



Republic of the Philippines
Department of Environment and Natural Resources
FOREST MANAGEMENT BUREAU
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MEMORANDUM

FOR : All Regional Directors
All PENROs and CENROs

FROM : The Director

SUBJECT : **TECHNICAL BULLETIN NO. 13-A SUPPLEMENTAL
STANDARD COST AND DESIGN FOR SMALL WATER
IMPOUNDING SYSTEM (SPRING DEVELOPMENT)**

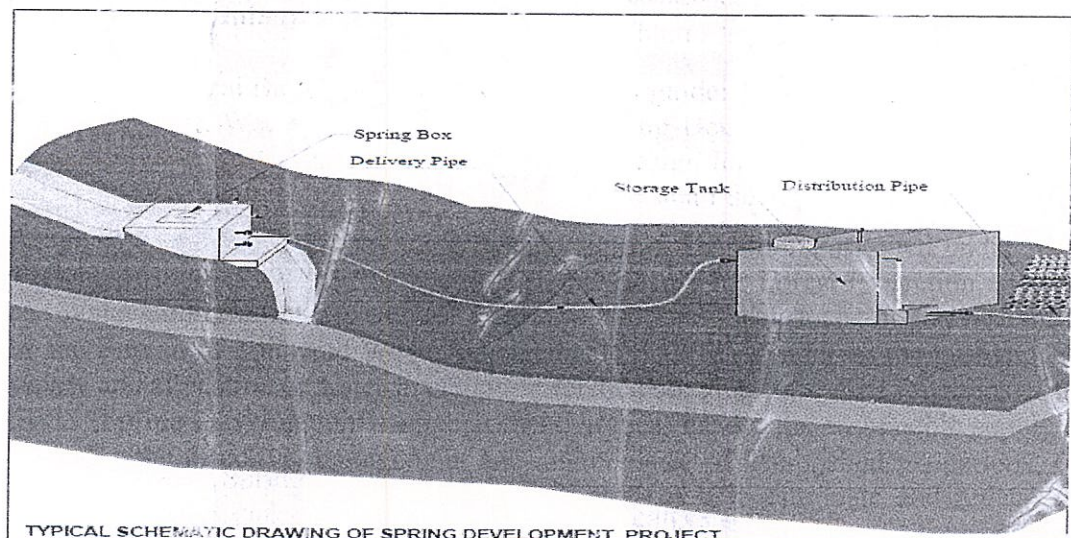
DATE : JUN 27 2018

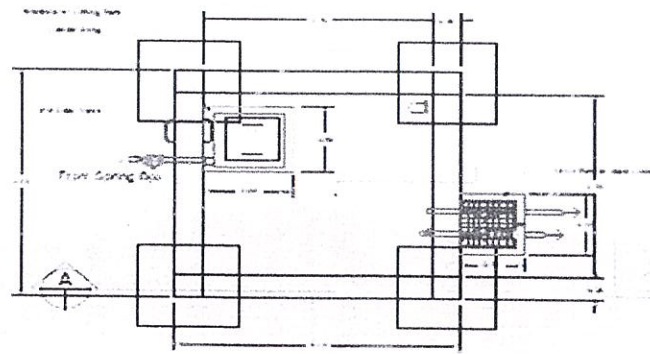


1. The Technical Bulletin

This Technical Bulletin provides supplemental guidelines for the standard cost and design of Small Water Impounding System (Spring Development) cited under FMB Technical Bulletin No. 13 "Standard Cost and Design for Forest Protection and Soil and Water Conservation Measures". It is one of the small-scale technologies developed by the Bureau of Soils and Water Management (BSWM) to address the problems on supply and allocation of water in certain watershed communities. The functions of the SWIS (Spring Development), among others, are: (a) ensure the sustainable supply of water for the effective management and maintenance of established plantations; (b) enhance and stabilize the condition of soil; and (c) help eliminate and reduce the impacts of flooding and severe cases of soil erosion.

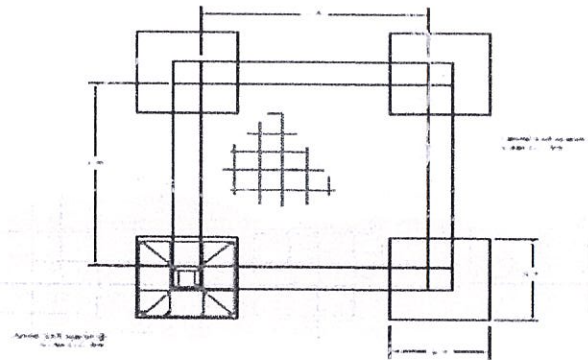
The SWIS (Spring Development) consists of concrete spring box or intake structure, storage tank, and PE pipes or concrete canals for distribution by gravity as seen on the diagram and designs below.





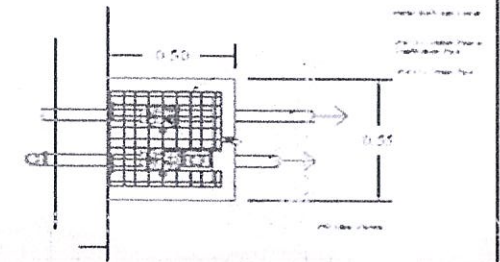
GROUND LEVEL PLAN

Scale: 1:40m



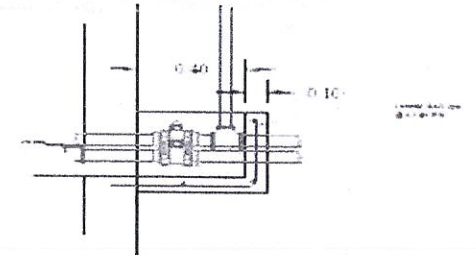
FOUNDATION PLAN

Scale: 1:40m



PLAN

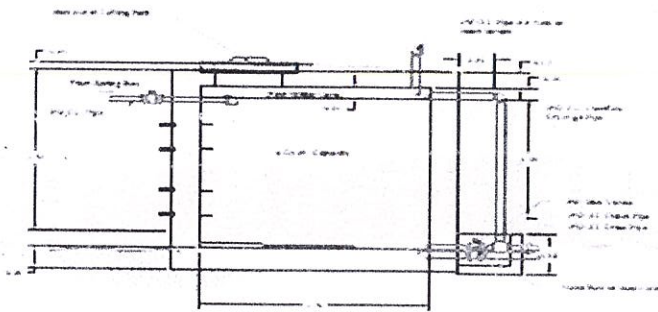
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PLAN

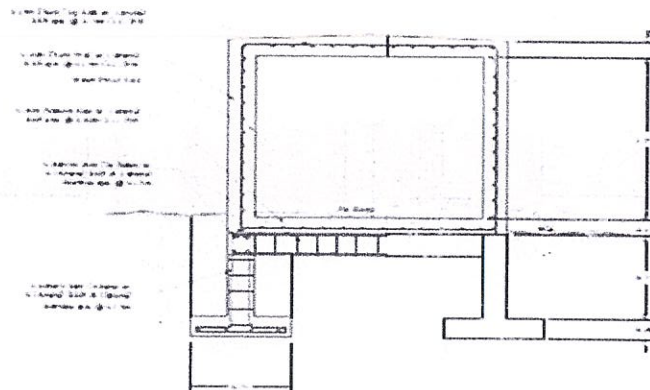
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DETAIL OF VALVE BOX



