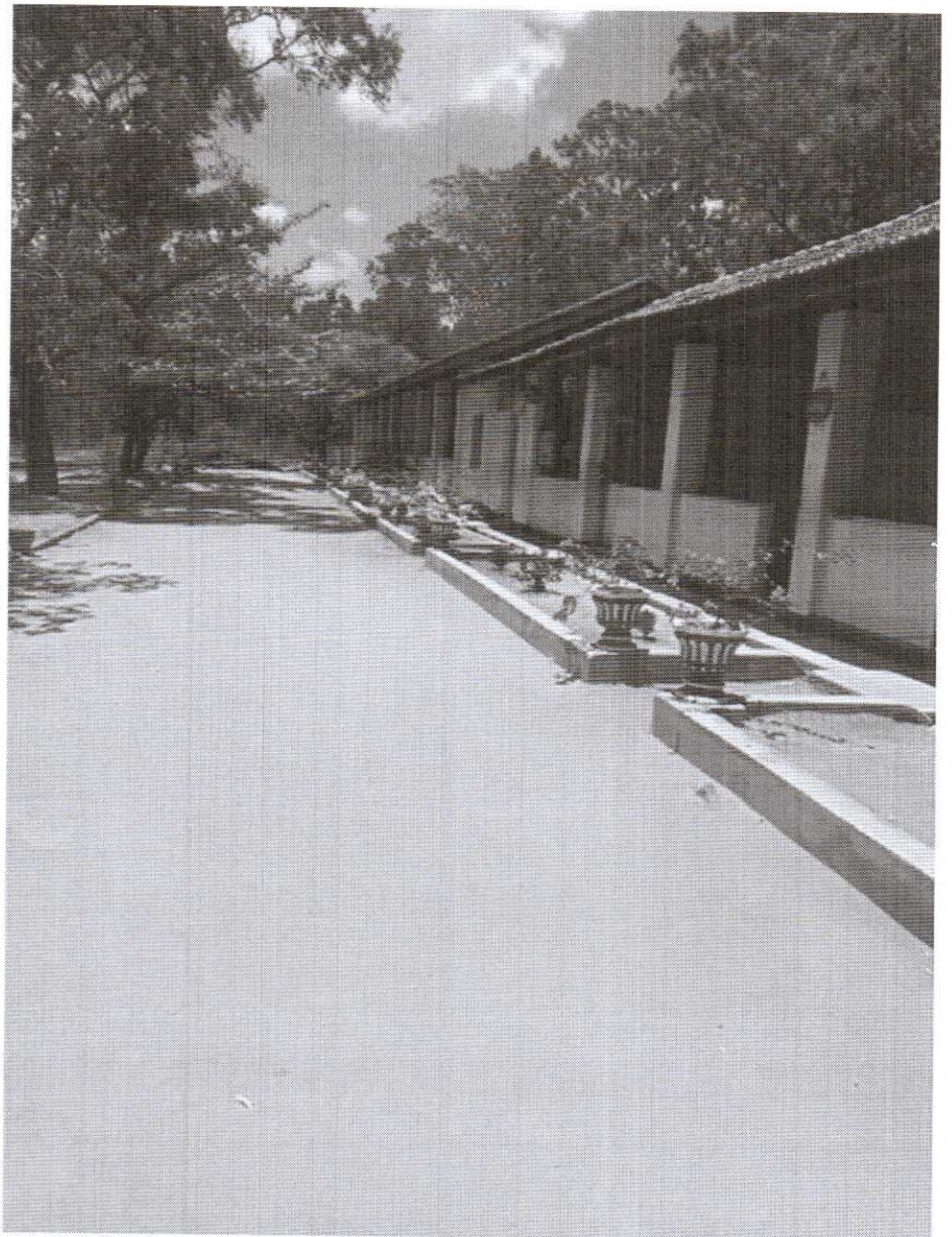


Mechanical Engineering Sectional Committee CSR Project

# RAIN WATER HARVESTING AND POT IRRIGATION

Makalanegma Junior School, Galgomuwa



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## 1.0 INTRODUCTION

Availability of the water is becoming global challenge day by day with the rapid technical advancement of the world since the consumption of the water is gradually increased while the usable water resources are declined.

More than 2000 million people would live under conditions of high water stress by the year 2050, according to the UNEP (United Nations Environment Program), which warns water could prove to be a limiting factor for development in a number of regions in the world. About one fifth of the world's population lacks access to safe drinking water and with the present consumption patterns; two out of every three persons on the earth would live in water stressed conditions by 2025.

