Proposed Roads

All weather gravel road is to be provided along the embankment of main canals, laterals and sub-laterals at an intensity of about 20 meters of 0 & M roads for each hectare of service area based on the following criteria.

- 1. When a small canal runs parallel to an existing road within a center to center distance of 40 meters; the road embankment may be omitted.
- 2. Generally, the road embankment shall be placed at the service area except in existing canals where a road is already existing along the canal embankment in which case, the location of the existing road shall be maintained.
- 3. When both sides of the canal is serviced, the road shall be placed at the wider embankment of the existing canal.
- 4. If possible maintain operation road along same side of the canal from headgate to end to avoid vehicle/equipment switching from left to right embankment or vice versa.
- 5. Generally, the canal operating roads shall terminate at the furthest turnout of a canal. However, when a canal terminates near an existing road or another canal, a connecting road may be provided.
- 6. Bridges are to be provided along the 0 & M roads parallel with siphons where concrete pipe or box culverts are not économical. Bridges most commonly used are reinforced concrete deck girder (RCDG) type with 3.50 meter roadway width and 0.46 meter side walk on both sides.
- Proposed Road Length
 Proposed road length are as follows;

	Appendi Pago	<u>x 40+12</u> 2
Table 4D-9. List of Proposed Acc		
	ess & Service Roads	
a) Service Roads		
1) Type A along the Main Canal Diversion weir to Hdgt, Lat. F	भारता वर्षक्ष । वर्षका प्रमुख्य १ वर्षको वर्षका चित्रका प्रमुख्य	(km)
Diversion weir to Hdgt, Lat. P	left side	8.580
Hogt, Lat. Hoto Katipunan and hor Mahayag Provincial Road		
Katipunan Bo. Rd. to Dagohoy - San Miguel Natl. Road	right side	11.180
Mahayag Natl. Road to Malitbog. Natl. Road		
Ged 3 No. 2 To. Sub-total	को प्राप्त विकास दिन है। देखाली विकास किया है। इस स्टब्स	22.900
2) Type A along the Lateral Canal		
Lateral C-3 Hdgt. Lat. C-3 to End Check	right side	2.100
Laeral N Hdgt. Lat. N-3 to Hdgt. Lat. N	left side	
Lateral N-4 Hdgt. N-4 to Hdgt. N-4a	left side	and the first of the second
Lateral N-4a Hdgt, Lat. N-4a to End Check	left side	1.100
Sub-total		4.700
3) Type B along the Lateral Canal		
Hdgt. Lat. A to End Check	right side	
Datetar D.		
Estaca-Suba Bo. Rd. to End Check		
Lateral C Bagumbayan-Caluasan Prov. Road	The second of the second	2.790
	Figure 31de	
Lateral C-l Hdgt. Lat. C-l to Hdgt. Lat. C-l Hdgt. Lat. C-la to End Check		0.7110
Lateral C-4b	Parales (1986), histo	
Hdgt. Lat. C-4b to End Check	医二氯甲基甲基甲基甲基甲基甲基甲基甲基甲基甲基甲基甲基甲基甲基甲基甲基甲基甲基甲基	3-8604 Miles (1-12) (1-12)

	Appendix 40-12 Page 3	
Lateral C-4 to End Check	left side 2.380	
Lateral C-5 Hdgt. Lat. C-5 to Hdgt. Lat. C-5b ⁻¹ Hdgt. Dat. C-5b to End Check Lat. C-5 (3)	left side 72.090	
Lateral C-5b Hdgt, Lat: C-5b to End Check	left side 2.640	
Lateral C-6 Hdgt, Lat. C-6	right side 2.060	
Lateral C-7 Hdgt. Lat: C-7 to End Check	left side von 2.100	
불학자를 하고 말을 받는데 그들을 뿐만 하는데 하나 없는	left side 1.840	
Hdgt, Lat, E to End Check	right side 3.260	
Lateral F Hdgt. Lat. F to End Check	right side 1.900	
Lateral F-1 Hdgt, Lat. F-1 to End Check		
Lateral H Hdgt. Lat. H to End Check	right side ,1.070	
Lateral I Katipunan-Mahayag Prov. Road to End Check	right side 1.630	
Lateral K Hdgt. Lat. K to End Check	right side 1.750	
Lateral L Hdgt. Lat. L to End Check	right side 3.720	
Lateral N Hdgt. Lat. N to Hdgt. Nat. N-3 and Hdgt. Lat. N-4 to End Check	left side 5.260	
Hdgt. Lat. N-2 to End Check	right side 2.020	
Lateral N-4 Hdgt. Lat. N-4a to End Check	left side 0.960	
Lateral O Hdgt. Lat. O to End Check	left side 1.340	