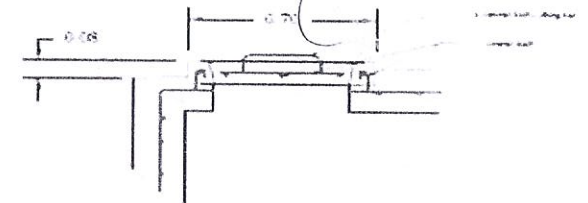
FRONT ELEVATION

Scale: 1:40m



SECTION 1A

Scale: 1:40m

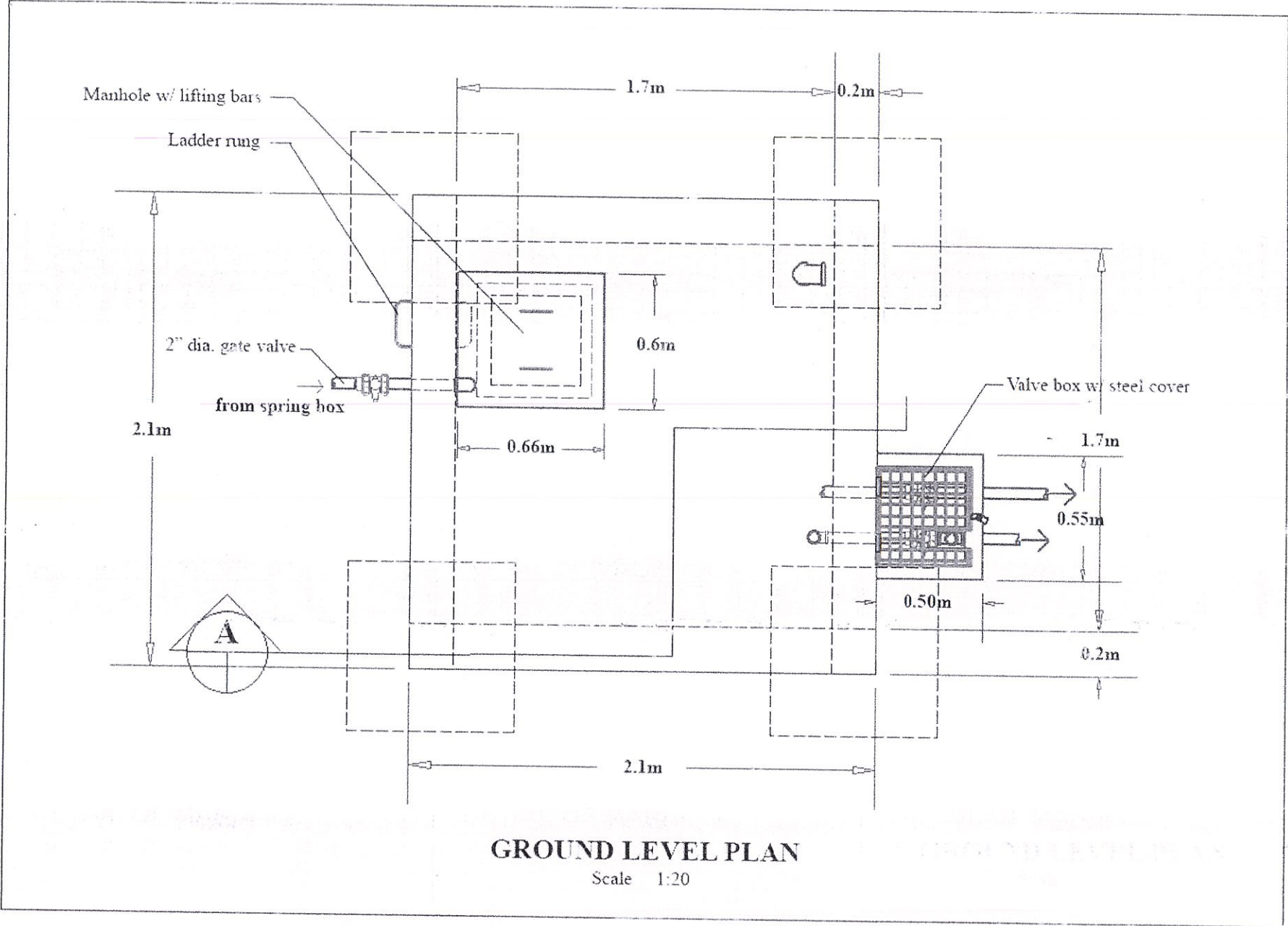


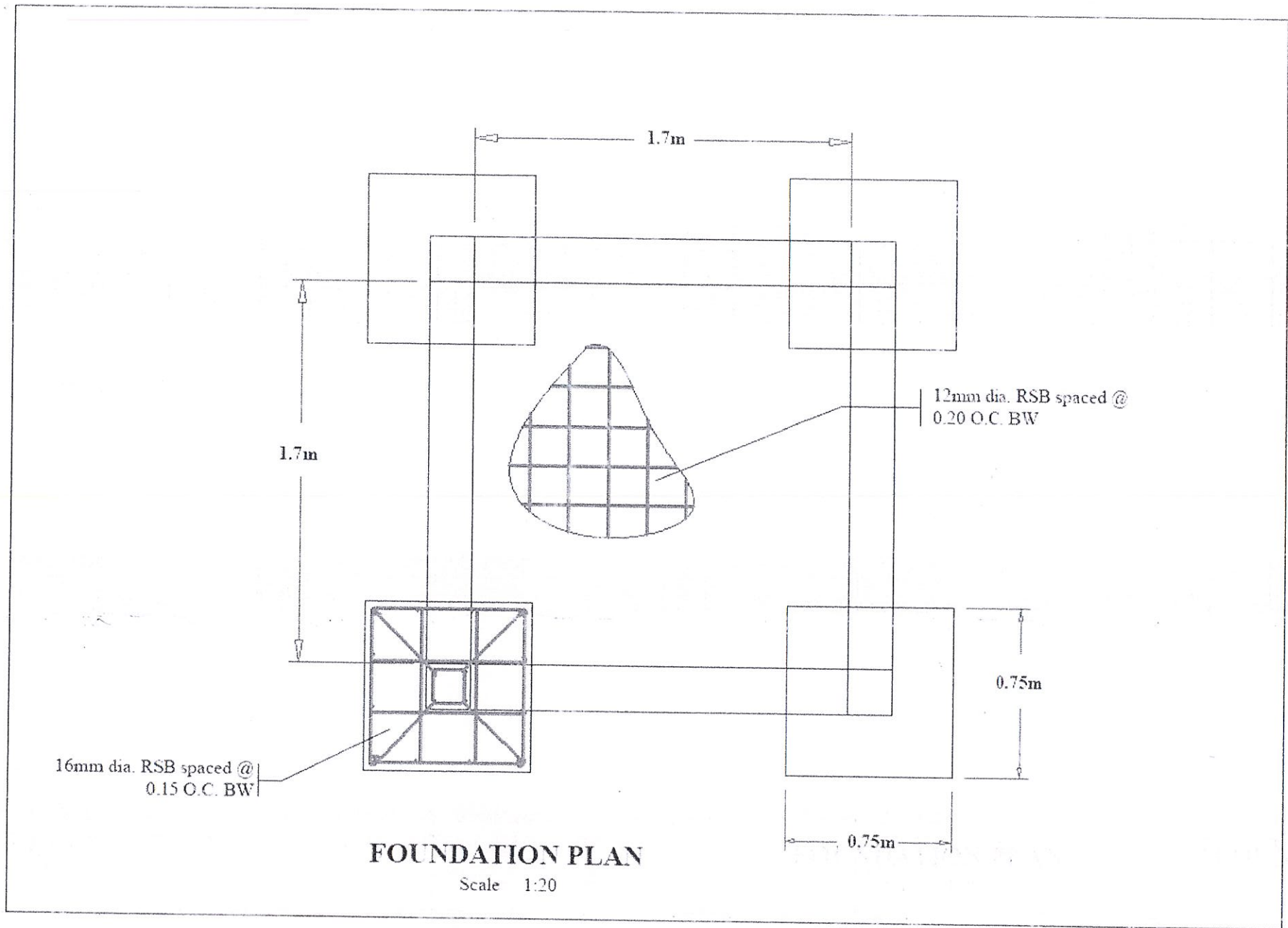
DETAIL OF MANHOLE

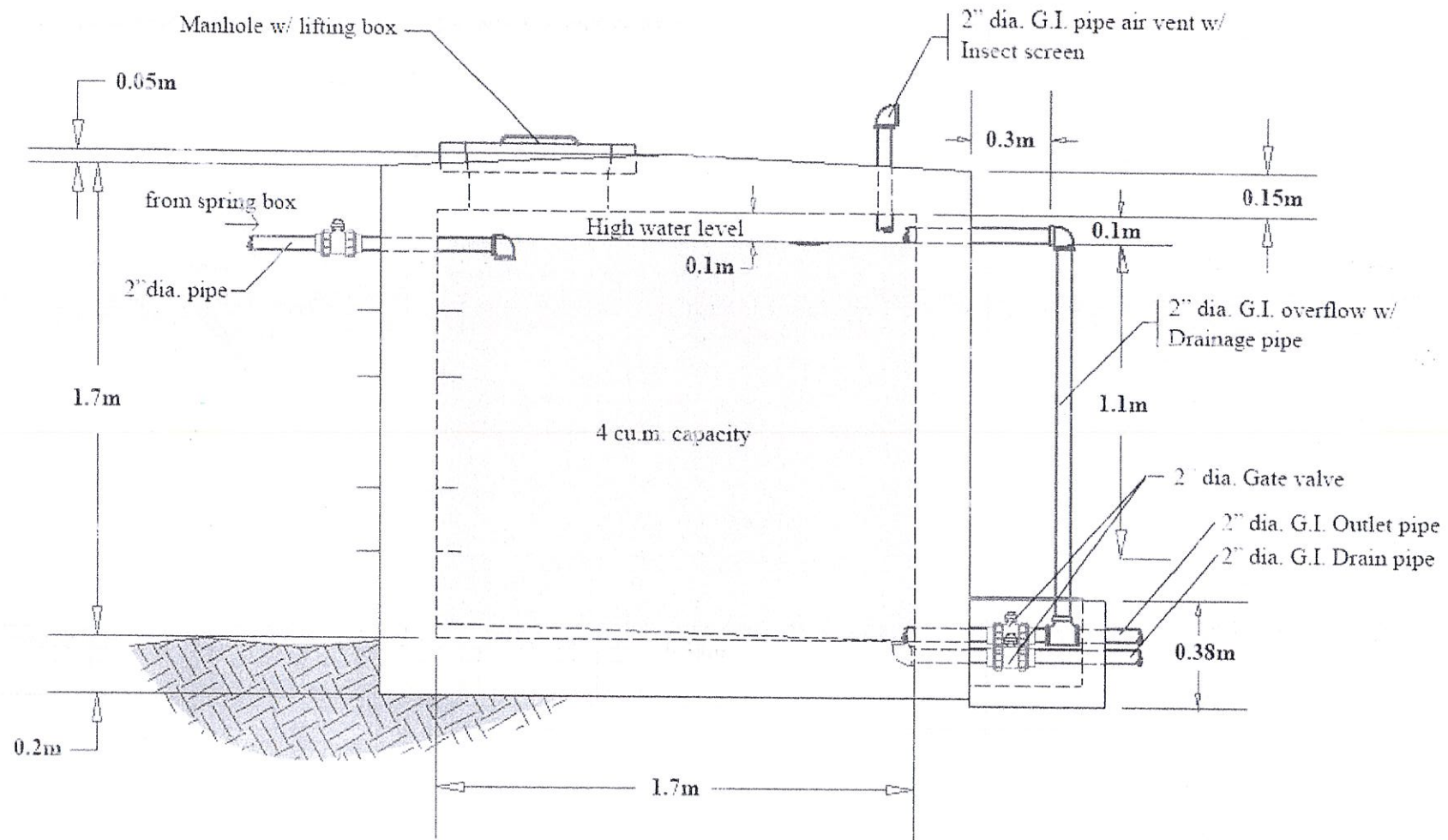
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- Note:
- Provide additional reinforcements and concrete support in case of larger capacity of storage tank.
 - Size of delivery and distribution pipe may vary depending on site situation.

