 | form work |  |  |  | - |
|  | fix zigba form work to place concrete | m2 | 1.76 | 200.0 | 352.00 |
| 3 | Galvanized metal clamp with necessary fixtures used to hold pipes on head of anchor blocks | pcs | 1 | 1,000.0 | 1,000.00 |
|  | **Total cost for one Anchor block** |  |  |  | **3,002.20** |
| **10.2** | **Construction of masonry thrust block (40cmX40cmx 100cm )** |  |  |  |  |
| **10.2.1** | **Earth Work** |  |  |  |  |
| 10.2.1.1 | Clearance top vegetable soil (20cm depth) | m2 | 4 | 20 | 80 |
| 10.2.1.2 | Excavation for base foundation (100cm depth) | m3 | 1 | 50 | 50 |
| 10.2.1.3 | Cart away surplus excavated material | m3 | 0.16 | 20 | 3.2 |
| **10.2.2** | **Concrete Work** |  |  |  | 0 |
| 10.2.2.1 | Mass concrete below Ground level | m3 | 0.5 | 2500 | 1250 |
| **10.2.3** | **Masonry work** |  |  |  | 0 |
| 10.2.3.1 | Stone masonry work above ground level | m3 | 0.35 | 1800 | 630 |
| 10.2.4 | Pointing of Masonry Block | m2 | 1.6 | 300 | 480 |
| 10.2.5 | Plastering the top part of masonary block | m2 | 0.18 | 350 | 63 |
|  | **Total sum for one Masonry trust block** |  |  |  | **2,556.20** |
| **Project: - Boreta Woyo Kebele Water Supply and Sanitation Project** | | | | | |
| **Location: - Sidama Zone, Bona zuriya Woreda** | | | | | |
| **TITLE: Bill of Quantities and specification of Valve chambers for Reservoir** | | | | | |
| **S. No** | **Description** | **Unit** | **Qty** | **Unit Price** | **Total Price** |
| **F** | **Constraction of Valve Chamber for Reservoir** |  |  |  |  |
| **1.1** | **Earth work** |  |  |  |  |
| 1.2 | Site clearing to remove top soil to a depth of 20cm | m3 | 0.8 | 10.00 | 8.00 |
| 1.3 | Excavation for base foundation | m3 | 2.25 | 28.00 | 63.00 |
| 1.4 | 25cm thick hardcore filling | m2 | 2.25 | 250.00 | 562.50 |
| 1.5 | Cart away excavated materials | m3 | 2.25 | 15.00 | 33.75 |
| **2** | **Masonry Work** |  |  |  | - |
| 2.1 | Stone masonry wall | m3 | 2.25 | 1,500.00 | 3,375.00 |
| **3** | **Concrete work** |  |  |  | - |
| 3.1 | 10cm thick mass concrete above hardcore | m3 | 0.26 | 1,200.00 | 312.00 |
| 3.2 | 10cm thick RC concrete for roof slab | m3 | 0.51 | 1,200.00 | 612.00 |
| 3.3 | RC bar Ø 10mm | kg | 14 | 58.00 | 812.00 |
| 3.4 | Black wire Ø 1.5mm | kg | 1 | 30.00 | 30.00 |
| **4** | **Form work** |  |  |  | - |
| 4.1 | Form work for roof slab | m2 | 3.85 | 60.00 | 231.00 |
| 4.2 | Plastering & other finishing work |  |  |  | - |
| 4.3 | Plastering internal wall | m2 | 6 | 60.00 | 360.00 |
| 4.4 | Pointing of external masonry wall | m2 | 8 | 50.00 | 400.00 |
| 4.5 | Mane hole cover with angle iron frame and sheet metal including pad lock (70cm\*70) | ls | 1 | 200.00 | 200.00 |
|  | **Total for one reservoir VC** |  |  |  | **6,999.25** |
| **Project: - Boreta Woyo Kebele Water Supply and Sanitation Project** | | | | | |
| **Location: - Sidama Zone, Bona zuriya Woreda** | | | | | |
| ***Title: - Bills of Quantities for Valve Chambers Construction In Net - Work*** | | | | | |
| **It. No** | **Description** | **Unit** | **Quantity** | **Unit price** | **Total Price** |
| **C** | **CONSTRUCTION OF VALVE CHAMBERS IN NET WORK** |  |  |  |  |
