

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. 13-4 SUPPLEMENTAL STANDARD COST AND DESIGN FOR SMALL WATER

IMPOUNDING SYSTEM (SPRING DEVELOPMENT)

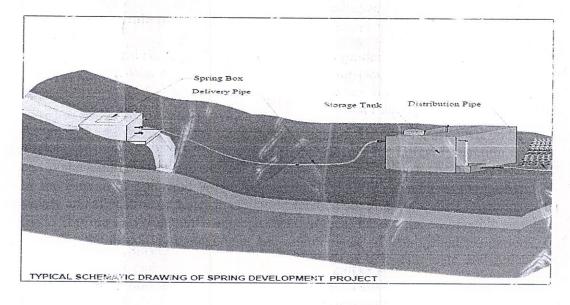
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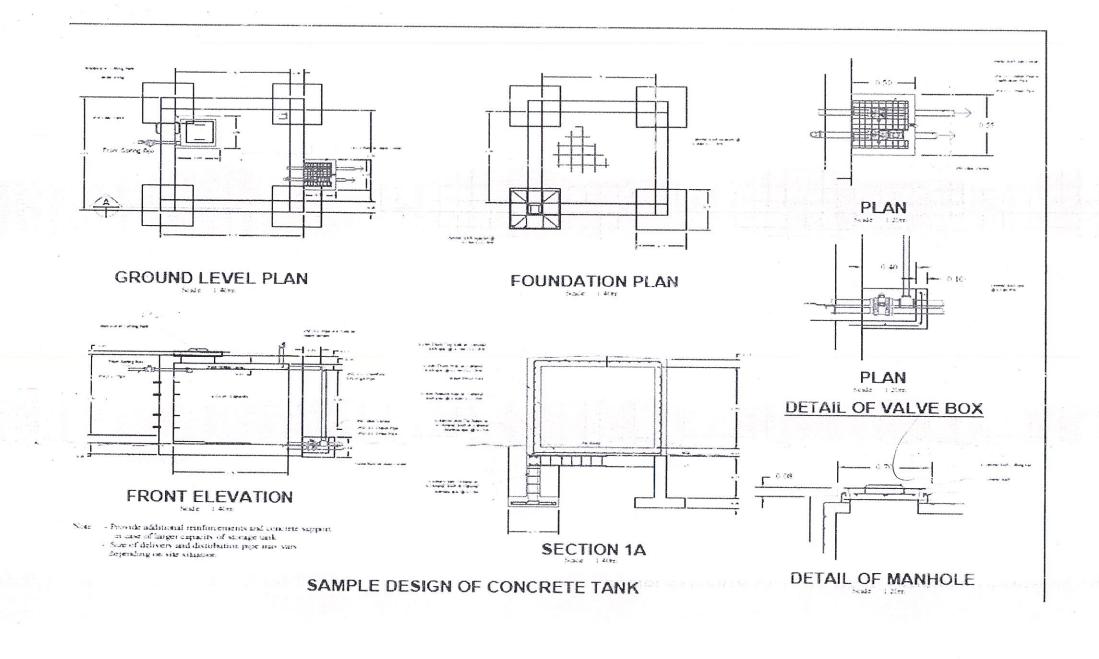
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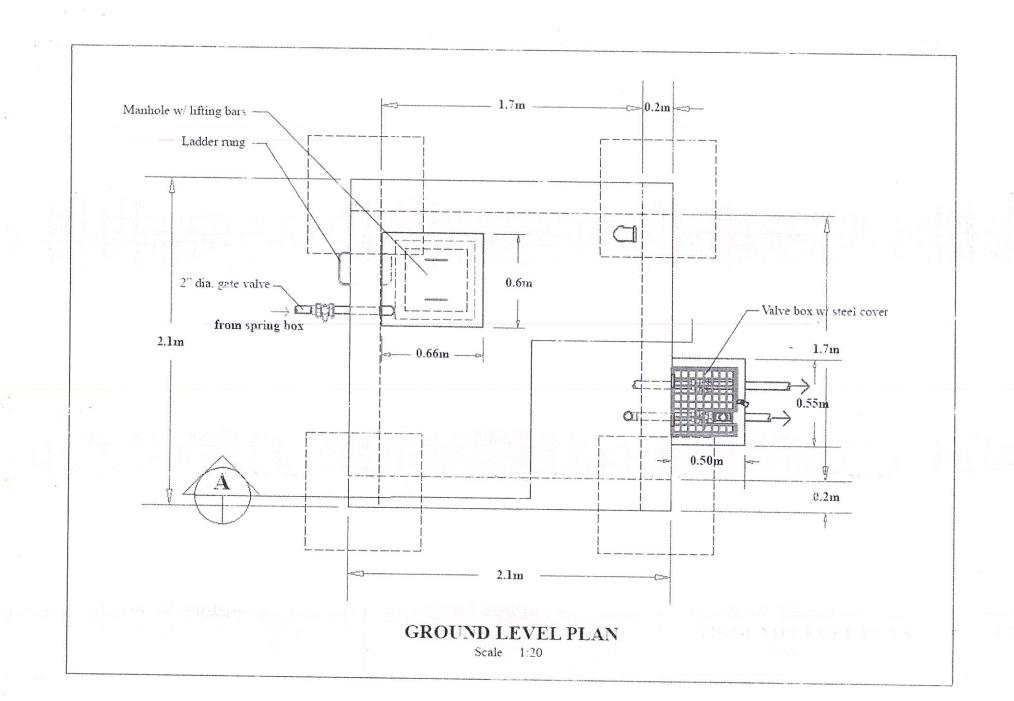
1. The Technical Bulletin