SAMPLE DESIGN OF CONCRETE TANK





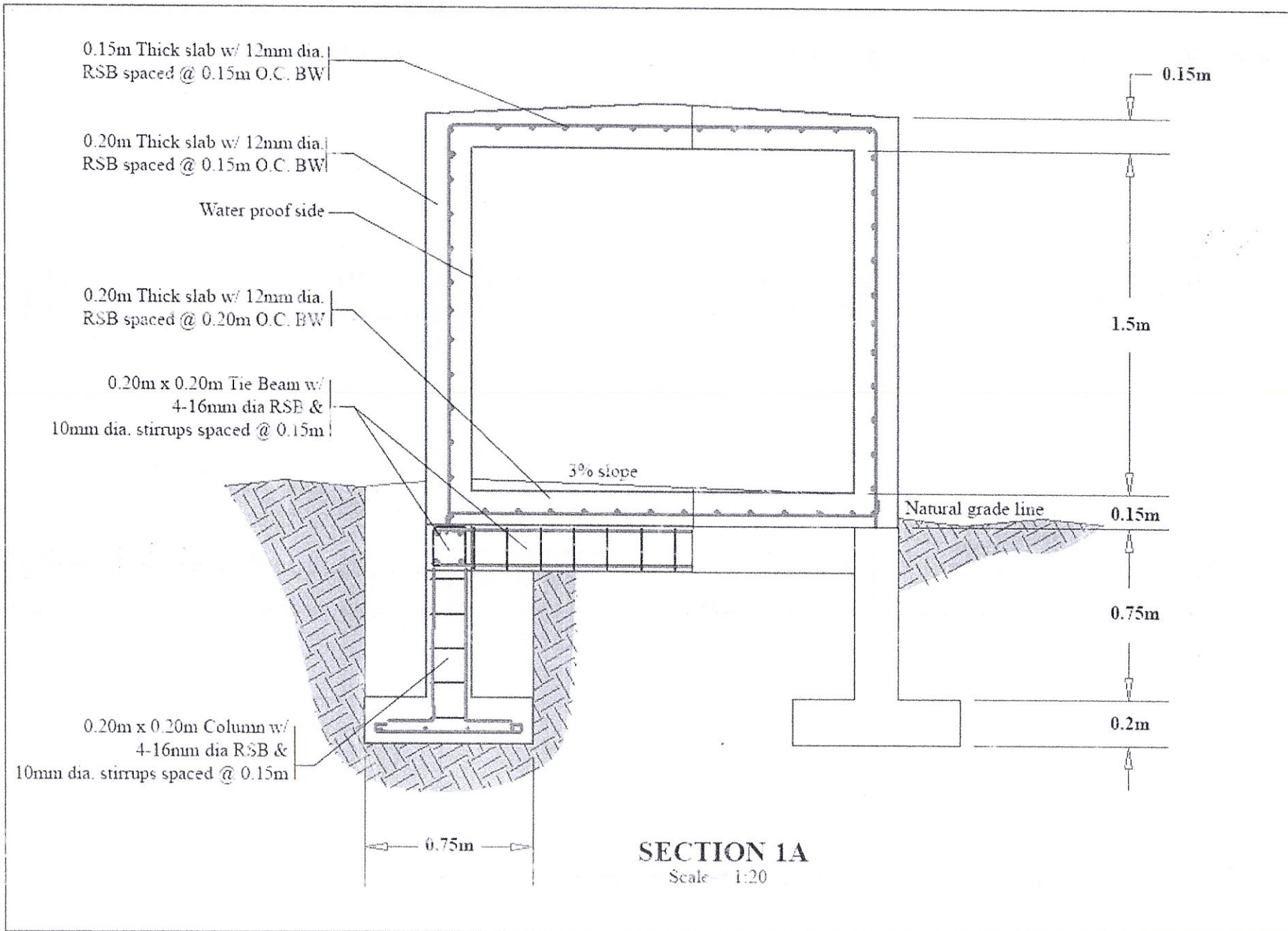


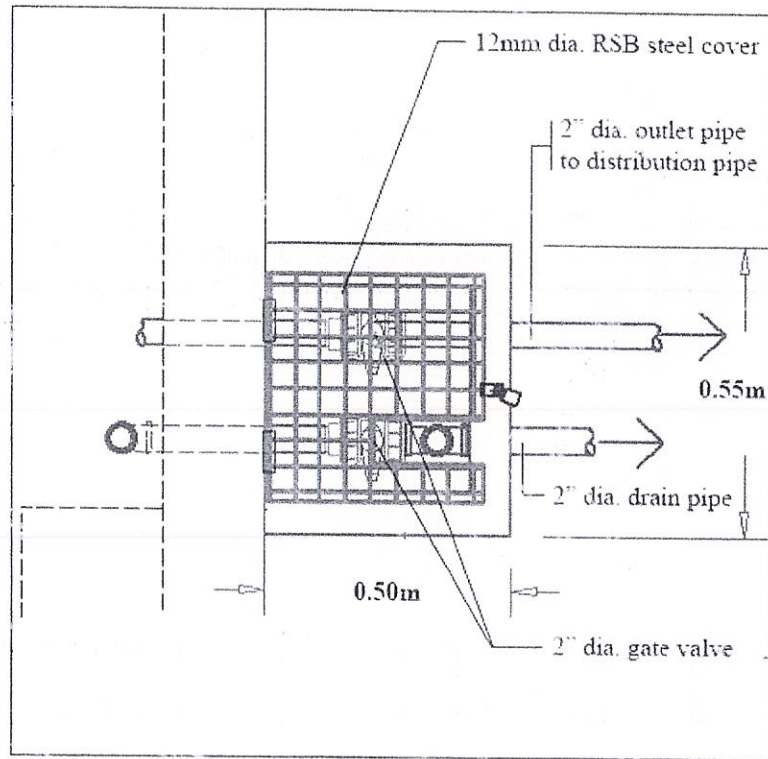
NOTE:

- Provide additional reinforcements and concrete support in case of larger capacity of storage tank.
- Size of delivery and distribution pipe may vary depending on site situation.