	Append1 Page	х 4D+12 ч
Lateral P Hdgt. Lat. P to End Check,		1.800
Lateral Q Hdgt, Lat. Q to End Check r		
Lateral Q-1 Hdgt. Lat. Q-1 to End Check,		
Lateral S Hdgt. Lat. S to Hdgt. Lat. S-1 1		
Lateral S-1 Rdgt. Lat. S-1 to End Check	eft side	1.650
Main Drainage Canal l National Road to Lat. D.C12		9.500
Sub-total		66.400
Total		94.000
[4] Harris (1945) - 1946 (1946) - 1946 (1946) - 1946 (1946) - 1946 (1946) - 1946 (1946) - 1946 (1946)		化自动线 化二氯化物 医二氯化
(b) Access Roads		
1) Type A Improvement of Provincial road		
1) Type A Improvement of Provincial road		10.000
1) Type A Improvement of Provincial road		
1) Type A Improvement of Provincial road Katipunan-Mahayag		7.700
1) Type A Improvement of Provincial road Katipunan-Mahayag Bagumbayan-Caluasan Sub-total		7.700
1) Type A Improvement of Provincial road Katipunan-Mahayag Bagumbayan-Caluasan Sub-total 2) Type A New construction Lateral C End Check Lat. C-3 to End Check Lat. N-44		7.700
1) Type A Improvement of Provincial road Katipunan-Mahayag Bagumbayan-Caluasan Sub-total 2) Type A New construction Lateral C		7.700 17.700
1) Type A Improvement of Provincial road Katipunan-Mahayag Bagumbayan-Caluasan Sub-total 2) Type A New construction Lateral C End Check Lat. C-3 to End Check Lat. N-44		7.700 17.700 0.500
1) Type A Improvement of Provincial road Katipunan-Mahayag Bagumbayan-Caluasan Sub-total 2) Type A New construction Lateral C End Check Lat. C-3 to End Check Lat. N-44 Sub-total 3) Type B Improvement of barrio road		7.700 17.700 0.500 0.500
1) Type A Improvement of Provincial road Katipunan-Mahayag Bagumbayan-Caluasan Sub-total 2) Type A New construction Lateral C End Check Lat. C-3 to End Check Lat. N-46 Sub-total		7.700 17.700 0.500
1) Type A Improvement of Provincial road Katipunan-Mahayag Bagumbayan-Caluasan Sub-total 2) Type A New construction Lateral C End Check Lat. C-3 to End Check Lat. N-40 Sub-total 3) Type B Improvement of barrio road Natl. Highway - Main Canal		7.700 17.700 0.500 0.500
1) Type A Improvement of Provincial road Katipunan-Mahayag Bagumbayan-Caluasan Sub-total 2) Type A New construction Lateral C End Check Lat. C-3 to End Check Lat. N-44 Sub-total 3) Type B Improvement of barrio road Natl. Highway - Main Canal Estaca - Suba, Estaca		7.700 17.700 0.500 0.500 0.400 2.000
1) Type A Improvement of Provincial road Katipunan-Mahayag Bagumbayan-Caluasan Sub-total 2) Type A New construction Lateral C End Check Lat. C-3 to End Check Lat. N-44 Sub-total 3) Type B Improvement of barrio road Natl. Highway - Main Canal Estaca - Suba, Estaca Sub-total		7.700 17.700 0.500 0.500 0.400 2.000
1) Type A Improvement of Provincial road Katipunan-Mahayag Bagumbayan-Caluasan Sub-total 2) Type A New construction Lateral C End Check Lat. C-3 to End Check Lat. N-4 Sub-total 3) Type B Improvement of barrio road Natl. Highway - Main Canal Estaca - Suba, Estaca Sub-total 4) Type B New construction Lateral A		7.700 17.700 0.500 0.500 2.000 2.000