| **1** | **Earth work** |  |  |  |  |
| 1.1 | Site clearing to remove the top soil to a depth of 20cm | m2 | 4 | 10 | 40.00 |
| 1.2 | Excavation for foundation to a depth of 30cm | m3 | 0.588 | 28 | 16.46 |
| 1.3 | Cart away the excavated surplus material for a distance of 100m | m3 | 2 | 15 | 30.00 |
| 1.4 | 25cm thick hard core filling under the floor slab | m3 | 0.49 | 60 | 29.40 |
| **2** | **Masonry work** |  |  |  | - |
| 2.1 | Construction of 30 cm thick masonry wall embedded with 1:3 mortar | m3 | 1.5 | 1500 | 2,250.00 |
| 2.2 | Plastering the internal masonry wall | m2 | 6 | 60 | 360.00 |
| 2.3 | Pointing out the exposed part of the masonry wall | m2 | 8 | 50 | 400.00 |
| **3** | **Concrete work** |  |  |  | - |
| 3.1 | Mass concrete for floor slab | m3 | 0.45 | 1200 | 540.00 |
| 3.2 | Supply & Install 700mm\*700mm\* 3mm thick lockable steel man-hole cover with all fixing hinges & and angle iron frame and all accessories with lockable gate including anti- rust painted | ls | 1 | 750 | 750.00 |
| **4** | **Form work** |  |  |  | - |
| 4.1 | Smooth and well strutted zigba form work | m2 | 3.85 | 200 | 770.00 |
|  | **Total for one valve chamber** |  |  |  | **5,185.86** |
| **Project: - Boreta Woyo Kebele Water Supply and Sanitation Project** | | | | | |
| **Location: - Sidama Zone, Bona zuriya Woreda** | | | | | |
| **Title:- Bill of quantities for Constraction of 50mcu Concrete Sandwiched Masonry Reservoir** | | | | | |
| I.No | DESCRIPTION | Unit | Qty | Unit Rate | Read out Total Price |
| 1 | Earth work |  |  |  |  |
| 1.1 | Site clearing to remove the top vegetative part of the soil to a depth of 20cm | m2 | 100 | 20 | 2,000.00 |
| 1.2 | Foundation excavation in soft soil to a depth of 75 cm below ground level | m3 | 19.5 | 50 | 975.00 |
| 1.3 | Foundation excavation in rock formation | m3 | 15.2 | 70 | 1,064.00 |
| 1.4 | Filling and compacting foundation base with selected sand materials for 20 cms | m3 | 8 | 60 | 480.00 |
| 1.5 | Placing 40 cm thick basaltic stone or equivalent hard core well-rolled consolidated and blinded with gravel | m3 | 28.3 | 550 | 15,565.00 |
| 1.6 | Back filling around a foundation with approved selected sand materials from site well rammed in layer of 20 cm | m3 | 8 | 150 | 1,200.00 |
| 1.7 | Cart away surplus excavated soil and rock materials from the site to a distance of 100 m | m3 | 29.5 | 20 | 590.00 |
| 2 | Concrete work |  |  |  | - |
| 2.1 | Casting 100 mm thick Lean concrete over hard-core with Grade C-15 concrete with minimum cement 150kg/m3 mix ration (1:3:6) | m3 | 3.83 | 2200 | 8,426.00 |
| 2.2 | Casting 25 cm thick RCC Base slab in Grade C-25 reinforced concrete with minimum cement 360kg/m3 mix 1:11/2:3 | m3 | 10 | 3500 | 35,000.00 |
| 2.3 | Casting 20 cm thick RCC Roof cover slab with Grade C-25 reinforced concrete of minimum cement 360kg/m3 mix (1:11/2:3) | m3 | 8.4 | 3500 | 29,400.00 |
| 2.4 | Construction of trapezoidal shape section RCC friction key with Grade C-25 reinforced concrete simultaneously with base slab with dimensions a= 15cm, b=25cm, and h=20cm (1:11/2:3) mix | m3 | 1.4 | 3500 | 4,900.00 |