Therefore, finding alternatives to utilize usable water resources in the planet is a critical global need by now.

Rain Water Harvesting is an age old system of collection of rainwater for future use. But systematic collection and recharging of ground water is a recent development and is gaining importance as one of the most feasible and easy to implement remedy to restore the hydrological imbalance and prevent a crisis. The pot (or pitcher) irrigation is one of the best technic which can treat plants effectively with higher utilization of water. Method of the most efficient traditional system of irrigation Known and is well suited for small farmers in many areas of the world.

## 2.0 CSR PROJECT-RAIN WATER HARVESTING AND POT IRRIGATION.

### 2.1 BACKGROUND

The project of the IESL Mechanical Engineers' sectional committee is based on to promote rainwater harvesting and pot irrigation system. Many parts of the dry zone suffer from periodic draughts which affect the perennial crops such as fruit trees and also prevent the growing of vegetables during the dry season, unless a ready source of surface water is available.

However in many households the possibility exists of harvesting rainwater during the rainy season and many examples are available, where large Ferro cement rainwater tanks have been built to which the roof gutters are directed. While this capacity may not be adequate for a long draught period, using conventional irrigation methods, if a more efficient use of the water is possible, the crops may survive till the next rainy season.

Here, the Buried, unglazed, porous clay pots filled with water will be used to provide controlled irrigation to plants.

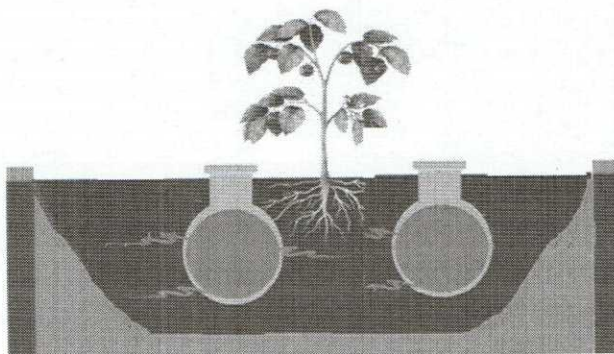


Fig 01 Pot irrigation system

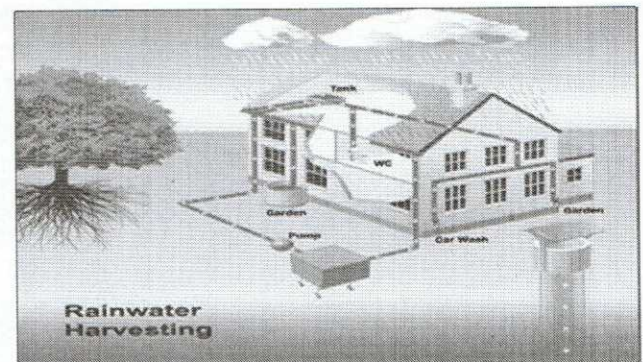


Fig 02 Rain water harvesting

## **Advantages**

- Save over 90% of water over traditional irrigation methods
- Cheap
- Easy to install, operate and maintain
- Low to no environmental impacts
- Controls weeds for you
- Minimize erosion by keeping the water underground

## **Disadvantage**

- Plants becoming dependent on the pitchers for water
- Do not develop the deep-rooting systems that would develop otherwise.

## **2.2 PROJECT PROPOSAL**

It was proposed to implement the Pot Irrigation System described above at Makalegma Junior School in the Kurunegala district. The primary details of the school are given below.

Name : Makalanegma Junior School

GN Division : Pahala kokwewa

Pradeshiya Sabha : Galgamuwa

District : Kurunegala

Province : North Western

Number of students : 274

Extend of the school premises : 7 acre

During the session 2018/2019 a rainwater harvesting and pot irrigation system was designed and proposed to install at Makalanegma Junior School which is located in a remote area of dry zone and closer to Galgamuwa. Around 274 students from grade 1 to grade 11 are getting education from this school with minimum facilities. This school will be directly benefited by this project as they are in real need of cultivating trees in large bare land of their school premises.