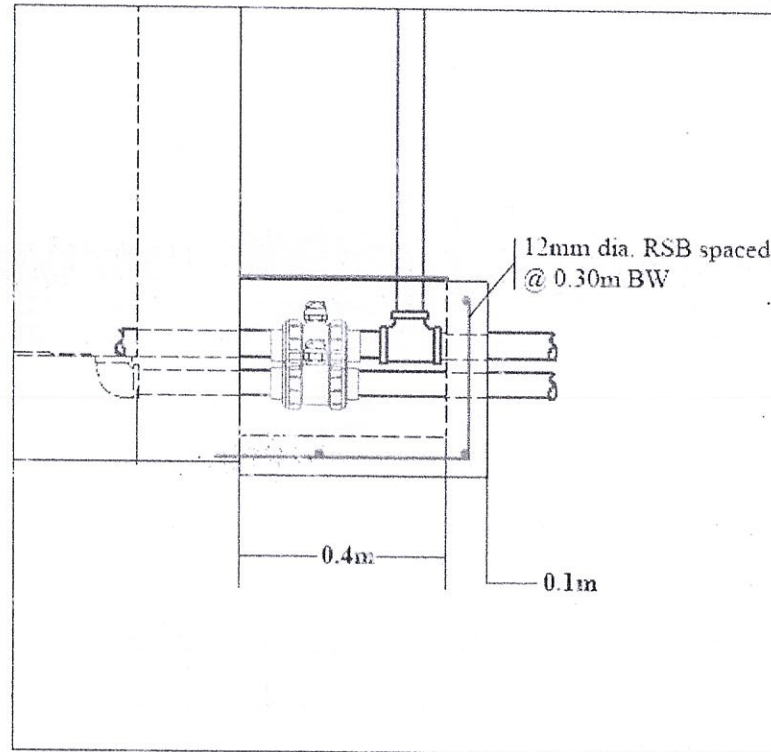
FRONT ELEVATION

Scale 1:20



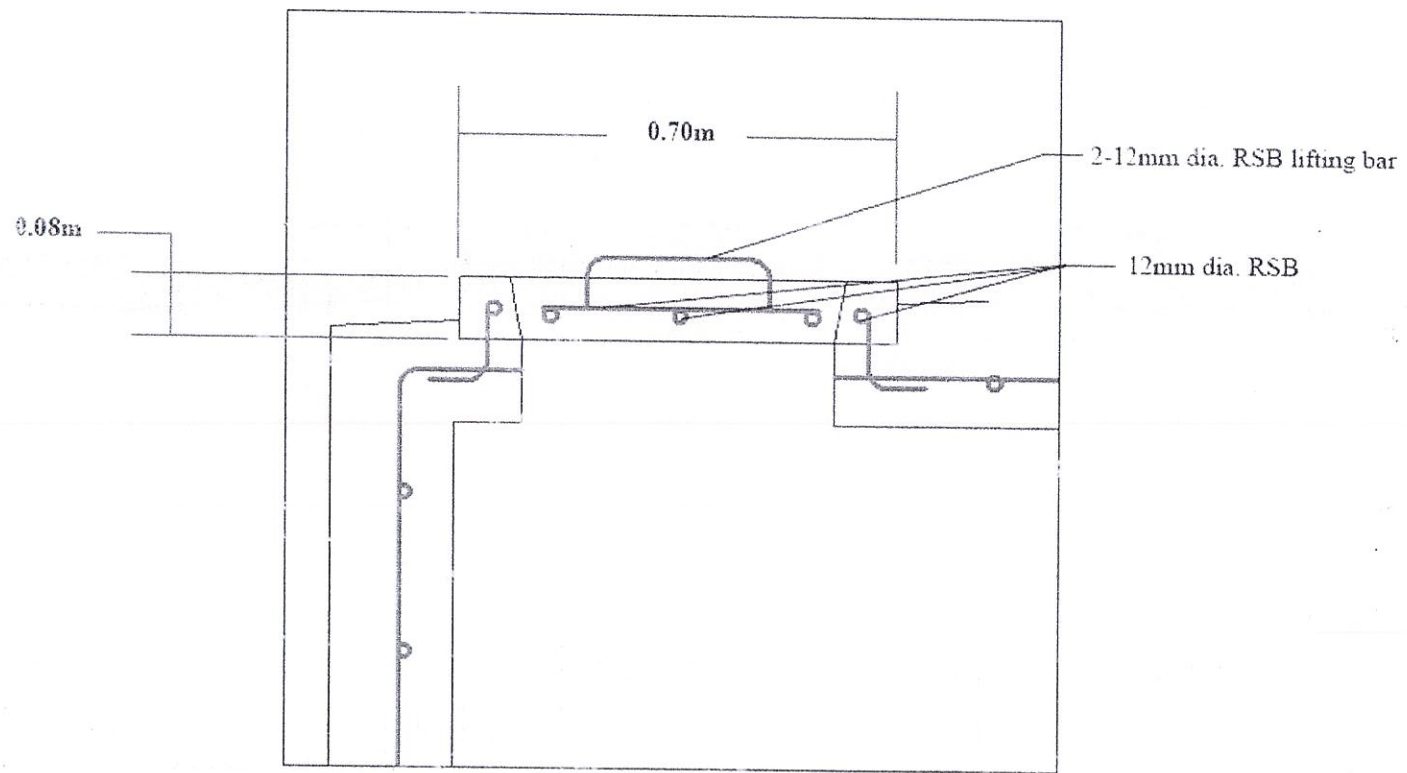


PLAN
Scale 1:20



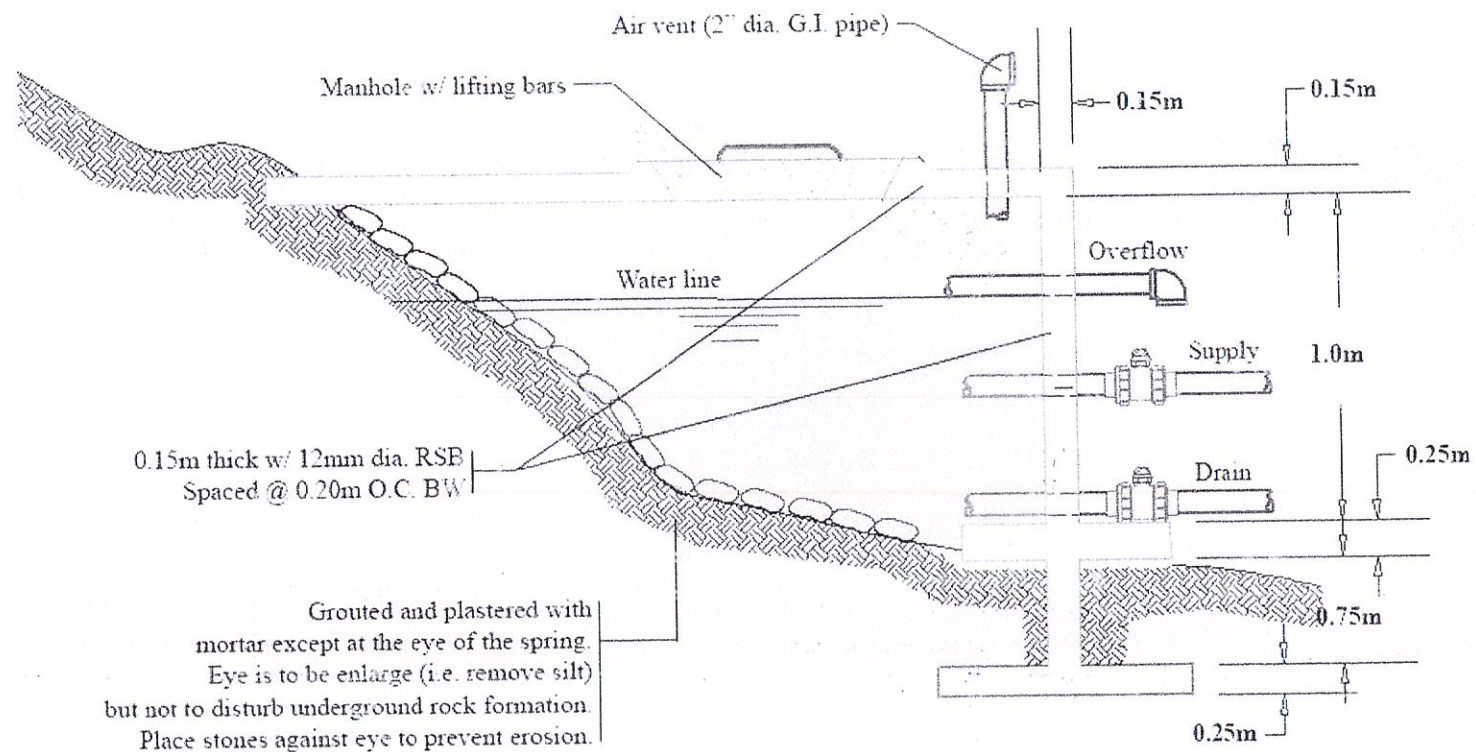
PLAN
Scale 1:20

DETAILS OF VALVE BOX

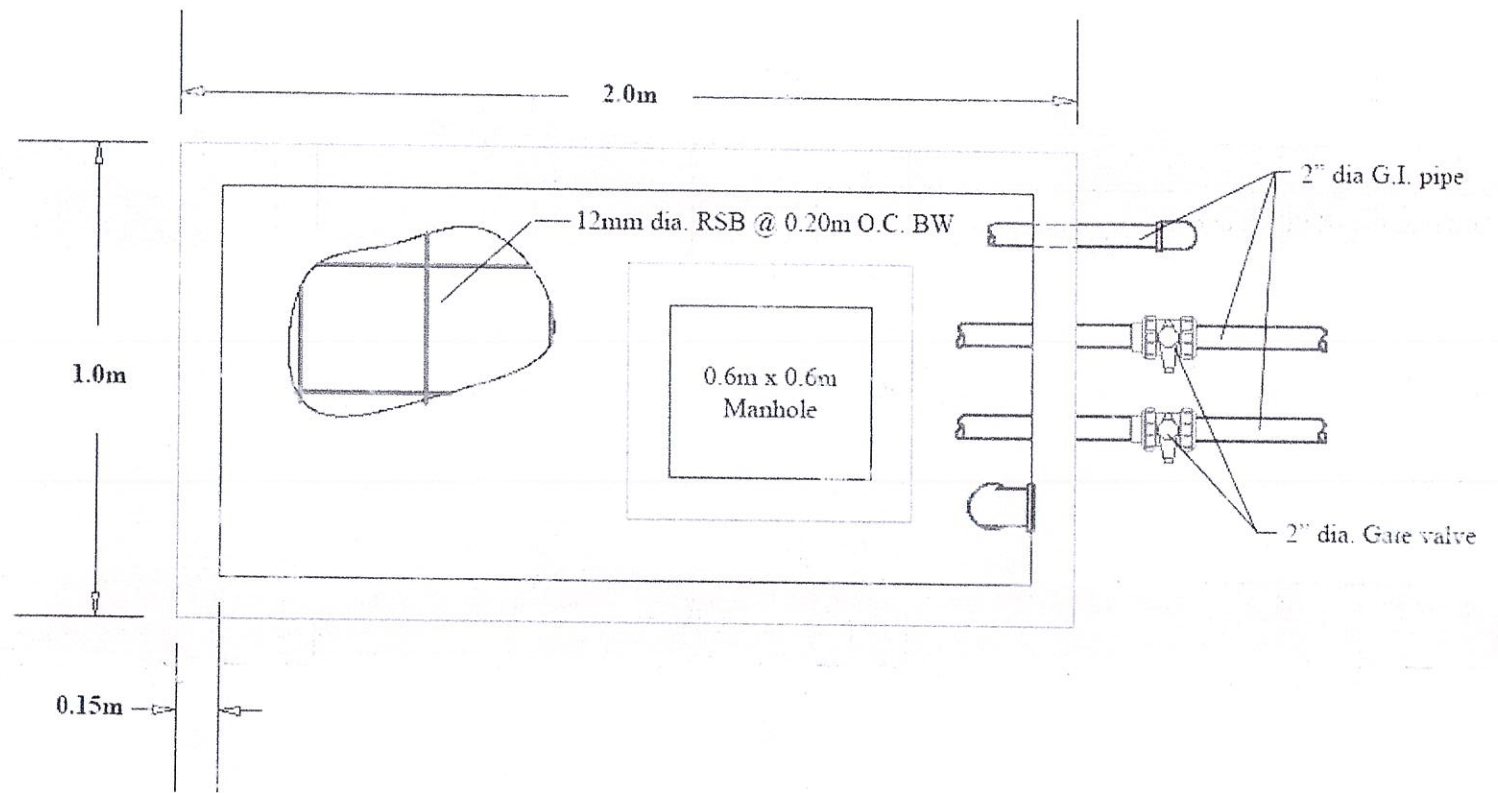


DETAIL OF MANHOLE

Scale 1:10

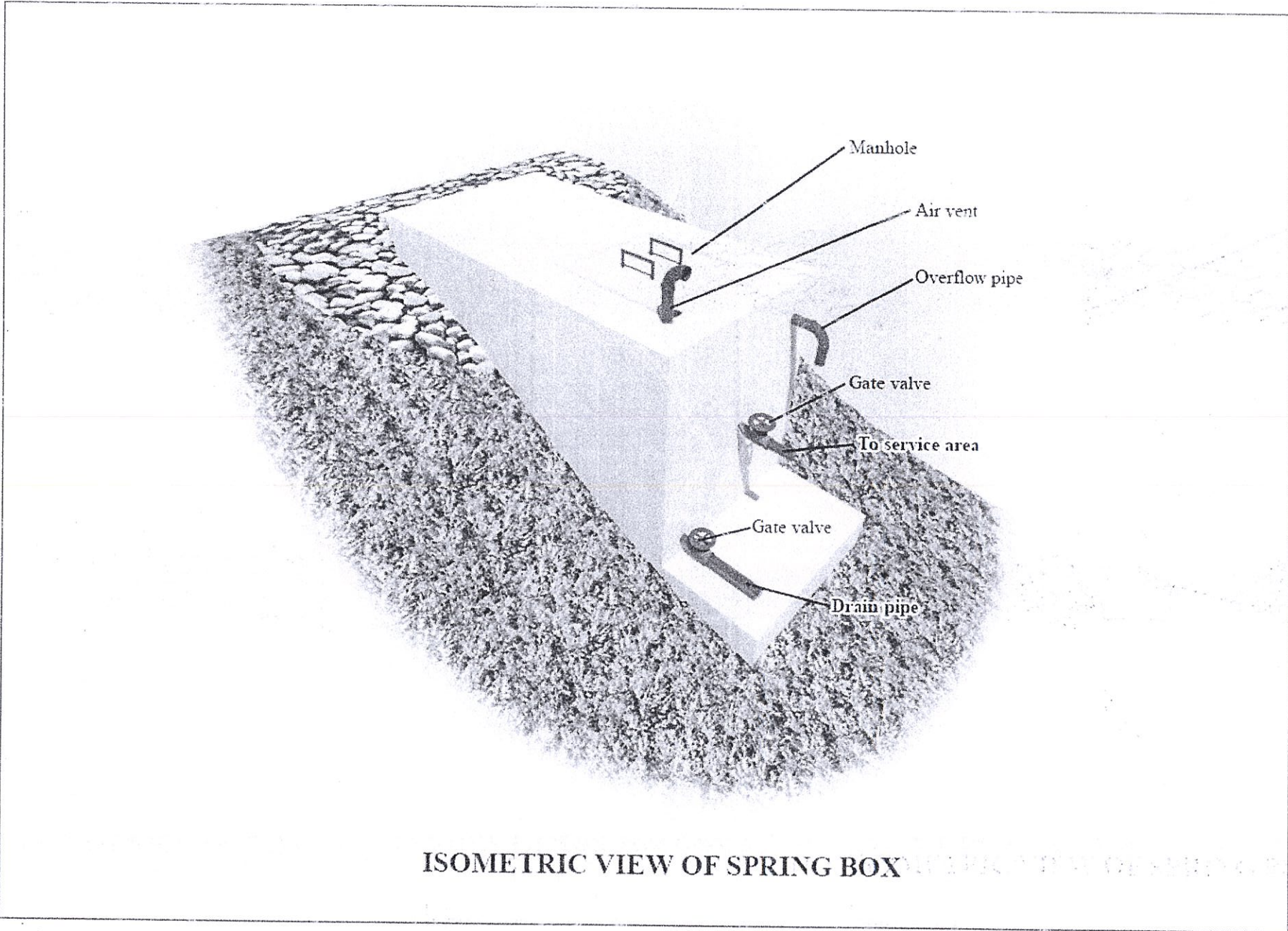


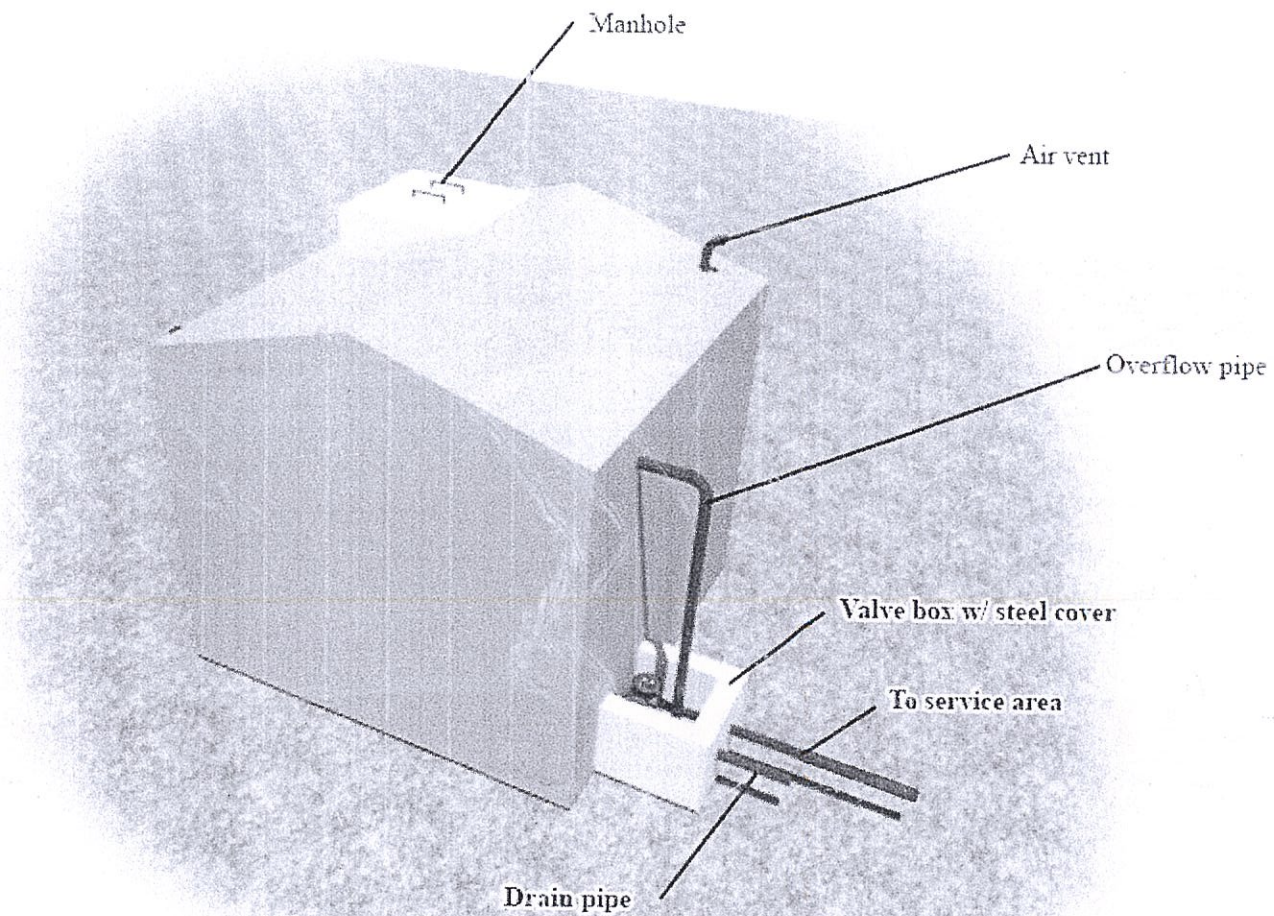
SIDE VIEW OF SPRING BOX
NOT TO SCALE



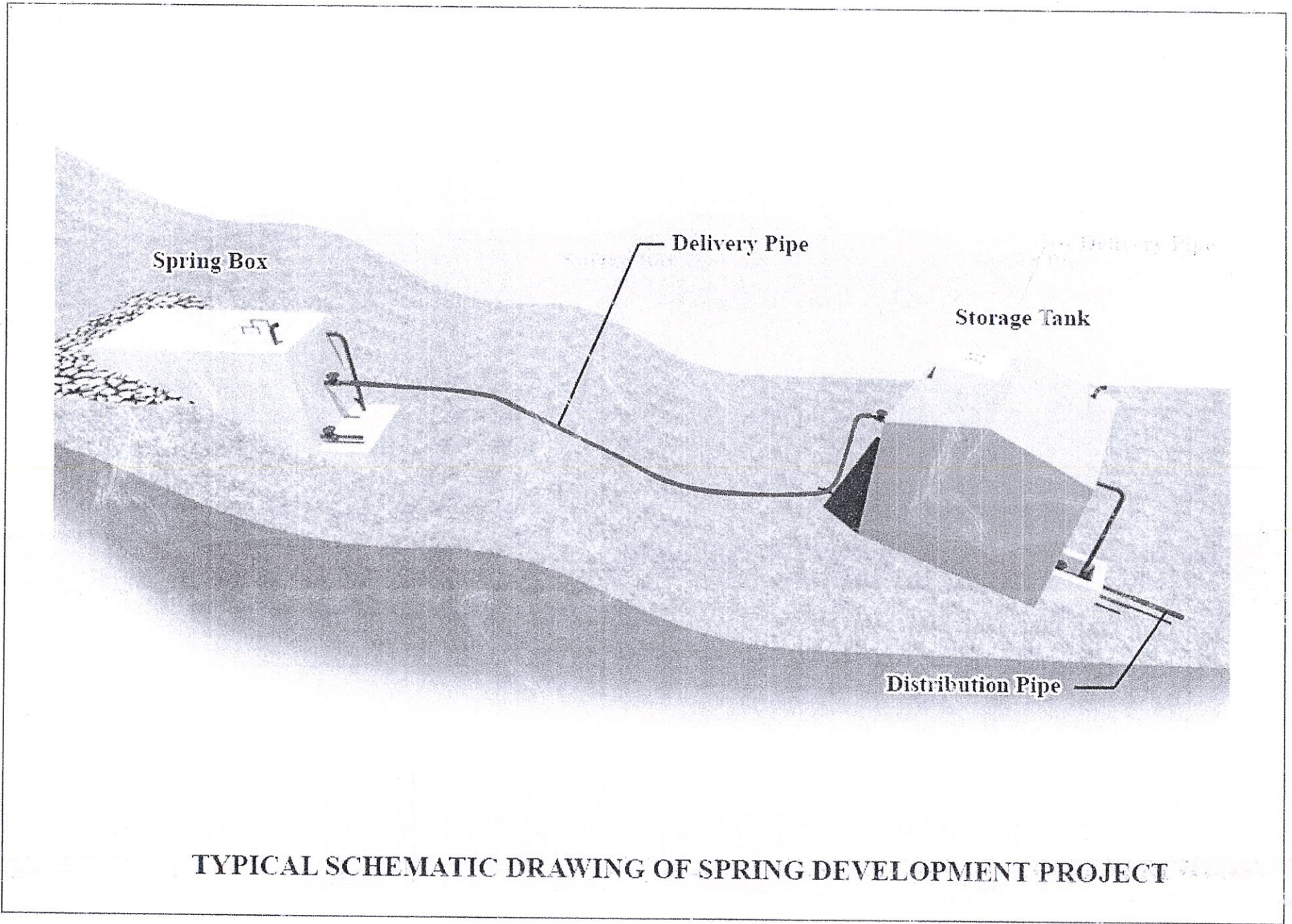
TOP VIEW OF SPRING BOX

Scale 1:14





ISOMETRIC VIEW OF CONCRETE TANK



TYPICAL SCHEMATIC DRAWING OF SPRING DEVELOPMENT PROJECT

2. Scope and Coverage

This Supplemental Technical Bulletin shall apply to all components of all forestland development programs and projects.

3. Users of this Technical Bulletin

The intended users of this technical bulletin are personnel of DENR field offices who are involved in planning, implementing and managing of forest resources and forestlands.

4. Reconnaissance and Assessment Survey

Reconnaissance and assessment survey of the proposed site within the forest or public land and coordination with stakeholder beneficiaries, within the watershed, will be conducted in order to calculate the estimated plantation water requirement and storage tank size to be