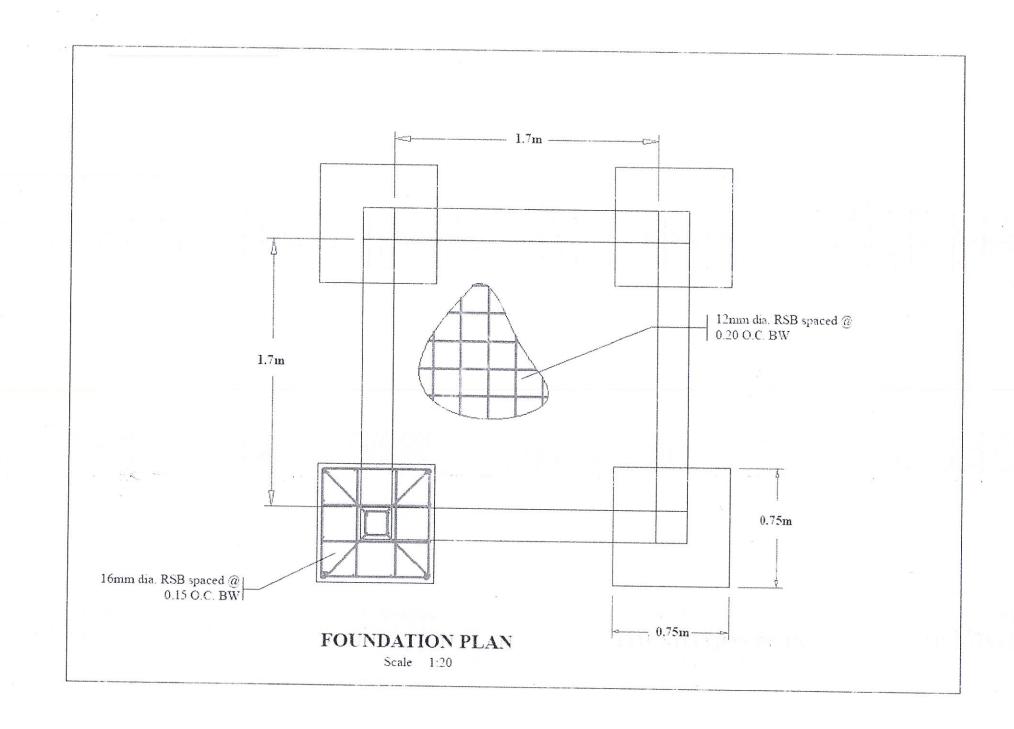
This Technical Bulletin provides supplemental guidelines for the standard cost and design of Small Water Impounding System (Spring Development) cited under FMB Technical Bulletin No. 13 "Standard Cost and Design for Forest Protection and Soil and Water Conservation Measures". It is one of the small-scale 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.

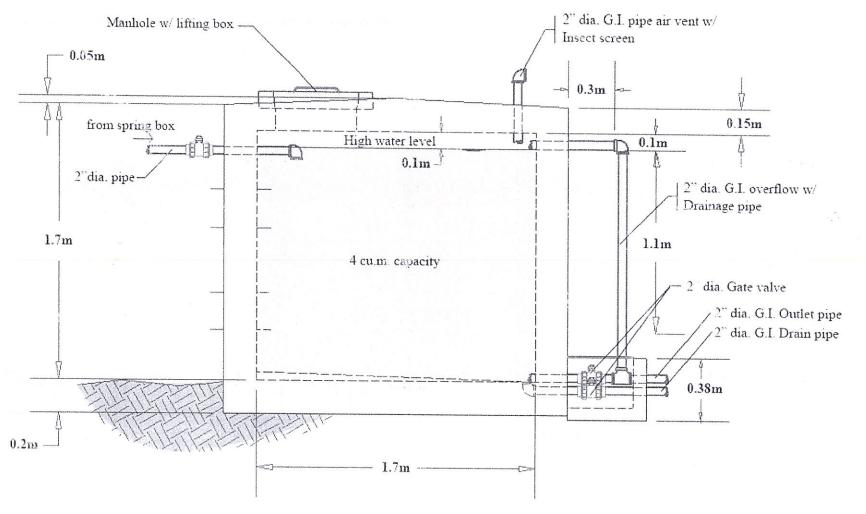
The SWIS (Spring Development) consists of concrete spring box or intake structure, storage tank, and PE pipes or concrete canals for distribution by gravity as seen on the diagram and designs below.