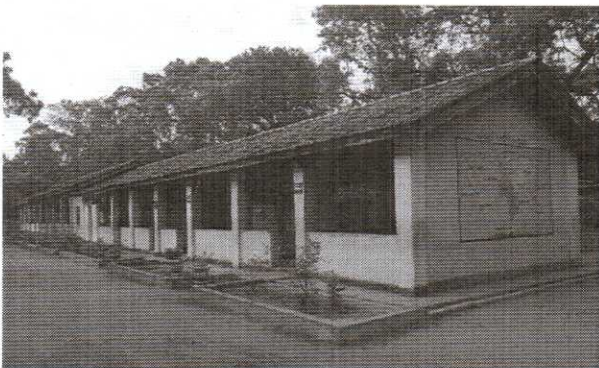


Fig 03 Makalagama Junior

## **2.3 Implementation of Pot irrigation system**

The rain pattern of the area is not conducive to cultivate plants unless proper manual watering system is available in the area since many months of the year is free from rain. Therefore, it is compulsory to

have a backup storage of water to feed plants in dry months. Currently , this school is not facilitate with watering system to the garden , so that they are not in a position to plant trees in their large bare land though they are dreaming to have green environment. Therefore, the concept and resources provide by this CSR project will directly helpful them to have green and healthy surrounding around their school and conveying strong message to the villagers to encourage utilizing rain water in their own garden as well.

Initially it was planned to fabricate and install a 10m<sup>3</sup> cement water tank for collecting rain water from the main hall roof (1600 ft<sup>2</sup>) and transfer to farming area via piping system and fill the buried pot near plants. Anyhow, considering the complexity and time factor, later it was decided to install plastic tanks instead of Ferro cement tanks.

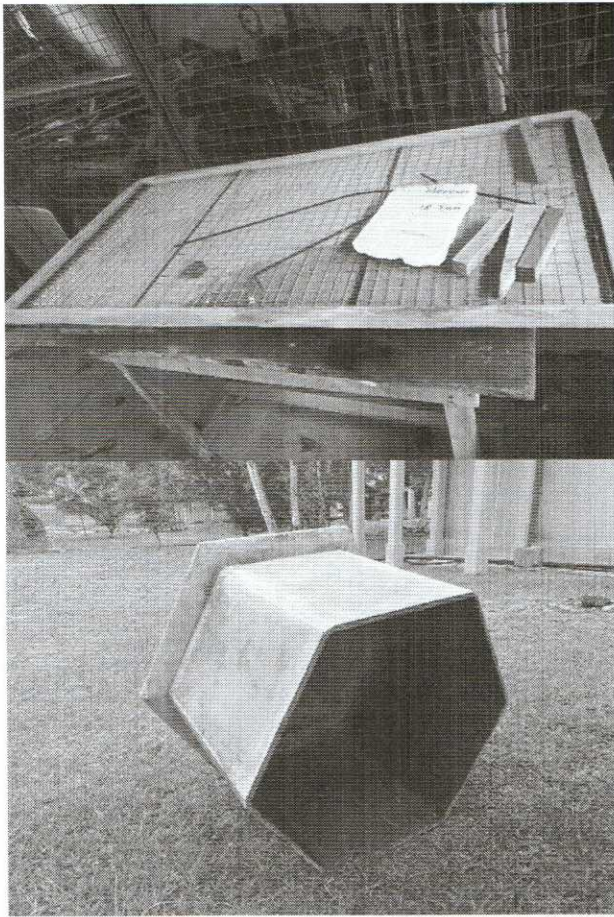


Fig 04- Ferro Cement Tanks at NERD Center

Installation of rain water gutter system and piping also included in this project as it is aimed to install complete watering system at this school garden. Around 50 mango trees, 25 pomegranate trees and 25 guava trees to be planted in the proposed area. Theproposed rain water systemillustrated in following figures.