| 2.5 | Construction of 10 cm thick reinforced concrete Grade C-25 filled between masonry wall and reinforced with hoop reinforcement of Hexagonal Mesh-Wire of size ¾ tide to diameter 6mm vertical bars @ 30cm c/c | m3 | 8.5 | 2200 | 18,700.00 |
| 2.6 | Casting 20cm thick RCC concrete Ring beam of Grade C-25 with minimum cement 360kg/m3 with mix ratio (1:11/2:3) | m3 | 2.58 | 2100 | 5,418.00 |
| 2.7 | supply, cut, bend and fix in position reinforcement bars the price shall be include cuting and bending |  |  |  | - |
|  | ø=6mm | kg | 75 | 58 | 4,350.00 |
|  | ø=8mm | kg | 750 | 58 | 43,500.00 |
|  | ø=10mm | kg | 1820 | 58 | 105,560.00 |
|  | ø=12mm | kg | 160 | 58 | 9,280.00 |
|  | Blak wire | kg | 15 | 30 | 450.00 |
| 2.8 | Supply and install 3/4 hexagonal mesh wire for hoop stress and wall tied to ɸ6mm vertical bars @30cm c/c | m2 | 51 | 8 | 408.00 |
| 2.9 | Fixing of good quality wooden or metal form work firmly with strong strutting/scaffolding & tight to avoid Bleeding & Bulging out | m2 | 4 | 150 | 600.00 |
| 3 | Masonry work |  |  |  | - |
| 3.1 | Construction of 2 x 20 cm thick masonry Wall on both side of the concrete - Core embedded with cement Sand mortar of mix 1 : 3 | m3 | 24 | 750 | 18,000.00 |
| 3.2 | Chiseling and floor finish 45 mm thick trawl and smooth finish with 1:3 cement Sand mortar screed | m2 | 25 | 50 | 1,250.00 |
| 3.3 | Semi dressed stone pavement around the reservoir 1.0 m wide cemented with in 1:3 mix cement mortar | m2 | 28 | 150 | 4,200.00 |
| 3.4 | Construction of semi-circular 30 cm diameter drainage ditch as per drawing | m | 44 | 40 | 1,760.00 |
| 4 | Plastering and other finishing work |  |  |  | - |
| 4.1 | Chiseling and 12mm plastering the whole inner wall face and exposed face of all concrete works with 3coats of cement sand mortar of 1:3 mix | m2 | 53 | 75 | 3,975.00 |
| 4.2 | Pointing the whole External face of the masonry wall with cement mortar mix 1 : 2 | m2 | 90 | 65 | 5,850.00 |
| 4.3 | 5cm cement screed for floor finish | m2 | 150 | 30 | 4,500.00 |
| 4.4 | Supply and placed tarred paper between lean concrete and floor slab | m2 | 30.18 | 20 | 603.60 |
| 4.5 | Supply and painting the lean concrete with bituminous mastic | m2 | 30.18 | 25 | 754.50 |
| 5 | Supply and Install Class-B Pipes and Fittings |  |  |  | - |
| 5.1 | Pipes |  |  |  | - |
| 5.1.1 | Supply and install ɸ=2 1/2" GI pipe for inlet | m | 6 | 140 | 840.00 |
| 5.1.2 | Supply and install ɸ=3" GI pipe for outlet | m | 6 | 140 | 840.00 |
| 5.1.3 | Supply and install ɸ=21/2" GI pipe for overflow | m | 6 | 140 | 840.00 |
| 5.1.4 | Supply and install ɸ=21/2" GI pipe for drainage | m | 6 | 140 | 840.00 |
| 5.1.5 | Supply and install pipe=21/2" vent pipe with Dom shape | m | 3 | 140 | 420.00 |
| 5.2 | Fittings |  |  |  | - |
| 5.2.1 | ɸ=2 1/2" Elbow 90 degree | pcs | 4 | 120 | 480.00 |
| 5.2.2 | ɸ=3" Elbow 90 degree | pcs | 2 | 120 | 240.00 |
| 5.2.3 | ɸ=2" Union | pcs | 2 | 175 | 350.00 |
| 5.2.4 | ɸ=21/2" Union | pcs | 2 | 180 | 360.00 |
| 5.2.5 | ɸ=2" Nipples | pcs | 8 | 40 | 320.00 |
| 5.2.6 | ɸ=21/2" Nipples | pcs | 4 | 75 | 300.00 |
| 5.2.7 | ɸ=21/2" Gate valve | pcs | 2 | 210 | 420.00 |