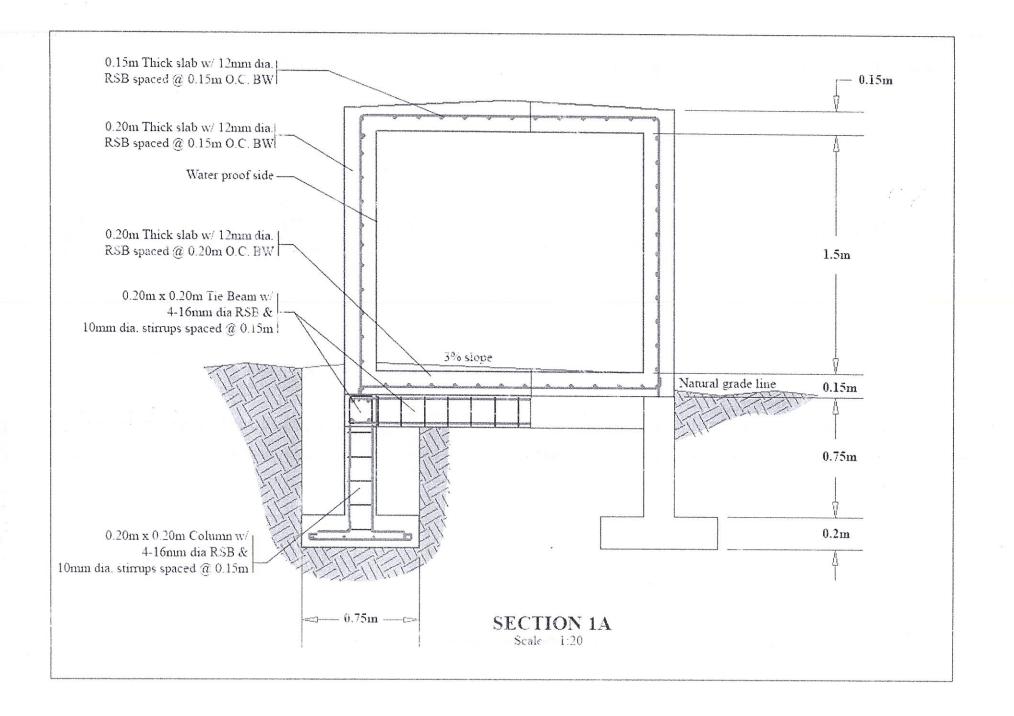


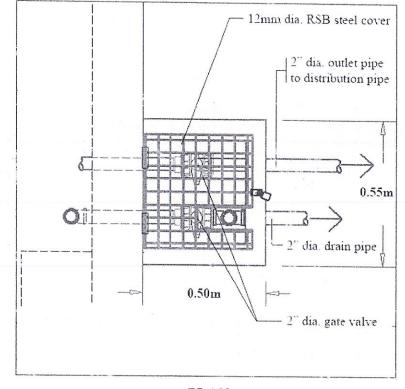
NOTE:

- 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

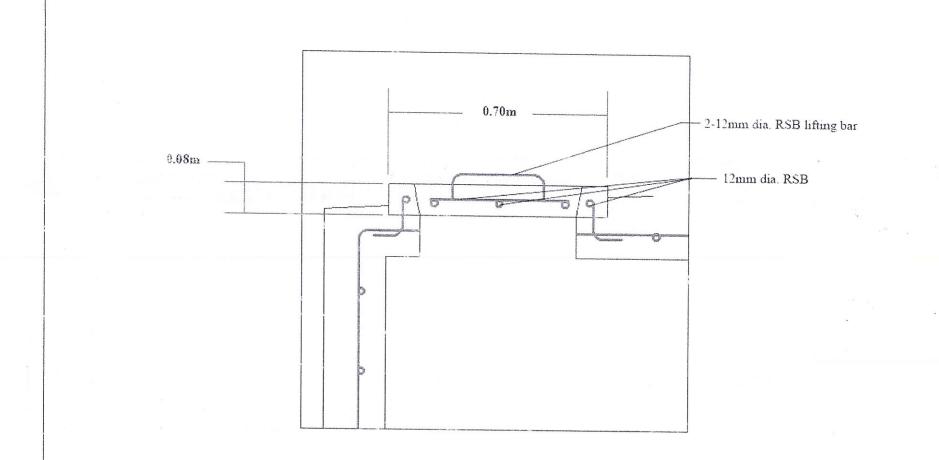




12mm dia. RSB spaced @ 0.30m BW

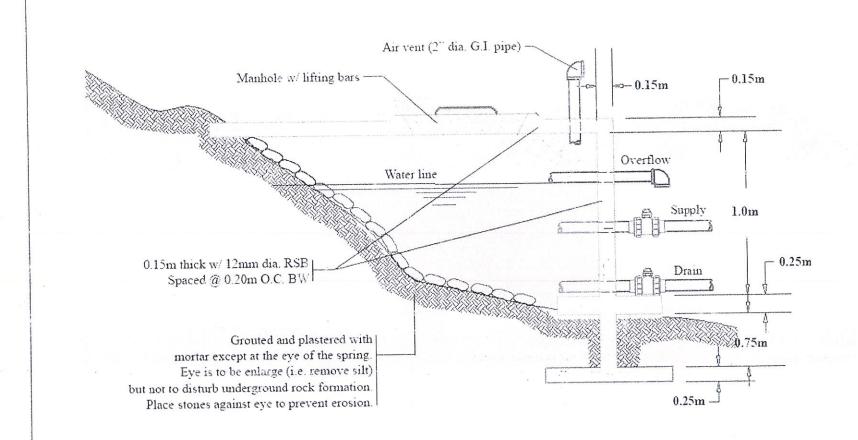
PLAN Scale 1:20

PLAN Scale 1:20

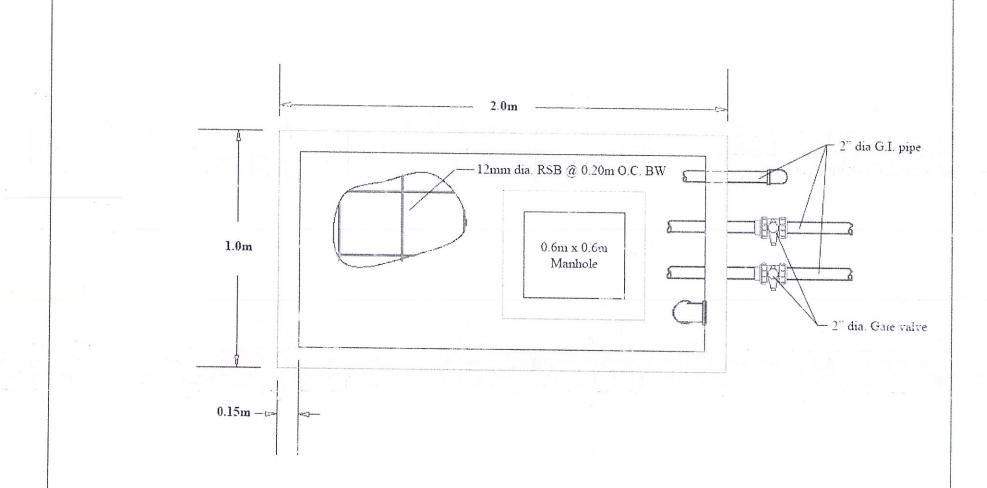


DETAIL OF MANHOLE