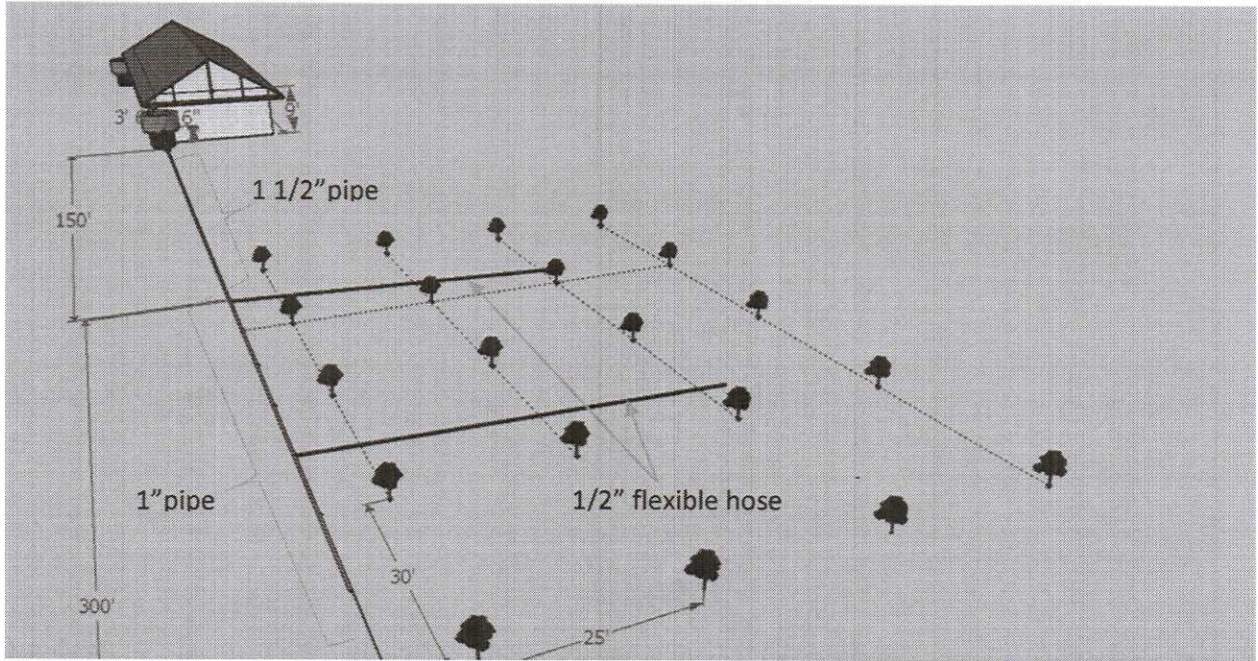


Fig 05 Proposed pot irrigation system

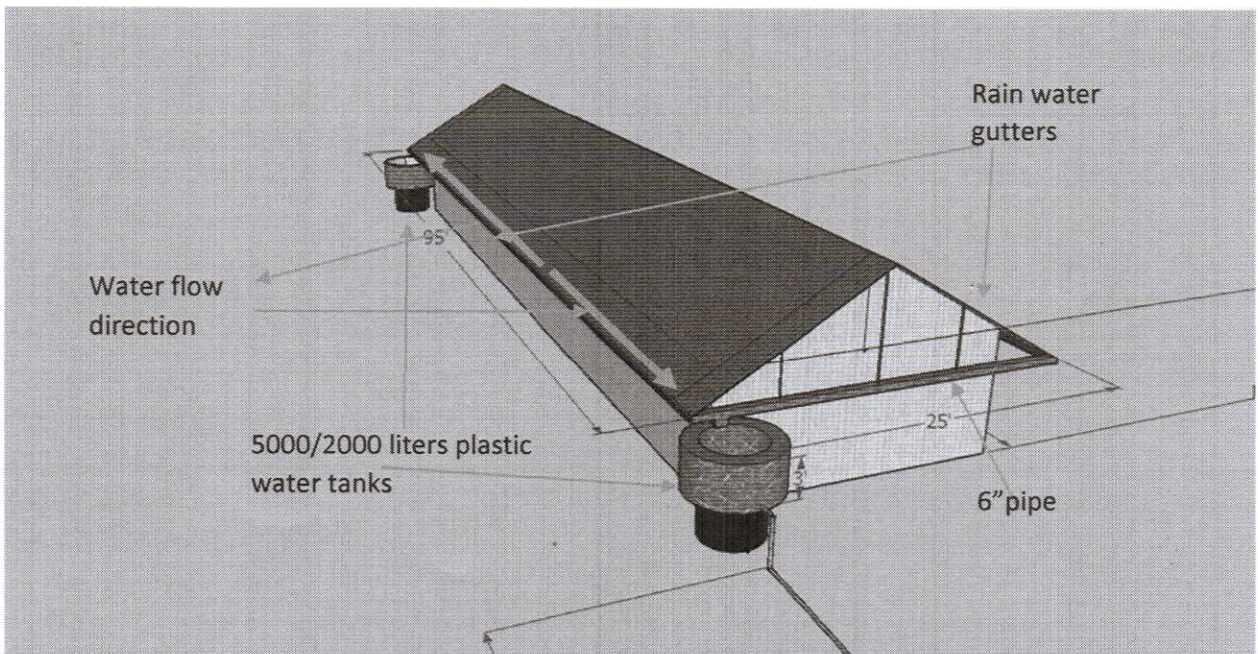


Fig 06 Proposed rain water harvesting system

### 2.3.1 Rainfall analysis

The relevant rainfall detail which was obtained from the irrigation department was tabulated and analyzed as below to decide best suit tank capacities and other parameters of pot irrigation system.