established. The survey will include, among others, the presence of spring with continuous flow of discharge, amount of flow discharge and elevation difference and distance of spring, as source of water, to the proposed location of tank.

All the identified sites will be subjected to coordination, survey, assessment and preparation of GIS generated map, in shape file format. Based on the coordination and survey made, the following information will be submitted: a) Technical description survey of the watershed site using GPS and the GPS reading of the specific location of the SWIS (Spring Development) sites; b) Coordination made with the stakeholders; c) detailed engineering design including the bill of materials and cost estimates, of the SWIS (Spring Development); and d) Geo-tagged pictures and plotted GIS map output of the watershed where the SWIS will be established.

The SWIS (Spring Development) shall be strategically located to maintain water pressure at all times and to ensure the flow of water supply by gravity to the service areas or plantation sites.

5. Standard Cost for Small Water Impounding System (Spring Development)

The cost of the following activities is computed based on the guidelines of the Bureau of Soils and Water Management (BSWM) for the construction of SWIS (Spring Development). Thus, close coordination with BSWM in the identification of areas and construction of Spring Box and Storage Tank for SWIS (Spring Development) must be done.

The attached derivation of standard unit cost for a SWIS (Spring Development) was based on the prototype design for a one (1) hectare service area or plantation site. The basic requirement shall be a reinforced concrete water storage tank that can hold four

(4) cubic meter of water and the volume of spring discharge of at least 1.5 liters per second during dry season. The computed unit cost was derived for planning and budgeting purposes only.

Should the identified service area or plantation site is more than 1 hectare that will require a larger volume of water storage tank and that there is only one source of water found in the area, a design analysis shall be computed to ensure stability and determine the dimensions of the structural members of the water storage tank prior to computation of bill of materials and cost estimates.

Another option shall be by constructing several standard 4 cubic meter reinforced concrete water storage tanks that are strategically located considering the location of other source of water within the vicinity and its proximity to the service areas or plantation sites.