Scale 1:10

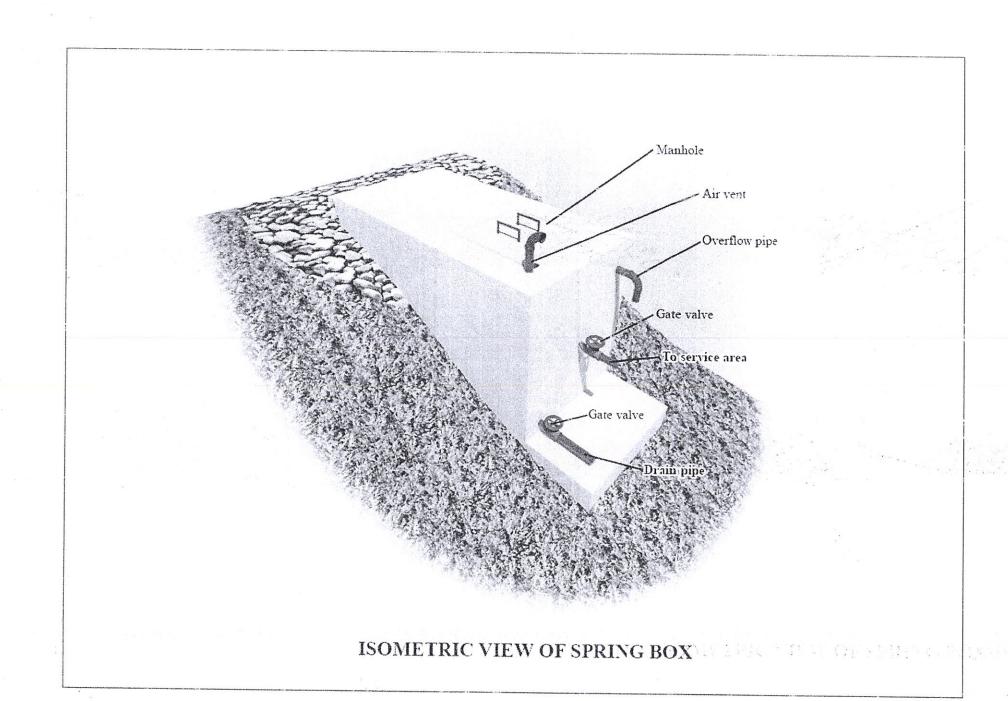


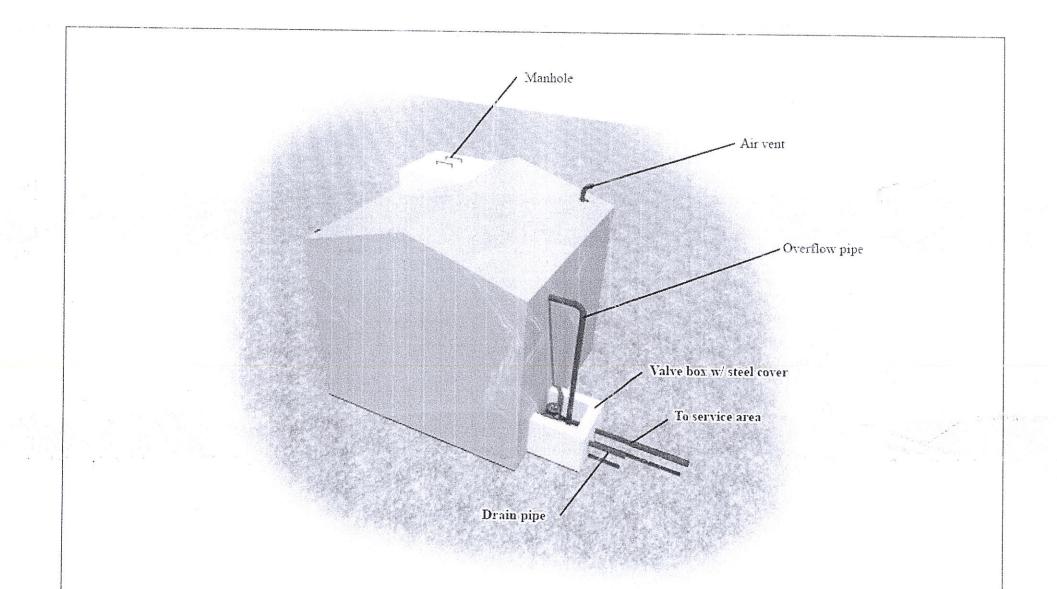
SIDE VIEW OF SPRING BOX NOT TO SCALE



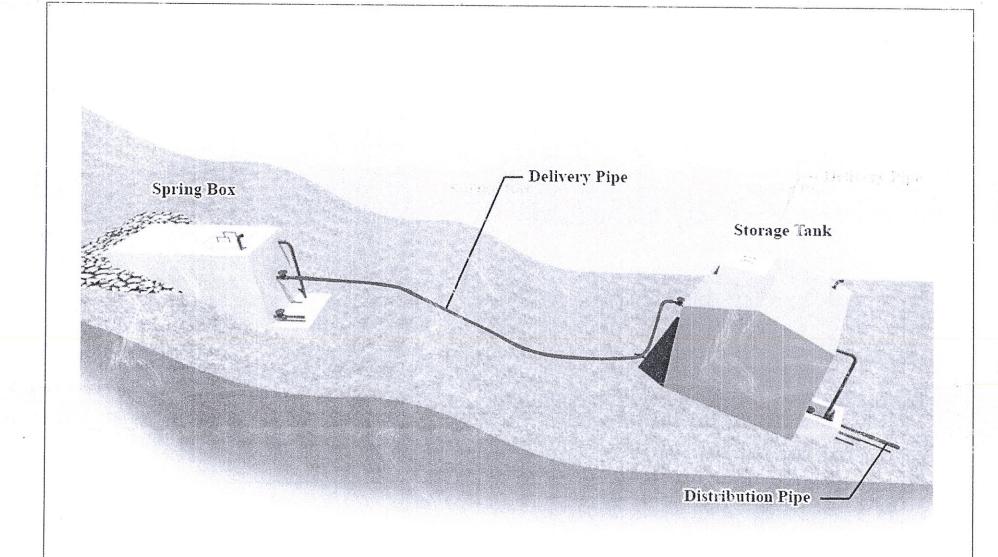
TOP VIEW OF SPRING BOX

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.