**Table 1 Rainfall Analysis**

		Monthly Rain details of Galgamuwa Area												
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
<b>2014</b>	Total(mm)	132.5	0.0	0.0	485.0	227.9	19.0	0.0	77.4	205.9	270.8	367.4	508.7	2294.6
<b>2015</b>	Total(mm)	0.0	31.4	0.0	337.6	137.9	6.6	0.0	61.1	87.0	375.0	261.8	258.3	1556.7
<b>2016</b>	Total(mm)	26.0	3.0	73.5	356.6	603.2	11.1	2.2	0.0	0.0	28.0	250.0	41.1	1394.7
<b>2017</b>	Total(mm)	128.2	29.3	52.6	21.5	193.4	11.1	2.2	0.0	0.0	0.0	0.0	0.0	438.3
	<b>Avrg</b>	71.7	15.9	31.5	300.2	290.6	12.0	1.1	34.6	73.2	168.5	219.8	202.0	1421.1

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Avg rain (mm)	71.7	15.9	31.5	300.2	290.6	12.0	1.1	34.6	73.2	168.5	219.8	202.0	1421.1
Harvest volume from 1800 ft <sup>2</sup> roof.(m <sup>3</sup> )	5.2	0.8	1.6	21.1	17.4	0.8	0.1	2.7	6.2	11.8	15.6	16.5	99.8

Expected Capacity of the Tank	7 m <sup>3</sup>
Capacity of a Pot( two pots per one tree)	4 liter
Required water per one plant	8 liter
Frequency of refill	4 days
Number of plants to be watered	100
Expected maximum utilizing duration of a full tank	50 days

## 2.4 ESTIMATED PROJECT COST

The total project cost was estimated using the appropriate current market rates of labor and material. Moreover, it has possibility to considerable amount of project cost with the help of IESL project team and villagers. The required funds to be obtain from IESL as a part of charity work conducted by mechanical engineering sectional committee.

No	Description	Unit Cost Rs.	Total CostRs
01- Installation of rainwater gutter			
i	Rain water gutter cost for 200 feet(labor and material)	300.00	60,000.00
	<b>Sub total</b>		<b>60,000.00</b>
02-Installation of Tanks			
i	PE Plus water tank 5000 L- 1 tank	55,000.00	55,000.00
ii	PE Plus water tank 2000 L- 1 tank	24,000.00	24,000.00
iii	Constructing platform for tanks		
	a Material including cement, soil and bricks		15,000.00
	b Labor		8,500.00
iv	Installing pipe connection between tanks and rain water gutters		
	a Material cost , including 6 inch pipe		10,000.00
	b Installation cost		4,000.00
	<b>Sub total</b>		<b>116,500.00</b>
03- Piping and accessories			
i	1 ½”Dia pipe –12 length	550.00	6,600.00
ii	1” 300 100m -24 length	175.00	4,200.00
iv	½” flexible hose-6 nos of 100 feet hose role	1,750.00	10,500.00
v	L-bow- reducers ,valves ,adhesive and other pipe fittings		3,000.00
vi	Transport cost		2,500.00
vii	Pipe laying labor cost		7,500.00
	<b>Sub Total</b>		<b>34,300.00</b>
04-Installation of pot for 100 plants			
i	Pot at factory (220 pots)	120.00	26,400.00
ii	Transport		7,500.00
iii	Paint for pot (material)	10.00	2,000.00
iv	Painting and Burring pot (labor cost)	30.00	8,000.00
	<b>Sub Total</b>		<b>43,900.00</b>
05-Supervision ,transport and other overheads of the project			
i	Pre visit cost including transport and other – 3visits		20,000.00
ii	Transport for the project team during project execution		25,000.00
iii	Food and accommodation for two day stay of the project team(5 members)		30,000.00
iv	Other and contingencies		15,000.00
	<b>Sub total</b>		<b>90,000.00</b>
	<b>Total Estimated Project Value</b>		<b>344,700.00</b>

As this is a CSR project , some of above cost factors can be eliminated with the help of project team and villagers. Accordingly 80% of the cost indicated in 2-ii, 3-iv, 4-iv, 5-i, 5-ii, 5-iii is anticipated to save.