SPRING DEVELOPMENT PROJECT

Bill of Materials and Detailed Cost Estimates

**Item No. I - EXCAVATION
LABOR**

Est. Quantity 10 Cu.m.

Manpower Description	Quantity	Duration	Rate/Day	Amount
Foreman	1	1	400.00	400.00
Common Laborer	5	1	260.00	1,300.00
Sub-Total				1,700.00
Total Cost of Item				1,700.00
Unit Cost		P/Cu.m.	170.00	

**Item No. II - BACKFILL
LABOR**

Est. Quantity 5 Cu.m.

Manpower Description	Quantity	Duration	Rate/Day	Amount
Foreman	1	1	400.00	400.00
Common Laborer	5	1	260.00	1,300.00
Sub-Total				1,700.00
Total Cost of Item				1,700.00
Unit Cost		P/Cu.m.	340.00	

**Item No. III - INSTALLATION OF DELIVERY PIPE FROM SPRING BOX
TO STORAGE TANK**

Est. Quantity 180 L.M.

1. MATERIALS

Materials Description	Quantity	Unit	Unit Cost	Amount
Teflone Tape (1"x390") (US Brand)	5	pc	80.00	400.00
HDPE Pipe 2" dia SDR 11	180	L. M.	230.00	41,400.00
Compression Coupling 2" dia	3	pc	950.00	2,850.00
Sub-Total				44,650.00

2. LABOR

Manpower Description	Quantity	Duration	Rate/Day	Amount
Foreman	1	2	400.00	800.00
Skilled Worker (Pipefitter)	1	2	350.00	700.00
Laborer/Helper	5	2	260.00	2,600.00
Sub-Total				4,100.00
Total Cost of Item				48,750.00
Unit Cost		P/L.M.	270.83	