PROGRAM OF WORKS

GENERAL INFORMATION

Name of Project

: Spring Development Project

Description

: Construction of Spring Box and Storage Tank

Crops Planted

: Lowland Vegetables

Discharge from Spring : 1.5 liters per second

Designed Service Area : 1 hectare

Starage Tank Capacity

: 4 Cu.M. of Water

tem No	Description	%	Unit	Qty	Unit Cost	Total Amount
I	EXCAVATION	0.80%	cu m	10	170.00	1,700.00
11	BACKFILL	0.80%	cu m	5	340.00	1,700.00
Ш	INSTALLATION OF DELIVERY PIPE	22.90%	L. M.	180	270.83	48,750.00
IV	CONSTRUCTION OF SPRING BOX AND STORAGE TANK (4 cu.m. Cap.)	55.7 <mark>5</mark> %	lot	1	118,670.00	118,670.00
V	INSTALLATION OF DISTRIBUTION PIPES	19.76%	lot	1	42,060.00	42,060.00
			1110		TOTAL	212,880,00

EREAKDOWN OF ITEMS

A. Direct Cost	Amount	Percentage
1. Materials	179,160.00	80.38%
2. Hauling of Materials	10,000.00	4.49%
3. Labor	33,720.00	15.13%
TOTAL	222,880.00	100.00%

B. Indirect Cost	Amount	Percentage
1. Overhead, Contengencies & Miscellaneous (O.C.M.)	2 1 11 11 11 11 12 12	
(15% of DC)	33,432.00	15.00%
2. Profit (10% of DC)	22,288.00	10.00%
3. VAT (5% of DC, OCM & Propit)	13,930.00	6.25%
TOTAL	69,650.00	31.25%

TOTAL PROJECT COST (A + B)

Say

292,530.00 Php293,000.00

PROJECT COST PER CU.M. STORAGE CAPACITY

Php293,000.00 Php73,250.00

Note:

For Direct Cost above 5M, OCM & Profit should be 12% & 8% of EDC, respectively

Source: Bureau of Soils and Water Management

Item No. I- EXCAVATION	٧			Est. Quantity	10 Cu.m.
LABOR Manpower Description	7	Quantity	Duration	Rate/Day	Amount
Foreman	72	1	 	1 400.00	400.0
Common Laborer				260.00	1,300.0
				Sub-Total	1,700.0
			Total Cost	of Item	1,700.00
	3		Unit Cost	P/Cu.m.	170.00
Item No. II - BACKFILL				Est. Quantity	5 Cu.m.
LABOR	τ'		I	T_ /_ T	
Manpower Description		Quantity	Duration	Rate/Day	Amount
Foreman		1		 	400.0
Common Laborer		5	1		1,300.0
			L	Sub-Total	1,700.0
			Total Cost	of Item	1,700.00
in der 1a december 1 - 1 1a december 1 - 1 1a december 1 - 1			Total Cost of Unit Cost	of Item P/Cu.m.	1,700.00 340.00
TO STORAGE TANK	ON OF DELIVE	RY PIPE FROM S	Unit Cost	T	
TO STORAGE TANK 1. MATERIALS	ON OF DELIVE		Unit Cost	P/Cu.m.	340.00 180 L.M.
TO STORAGE TANK 1. MATERIALS Materials Description		Quantity	Unit Cost PRING BOX Unit	P/Cu.m. Est. Quantity Unit Coss	340.00 180 L.M. Amount
TO STORAGE TANK 1. MATERIALS Materials Description Teflone Tape (1"x390") (Quantity 5	Unit Cost PRING BOX Unit pc	P/Cu.m. Est. Quantity Unit Cost 80.00	340.00 180 L.M. Amount 400.00
TO STORAGE TANK 1. MATERIALS Materials Description Teflone Tape (1"x390") (HDPE Pipe 2" dia SDR 11	US Brand)	Quantity 5	Unit Cost PRING BOX Unit pc L. M.	Est. Quantity Unit Cost 80.00 230.00	340.00 180 L.M. Amount 400.00 41,400.00
TO STORAGE TANK 1. MATERIALS Materials Description Teflone Tape (1"x390") (HDPE Pipe 2" dia SDR 11	US Brand)	Quantity 5	Unit Cost PRING BOX Unit pc L. M.	P/Cu.m. Est. Quantity Unit Cost 80.00	340.00 180 L.M. Amount 400.00
TO STORAGE TANK 1. MATERIALS Materials Description Teflone Tape (1"x390") (HDPE Pipe 2" dia SDR 11 Compression Coupling 2	US Brand)	Quantity 5	Unit Cost PRING BOX Unit pc L. M. pc	Est. Quantity Unit Cost 80.00 230.00	340.00 180 L.M. Amount 400.00 41,400.00 2,850.00
TO STORAGE TANK 1. MATERIALS Materials Description Teflone Tape (1"x390") (HDPE Pipe 2" dia SDR 11 Compression Coupling 2	US Brand)	Quantity 5	Unit Cost PRING BOX Unit pc L. M. pc	Est. Quantity Unit Cost 80.00 230.00	340.00 180 L.M. Amount 400.00 41,400.00 2,850.00
TO STORAGE TANK 1. MATERIALS Materials Description Teflone Tape (1"x390") (HDPE Pipe 2" dia SDR 11 Compression Coupling 2 2. LABOR Manpower Description	US Brand)	Quantity 5 180	Unit Cost Unit pc L. M. pc Sub-Total	P/Cu.m. Est. Quantity Unit Cost 80.00 230.00 950.00 Rate/Day	340.00 180 L.M. Amount 400.00 41,400.00 2,850.00 44,650.00 Amount 800.00
TO STORAGE TANK 1. MATERIALS Materials Description Teflone Tape (1"x390") (HDPE Pipe 2" dia SDR 11 Compression Coupling 2 2. LABOR Manpower Description Foreman	US Brand) " dia	Quantity 5 180 3 Quantity 1	Unit Cost Unit pc L. M. pc Sub-Total	P/Cu.m. Est. Quantity Unit Cost 80.00 230.00 950.00 Rate/Day 400.00	340.00 180 L.M. Amount 400.00 41,400.00 2,850.00 44,650.00 Amount 800.00 700.00
TO STORAGE TANK 1. MATERIALS Materials Description Teflone Tape (1"x390") (HDPE Pipe 2" dia SDR 11 Compression Coupling 2 2. LABOR Manpower Description Foreman Skilled Worker (Pipefitte	US Brand) " dia	Quantity 5 180 3	Unit Cost PRING BOX Unit pc L. M. pc Sub-Total Duration 2	P/Cu.m. Est. Quantity Unit Cost 80.00 230.00 950.00 Rate/Day 400.00 350.00	340.00 180 L.M. Amount 400.00 41,400.00 2,850.00 44,650.00 Amount 800.00 700.00
TO STORAGE TANK 1. MATERIALS Materials Description Teflone Tape (1"x390") (HDPE Pipe 2" dia SDR 11 Compression Coupling 2 2. LABOR Manpower Description Foreman Skilled Worker (Pipefitte	US Brand) " dia	Quantity 5 180 3 Quantity 1	Unit Cost PRING BOX Unit pc L. M. pc Sub-Total Duration 2	P/Cu.m. Est. Quantity Unit Cost 80.00 230.00 950.00 Rate/Day 400.00 350.00	340.00 Amount 400.00 41,400.00 2,850.00 44,650.00 Amount 800.00 700.00 2,600.00
Item No. III - INSTALLATI TO STORAGE TANK 1. MATERIALS Materials Description Teflone Tape (1"x390") (HDPE Pipe 2" dia SDR 11 Compression Coupling 2 2. LABOR Manpower Description Foreman Skilled Worker (Pipefitte	US Brand) " dia	Quantity 5 180 3 Quantity 1	Unit Cost PRING BOX Unit pc L. M. pc Sub-Total Duration 2	P/Cu.m. Est. Quantity Unit Cost 80.00 230.00 950.00 Rate/Day 400.00 350.00 260.00 Sub-Total	340.00 180 L.M. Amount 400.00 41,400.00 2,850.00 44,650.00 Amount 800.00