| 5.2.8 | ɸ= 3" Gate valve | pcs | 1 | 400 | 400.00 |
| 5.2.9 | ɸ=3" Flanged water meter | pcs | 1 | 3200 | 3,200.00 |
| 5.2.10 | ɸ=21/2" Tee | pcs | 2 | 180 | 360.00 |
| 5.2.11 | ɸ=3" Tee | pcs | 1 | 250 | 250.00 |
| 5.2.12 | Nuts and bolts | no. | 24 | 20 | 480.00 |
| 6 | Micllonouse work |  |  |  | - |
| 6.1 | Supply & Install lockable steel man-hole cover with all fixing hinges & accessories with lock gate (Design) | no. | 1 | 800 | 800.00 |
| 6.2 | Supply and install both external & internal ladder made of class B, G S pipe of DN 25 mm length 3.0 m having extra 1.0 m high handle at the top for external ladder | no. | 2 | 1850 | 3,700.00 |
| 6.3 | Fencing around the compound (8\*8m) with 10cm well seasoned Tid post stand to the height of 2m above ground level with 0.5m deep concrete foundation and bracing diagonals at the corner. The fence shall be constructed with 3mm barbed wire horizontally every 0.1m bellow 1m and 0.2m above 1m with two ways diagonal bracings | m2 | 64 | 60 | 3,840.00 |
| 6.4 | Supply and fix corrugated iron sheet door of size2m\*1m with tabular post including pad lock | ls | 1 | 400 | 400.00 |
| 7 | Cleaning and Disinfecting | ls | 1 | 200 | 200.00 |
|  | Total for one 50mcu Masonry Reservior |  |  |  | 348,639.10 |
| **Project: - Boreta Woyo Kebele Water Supply and Sanitation Project** | | | | | |
| **Location: - Sidama Zone, Bona zuriya Woreda** | | | | | |
| **Title:- Bill of Quantities for Break Pressure Tank** | | | | | |
| **I.No** | **DESCRIPTION** | **Unit** | **Quantity** | **Unit price** | **Amount** |
|
| **1** | **Earth Work** |  |  |  |  |
| 1.1 | Site Clearing of depth of 20cm | M3 | 1.3 | 20.00 | 26.00 |
| 1.2 | Excavation of foundation 20cm | m3 | 1.6 | 80.00 | 128.00 |
| 1.3 | Cart away surplus excavated material | m3 | 3.39 | 20.00 | 67.80 |
| 1.4 | 20cm thick basaltic hard core | m3 | 5.29 | 90.00 | 476.10 |
| **2** | **Masonry Work** |  |  |  | - |
| 2.1 | Stone masonry wall as per drawing | m3 | 5.52 | 1,100.00 | 6,072.00 |
| 2.2 | Pointing of external masonry wall | M2 | 6.72 | 120.00 | 806.40 |
| **3** | **Concrete work** |  |  |  | - |
| 3.1 | 10cm thick lean concrete above the hard core | m3 | 0.61 | 2,200.00 | 1,342.00 |
| 3.2 | 45mm thick cement screening of floor | m3 | 0.25 | 2,000.00 | 500.00 |
| 3.3 | Plastering of internal wall | m2 | 0.16 | 130.00 | 20.80 |
| 3.4 | Pointing of external wall | m2 | 1.2 | 120.00 | 144.00 |
| **4** | **Supply and install 1mm sheet metal for man hole (60cm\*60cm)** | No | 1 | 1,200.00 | 1,200.00 |
| **5** | **Supply and install GI pipes and fitting (Class B)** |  |  |  | - |
|  | Ф 2’’ for outlet , Drainage and overflow | m | 6 | 270.00 | 1,620.00 |
|  | Float valve Ф 2’’ | pcs | 1 | 800.00 | 800.00 |
|  | Gate Valve Ф 2’’ | pcs | 2 | 1,500.00 | 3,000.00 |
|  | Union Ф 2’’ | pcs | 2 | 300.00 | 600.00 |
|  | Nipples Ф 2’’ | pcs | 2 | 120.00 | 240.00 |
|  | Reinforcement bar Ф 10mm with tie bare | kg | 17 | 58 | 986.00 |
|  | Black wire 1.5mm | kg | 1 | 30.00 | 30.00 |
|  | **Total for1(One) break pressure tank** | **Birr** |  |  | **18,059.10** |

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# 7. Drawings