		Appendix 4D-12 Page 5	
	(홍) 하는 경기를 보는 사람이 가능하는 것이 되었다. 그런 사람들이 되었다. 그렇게 되었다. (조) 그렇게 되는 일본 (1) 그 교육에 (1) 그를 들어 있다. (조) 그를 모든 것이 되었다.		
	Lateral C+5b		
	End Check to Natl. Road	0.210	
	Lateral C-6 End Check to Lat. C-5b Service Road	0.200	
	Lateral D End Check Lat. D to End Check Lat. C-a	0.360	
	Lateral H End Check Lat, H to End Check Lat. F	0.400	
	Lateral K End Check to Provincial Road	0,090	
	Lateral L End Check Lat. L to End Check Lat. E	0.650	
	Lateral N		
	End Check Lat. N to End Check Lat. Q-1	0.320	
	Lateral N-2 End Check Lat. N-2 to End Check Lat. O	0.250	
Altan ar	Lateral P		
	End Check Lateral P to Prov. Road	0.080	
		0.080	
	End Check Lateral P to Prov. Road Lateral Q End Check to Service Road Lat. S-1 Lateral Q-1	0.080	
	End Check Lateral P to Prov. Road Lateral Q End Check to Service Road Lat. S-1 Lateral Q-1 End Check Lat. Q-1 to End Check Lat. L-5	0.080 0.300 0.400	
	End Check Lateral P to Prov. Road Lateral Q End Check to Service Road Lat. S-1 Lateral Q-1 End Check Lat. Q-1 to End Check Lat. L-5 Sub-total	0.080 0.300 0.400	
	End Check Lateral P to Prov. Road Lateral Q End Check to Service Road Lat. S-1 Lateral Q-1 End Check Lat. Q-1 to End Check Lat. L-5 Sub-total Total	0.080 0.300 0.400 <u>3.700</u> 24.300	
	End Check Lateral P to Prov. Road Lateral Q End Check to Service Road Lat. S-1 Lateral Q-1 End Check Lat. Q-1 to End Check Lat. L-5 Sub-total Total	0.080 0.300 0.400 <u>3.700</u> 24.300	
	End Check Lateral P to Prov. Road Lateral Q End Check to Service Road Lat. S-1 Lateral Q-1 End Check Lat. Q-1 to End Check Lat. L-5 Sub-total Total Grand Total	0.080 0.300 0.400 <u>3.700</u> 24.300	
	End Check Lateral P to Prov. Road Lateral Q End Check to Service Road Lat. S-1 Lateral Q-1 End Check Lat. Q-1 to End Check Lat. L-5 Sub-total Total Grand Total	0.080 0.400 3.700 24.300	
	End Check Lateral P to Prov. Road Lateral Q End Check to Service Road Lat. S-1 Lateral Q-1 End Check Lat. Q-1 to End Check Lat. L-5 Sub-total Total Grand Total	0.080 0.400 3.700 24.300	
	End Check Lateral P to Prov. Road Lateral Q End Check to Service Road Lat. S-1 Lateral Q-1 End Check Lat. Q-1 to End Check Lat. L-5 Sub-total Total Grand Total	0.080 0.300 0.400 <u>3.700</u> 24.300	
	End Check Lateral P to Prov. Road Lateral Q End Check to Service Road Lat. S-1 Lateral Q-1 End Check Lat. Q-1 to End Check Lat. L-5 Sub-total Total Grand Total	0.080 0.400 3.700 24.300	
	End Check Lateral P to Prov. Road Lateral Q End Check to Service Road Lat. S-1 Lateral Q=1 End Check Lat. Q=1 to End Check Lat. L=5 Sub-total Total Grand Total	0.080 0.400 3.700 24.300	

Proposed On-farm Development

A. Comparison of Terminal Water Supply System

Generally, on-farm facilities in the flat area has no limitation factors about its alignment. However, in the steep slope area such as the project area which has the average land slope is about three percent, on-farm facilities should be carefully aligned. Because the construction cost will vary in accordance with increase of drop structures in the canal.

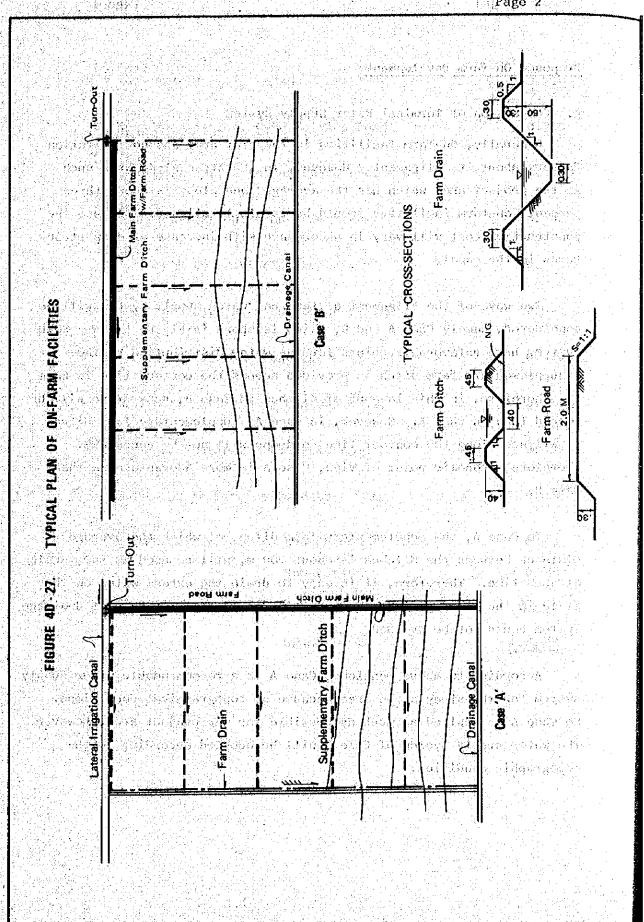
Two ways of the alignment as terminal water supply system will be considered, namely Case A and B, which is shown in Figure 4D+27. Both systems have unfavorable points for the water distribution system.