BOX AND STORAGE TANK (1.7m x 1.7m x			antite ekonominat tarena italiera zenereta ekonomia haren. Bereko artika di ekonomiaka artika	
1.5m, inside dimension)				1 Lot
1. MATERIALS				
Materials Description	Quantity	Unit	Unit Cost	Amount
Portland Cement		bag	280.00	18,200.00
Sand Screened		cu m	1,000.00	4,000.00
Gravel 3/4		cu m	1,200.00	8,400.00
16 mm dia. X 6.0 m Rebars		рс	350.00	5,250.00
12 mm dia. X 6.0 m Rebars		рс	220.00	14,740.00
10 mm dia, X 6.0 m Rebars	+	рс	175.00	2,100.00
Tie wire gauge # 16		kg	80,00	640.00
Sahara		pack	45.00	1,800.00
Gate Valve (brass) 2" dia sched 40		рс	2,500.00	12,500.00
G.I. Elbow 90° 2" dia sched 40	-	рс	200.00	1,200.00
G.I. Pipe schedule 40 2" dia		рс	2,800.00	5,600.00
2"Ø Universal Transition Fitting/Joiner		рс	500.00	1,000.00
2"Ø-1"Ø Universal Transition Fitting/Join		pc :	300.00	300.00
2"Ø GI Tee		рс	300.00	300.00
Forms and Scaffolding	 	lot	20,000.00	20,000.00
Forms and Scarfolding	<u>_</u>	101	Sub-Total	96,030.00
			Sub-retail	30,030.00
2. LABOR				
Manpower Description	Quantity	Duration	Rate/Day	Amount
Foreman	1	8		3,200.00
Skilled Worker	1	8		2,800.00
Laborer	8	8		16,640.00
			Sub-Total	22,640.00
			- A	
		Total Cost o	of Item	118,670.00
) [Unit Cost	P/Lot	118,670.00
	- 103		Territoria de la companya della companya della companya de la companya della comp	
Item No. V - INSTALLATION OF DISTRIBUT SERVICE AREA 1. MATERIALS	ionaines fr	OM STORAG	БЕ ТАВК ТО	1 Lot
Materials Description	Quantity	Unit	Unit Cost	Amount
PE Pipes 1' dia (60m) SDR 17		pcs	4,500.00	36,000.00
Compression Coupling 1" dia		pcs	260.00	2,080.00
Teflone Tape (1"x390") (US Brand)		pcs	80.00	400.00
			Sub-Total	38,480.00
	OWEN THE PROPERTY OF THE PARTY			
2. LABOR		3.7		
Manpower Description	Quantity	Duration	Rate/Day	Amount
Foreman	1	2	400.00	800.00
Skilled Worker	1	2	350.00	700.00
aborer	4	2	260.00	2,080.00
hare,			Sub-Total	3,580.00