Item #	Item	Total amount	Expecting saving (80%)
2-ii b,	Labor for installing the tank platform	8,500.00	6,800.00
3-iv	Labor for pipe line laying	7,500.00	6,000.00
4-iv	Painting and burring pot(labor)	8,000.00	6,400.00
5-i	Pre visit cost including transport and other – 3 visits	20,000.00	16,000.00
5-ii	Transport for the project team during project execution	25,000.00	20,000.00
5-iii	Food and accommodation for two day stay of the project team(5 members)	30,000.00	24,000.00
<b>TOTAL EXPECTED SAVING</b>			<b>79,200.00</b>

Hence total expenditure in this project is anticipated as bellow.

Total project value	344,700.00
<b>Expected saving</b>	<b>-79,200.00</b>
<b>Total estimated Fund required for the project</b>	<b>265,500.00</b>

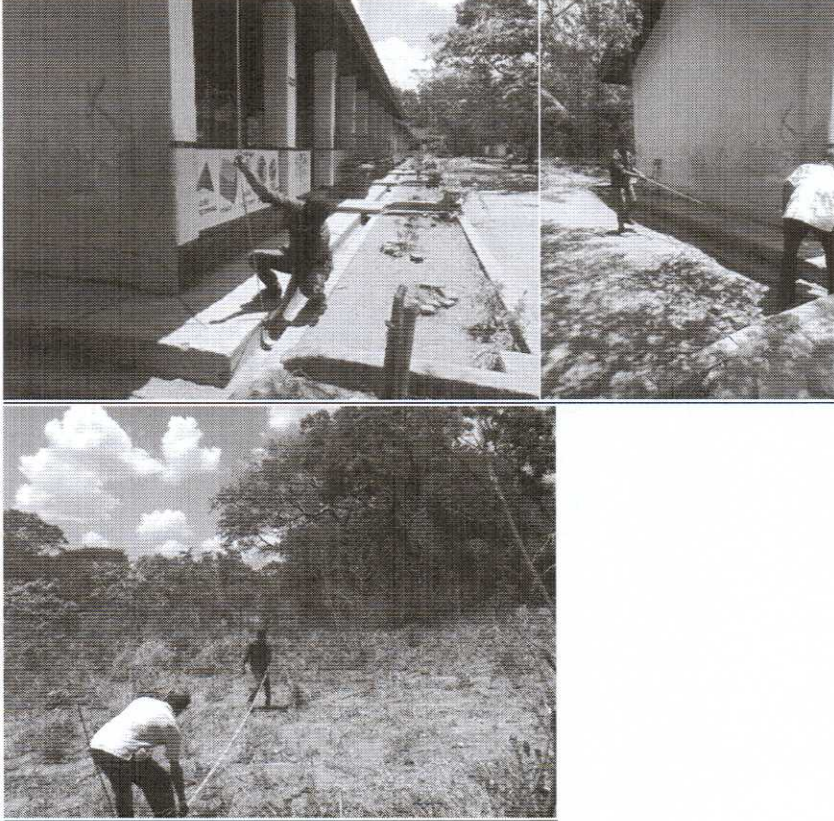


# Project Progress

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MESC has started the project with the money (Rs.150, 000.00 /Loan) received from a well-wisher