SPRING DEVELOPMENT PROJECT

Bill of Materials and Detailed Cost Estimates

BOX AND STORAGE TANK (1.7m x 1.7m x 1.5m, inside dimension)				1 Lot
1. MATERIALS				
Materials Description	Quantity	Unit	Unit Cost	Amount
Portland Cement	65	bag	280.00	18,200.00
Sand Screened	4	cu m	1,000.00	4,000.00
Gravel 3/4	7	cu m	1,200.00	8,400.00
16 mm dia. X 6.0 m Rebars	15	pc	350.00	5,250.00
12 mm dia. X 6.0 m Rebars	67	pc	220.00	14,740.00
10 mm dia. X 6.0 m Rebars	12	pc	175.00	2,100.00
Tie wire gauge # 16	8	kg	80.00	640.00
Sahara	40	pack	45.00	1,800.00
Gate Valve (brass) 2" dia sched 40	5	pc	2,500.00	12,500.00
G.I. Elbow 90° 2" dia sched 40	6	pc	200.00	1,200.00
G.I. Pipe schedule 40 2" dia	2	pc	2,800.00	5,600.00
2"Ø Universal Transition Fitting/Joiner	2	pc	500.00	1,000.00
2"Ø -1"Ø Universal Transition Fitting/Joiner	1	pc	300.00	300.00
2"Ø GI Tee	1	pc	300.00	300.00
Forms and Scaffolding	1	lot	20,000.00	20,000.00
			Sub-Total	96,030.00
2. LABOR				
Manpower Description	Quantity	Duration	Rate/Day	Amount
Foreman	1	8	400.00	3,200.00
Skilled Worker	1	8	350.00	2,800.00
Laborer	8	8	250.00	16,640.00
			Sub-Total	22,640.00
Total Cost of Item				118,670.00
Unit Cost				P/Lot 118,670.00
Item No. V - INSTALLATION OF DISTRIBUTION LINES FROM STORAGE TANK TO SERVICE AREA				1 Lot
1. MATERIALS				
Materials Description	Quantity	Unit	Unit Cost	Amount
PE Pipes 1' dia (60m) SDR 17	8	pcs	4,500.00	36,000.00
Compression Coupling 1" dia	8	pcs	260.00	2,080.00
Teflone Tape (1"x390") (US Brand)	5	pcs	80.00	400.00
			Sub-Total	38,480.00
2. LABOR				
Manpower Description	Quantity	Duration	Rate/Day	Amount
Foreman	1	2	400.00	800.00
Skilled Worker	1	2	350.00	700.00
Laborer	4	2	250.00	2,080.00
			Sub-Total	3,580.00
Total Cost of Item				42,060.00
Unit Cost				P/Lot 42,060.00

SPRING DEVELOPMENT PROJECT

Bill of Materials and Detailed Cost Estimates

Materials Description	Quantity	Unit	Unit Cost	Amount
Teflon Tape (1"x390") (US Brand)	5	pc	80.00	400.00
HDPE Pipe 2" dia SDR 11	180	L. M.	230.00	41,400.00
Compression Coupling 2" dia	3	pc	950.00	2,850.00
		Sub-Total		44,650.00
2. LABOR				
Manpower Description	Quantity	Duration	Rate/Day	Amount
Foreman	1	2	400.00	800.00
Skilled Worker (Pipefitter)	1	2	350.00	700.00
Laborer/Helper	5	2	260.00	2,600.00
		Sub-Total		4,100.00
		Total Cost of Item		48,750.00
		Unit Cost	P/L.M.	270.83
Item No. IV - CONSTRUCTION OF SPRING BOX AND STORAGE TANK (1.7m x 1.7m x 1.5m, inside dimension)				
1. MATERIALS				
Materials Description	Quantity	Unit	Unit Cost	Amount
Portland Cement	65	bag	280.00	18,200.00
Sand Screened	4	cu m	1,000.00	4,000.00
Gravel 3/4	7	cu m	1,200.00	8,400.00
16 mm dia. X 6.0 m Rebars	15	pc	350.00	5,250.00
12 mm dia. X 6.0 m Rebars	67	pc	220.00	14,740.00
10 mm dia. X 6.0 m Rebars	12	pc	175.00	2,100.00
Tie wire gauge # 16	8	kg	80.00	640.00
Sahara	40	pack	45.00	1,800.00

SPRING DEVELOPMENT PROJECT

Bill of Materials and Detailed Cost Estimates

SPRING DEVELOPMENT PROJECT					
Bill of Materials and Detailed Cost Estimates					
Item No. I- EXCAVATION					
			Est. Quantity	10	Cu.m.
LABOR					
Manpower Description	Quantity	Duration	Rate/Day	Amount	
Foreman	1	1	400.00	400.00	
Common Laborer	5	1	260.00	1,300.00	
			Sub-Total	1,700.00	
			Total Cost of Item	1,700.00	
			Unit Cost	P/Cu.m.	170.00
Item No. II - BACKFILL					
			Est. Quantity	5	Cu.m.
LABOR					
Manpower Description	Quantity	Duration	Rate/Day	Amount	
Foreman	1	1	400.00	400.00	
Common Laborer	5	1	260.00	1,300.00	
			Sub-Total	1,700.00	
			Total Cost of Item	1,700.00	
			Unit Cost	P/Cu.m.	340.00
Item No. III - INSTALLATION OF DELIVERY PIPE FROM SPRING BOX TO STORAGE TANK					
			Est. Quantity	180	L.M.
I. MATERIALS					

SPRING DEVELOPMENT PROJECT

Bill of Materials and Detailed Cost Estimates

Gate Valve (brass) 2" dia sched 40	5	pc	2,500.00	12,500.00
G.I. Elbow 90° 2" dia sched 40	6	pc	200.00	1,200.00
G.I. Pipe schedule 40 2" dia	2	pc	2,800.00	5,600.00
2"Ø Universal Transition Fitting/Joiner	2	pc	500.00	1,000.00
2"Ø -1"Ø Universal Transition Fitting/Joiner	1	pc	300.00	300.00
2"Ø GI Tee	1	pc	300.00	300.00
Forms and Scaffolding	1	lot	20,000.00	20,000.00
		Sub-Total		96,030.00
2. LABOR				
Manpower Description	Quantity	Duration	Rate/Day	Amount
Foreman	1	8	400.00	3,200.00
Skilled Worker	1	8	350.00	2,800.00
Laborer	8	8	260.00	16,640.00
		Sub-Total		22,640.00
		Total Cost of Item		118,670.00
		Unit Cost	P/Lot	118,670.00
Item No. V - INSTALLATION OF DISTRIBUTION LINES FROM STORAGE TANK TO SERVICE AREA				1 Lot
1. MATERIALS				
Materials Description	Quantity	Unit	Unit Cost	Amount
PE Pipes 1" dia (60m) SDR 17	8	pcs	4,500.00	36,000.00
Compression Coupling 1" dia	8	pcs	260.00	2,080.00
Teflone Tape (1"x390") (US Brand)	5	pcs	80.00	400.00
		Sub-Total		38,480.00
2. LABOR				
Manpower Description	Quantity	Duration	Rate/Day	Amount

SPRING DEVELOPMENT PROJECT

Bill of Materials and Detailed Cost Estimates

Foreman	1	2	400.00	800.00
Skilled Worker	1	2	350.00	700.00
Laborer	4	2	260.00	2,080.00
		Sub-Total		3,580.00
		Total Cost of Item		42,060.00
		Unit Cost	P/Lot	42,060.00

The above-cited derivation of standard unit cost for SWIS (Spring Development) was based on the proto type design for a one (1) hectare service area of plantation site, a required reinforced concrete (RC) water storage tank that can hold four (4) cubic meters of water and a volume of spring discharge of at least 1.5 liters per second during dry season. The computed unit cost was derived for planning and budgeting purposes only.

6. Engineering Design for Small Water Impounding System (Spring Development)

The required engineering design for this purpose shall be based on the result of the reconnaissance and assessment survey conducted. This is to determine the design parameters such as the estimated service area or plantation site, volume of water required and corresponding size of water storage tank. The detailed engineering design consists of a Reinforced Concrete (RC) spring box connected to an RC water storage tank with a high-density polyethylene (HDPE) delivery pipe and from the water storage tank to the service area or plantation site with a polyethylene (PE) distribution pipe line.

Should the required volume of water exceed the minimum four (4) cubic meters, the design of the RC water storage tank shall be adjusted correspondingly. Such adjustment shall be reflected on the details of the plan which is based on the computed structural analysis to ensure that the structure is stable to hold the required volume of water.

The detailed engineering design and structural analysis shall be approved by a licensed civil engineer.

FOR INFORMATION AND GUIDANCE.


NONITO M. TAMAYO, CESC IV