	[Total Cost o	fitem	42,060.00

Materials Description	in the	Quantity	Unit	Unit Cost	Amount
Teflone Tape (1"x390") (US	Brand)	5	рс	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
	Y and the		<u> </u>		
2. LABOR					
Manpower Description		Quantity	Duration	Rate/Day	Amount
Foreman		1	2 3006	400.00	800.00
Skilled Worker (Pipefitter)		1	2	350.00	700.00
Laborer/Helper		5	2	260.00	2,600.00
944 7.5			Sub-Total	1.112	
	71/15			1	4,100.00
5-4 E.			Total Cost of Item		48,750.00
			Unit Cost	P/L.M.	40,730.00
A. A. A. A. Marie			Jin Cost		270.83
The same and the same are a same and the same and the same are a same as a same and the same are a same as a same as a same are a same as a same are a same as a same are a same			3.45.41		
Item No. IV - CONSTRUCTOR BOX AND STORE (1.7m x 1.7m x 1.5m, inside di	AGE TANK	,			1 Lot
1. MATERIALS			15 (44.5)	T. S. Li	
Materials Description		Quantity	Unit	Unit Cost	Amount
Portland Cement	6.5	65	bag	280.00	18,200.00
Sand Screened	AL TOTAL	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	100	8	kg	80.00	640.00
Sahara		40	pack	45.00	1,800.00

SPRING DEVELOPMENT PR	OJECT		-			
	9		1		T	
Bill of Materials and Detailed (Cost Estima	ites				
		1	T		T	
Item No. I- EXCAVATION				Est. Quantity	10	Cu.m
LABOR					1	
Man power Description		Quantity	Duration	Rate/Day	Amo	unt
Foreman		1	1	400.00	400.0	0
Common Laborer		5	1	260.00	1,300	.00
· ty · ·			Sub-Tetal	2.74	1,700	
}			A3554	ti.		
			Total Cost of Item	i-	1,700	.00
her t	Park.		Unit Cost	P/Cu.m.	170.0	0
Item No. II - BACKFILL	radio a mo			Est. Quantity	5	Cu.m
LABOR						
Manpower Description		Quantity	Duration	Rate/Day	Amo	unt
Foreman		1	1	400.00	400.0	0
Common Laborer		5	1	260.00	1,300	.00
(23 · 12 ·			Sub-Total		1,700	.00
	V.		B	- 431		
			Total Cost of Item	D/C	1,700	.00
4			Unit Cost	P/Cu.m.	340.0	0
			<u>i</u>			
	OF DELI	VERY PIPE	FROM SPRING	Est. Quantity	180	L.M.
Item No. III - INSTALLATION BOX TO STORAGE TANK 1. MATERIALS	OF DELI	VERY PIPE	FROM SPRING	Est. Quantity	180	L.M.

Gate Valve (brass) 2" dia sched 40	5	pc	2,500.00	12,500.00
G.I. Elbow 90° 2" dia sched 40	6	pe	200.00	1,200.00
G.I. Pipe schedule 40 2" dia	2	рс	2,800.00	5,600.00
2"Ø Universal Transition Fitting/Joiner	2	рс	500.00	1,000.00
2"Ø -1"Ø Universal Transition Fitting/Joiner	1	рс	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
		-1-1-1		
2. LABOR			24 2	
Man power 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
			- 57,5	
West for		Total Cost of		110 (70 00
		Item Unit Cost	P/Lot	118,670.00
		Omi Cost	T/LUt	118,670.00
Item No. V - INSTALLATION OF DIST TO SERVICE AREA	RIBUTION	LINES FROM STO	DRAGE TABK	1 Let
1. MATERIALS		-	4	ĺ
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
3.02.0		Sub-Total		38,480.00
			24.5	
2. LABOR				
Manpower Description	Quantity	Duration	Rate/Day	Amount

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
(14), 주도 -		Sub-Total		3,580.00
* 0.		Total Cost of Item		42,060.00
		Unit Cost	P/Lot	42,060.90

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 reinferced 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. TAYAYO, CESO IV