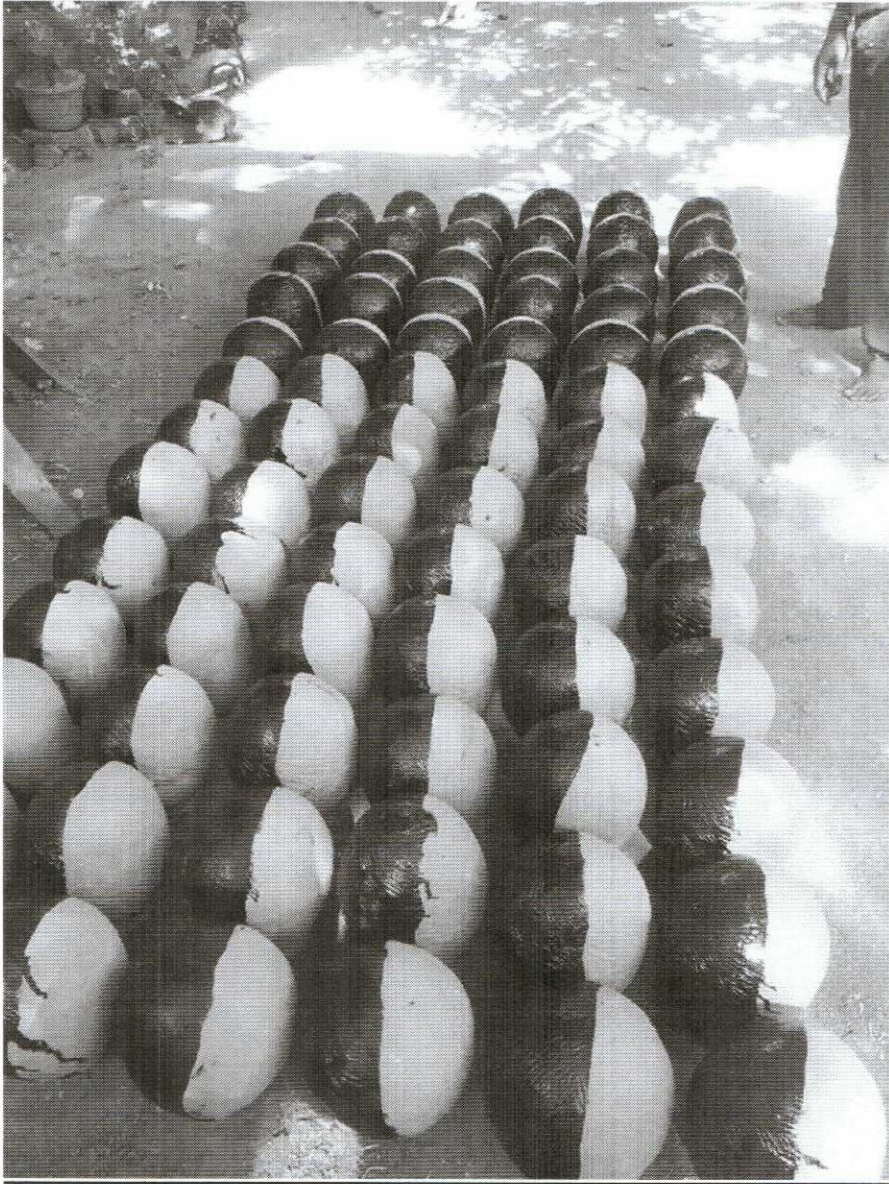
## Initial measurement



## Purchase of Pots



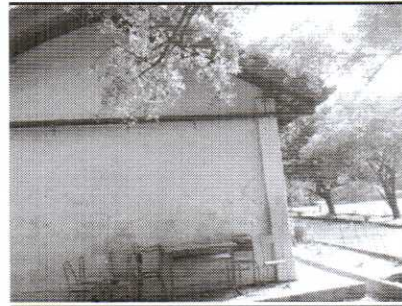
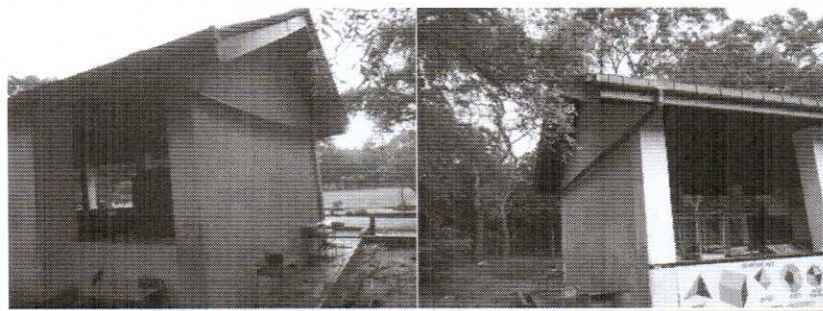
Pot Painting



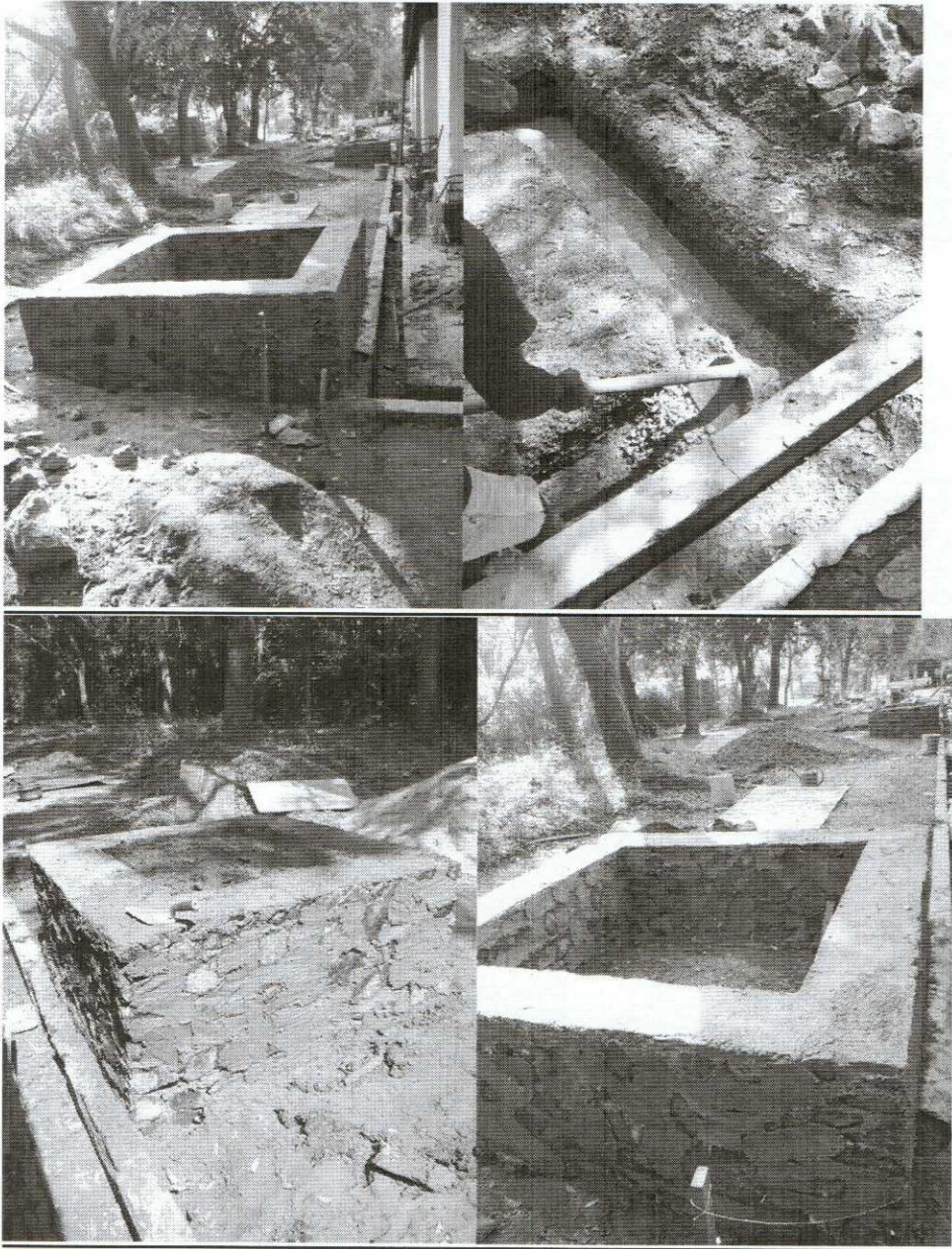
**Land Preparation**



**Fixing Gutters**



**Foundation Construction for Water tanks**



# Project commissioned on 12-01-2019





# Current Progress as at 23-02-2019

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MESC is monitoring the progress of the project and hope to update the council in every 3 months.

## Final cost

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Description (Vendor Name / Purpose)	Amount Rs.
PE-Plus (Private) Limited, Water tanks 2000L & 5000L	79,735.50
Makalanegama K.V., Civil works Material and labor	106,220.00
Prasanna Stores, Pipe work materials	30,823.00
Prasanna Stores, Civil works materials	9,410.00
Sameera vase, Pots and transport	32,400.00
My Print, Digital Printout	2,330.00
Breakfast	360.00
Transport, Highway	200.00
Transport, Highway	300.00
<b>Total</b>	<b>261,778.50</b>