A supplementary farm ditch is provided across the contour line in Case B. Therefore, in this lay-out of ditches in Case B, many drops will be needed than in Case A. However, in Case A, supplementary farm ditch, is aligned along the contour line so drops will not be necessary.

Therefore, economic point of view, Case A is more adovantageous than Case B.

In Case A, the supplementary farm ditch, of which the average distance between the ditches is about 200 m, will be used as farm drain at same time. Therefore, it is easy to drain the excess water on the field in the flood period. However, in Case B the plot to plot drainage system could not be avoided.

According to above mentions, Case A is a recommendable water supply system for the steep slope area because of topographical conditions. So Case A is applied as much as possible for the project area, however the water supply system of Case B will be adopted according to the topographic condition.



- B. Land Terracing and Leveling was an in the standard from the sta
- 1. Physical and Economic Limitation for Terracing

There are certain minimum physical requirements which must be considered before attempting to terrace an area. If any one of such limitations exists, the terracing project should not be undertaken.

Once the decision is reached on the need of terracing a certain area, as a result of either population pressure, or for better use of land or for only erosion control purposes, the first consideration is the slope of the land.

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Experiments conducted in the Ambuklao Watershed in Benguet and experiences gained in other areas indicate that the maximum slope of land which can be considered for terracing is fifty percent (or 26 degrees). However, the width of plot become very narrow for the operation of farm machinery in the project. If the terracing has a purpose for only errosion control, the land could be terraced up to above percentage. But, the aim of terracing in the project is not only the errosion control but also the farm land development to produce paddy rice, so that the width of at least 10 m will be needed in the plot for effective operation of farm machinery. Therefore, the maximum slope of area is determined at three percent. The land having the slope up to this percentage can be terraced provided that 1) there is sufficient soil depth for terracing, 2) the height of riser does not exceed the maximum permissible height, and 3) there is enough width on the leveled area of terraces.

Second limitation is the soil condition of the area. Terraces should not be constructed on shallow soils of less than 30 cm and on too much stony soils.

^{1/} devided from Hand Book of Bench Terracing, prepared by Bureau of Soil.

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Third limitation is the topography of the land to be terraced. For terracing purposes, areas with extremely unfavorable topography (too many ridges, gullies, depressions) even though the general slope of the land may be favorable, should be avoided.

Fourth limitation is the sub-soil and geological condition of the area. If many landslides are in evidence in or adjacent to the area due to geological conditions, terraces should not be constructed on such sites.

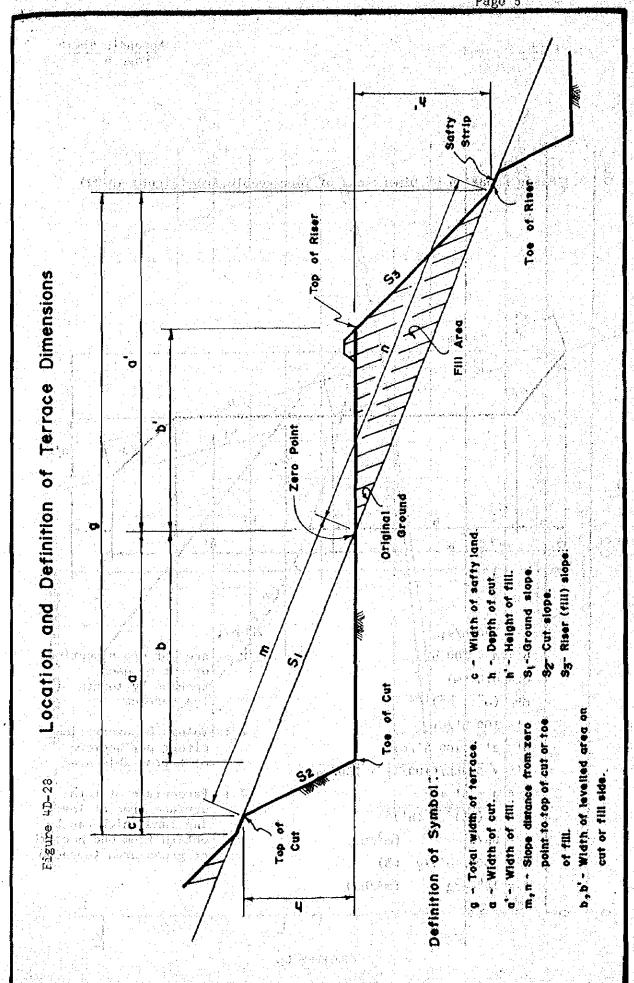
2. Dimension of Terraces

The maximum and minimum dimensions for the terracing would be based upon the following criteria;

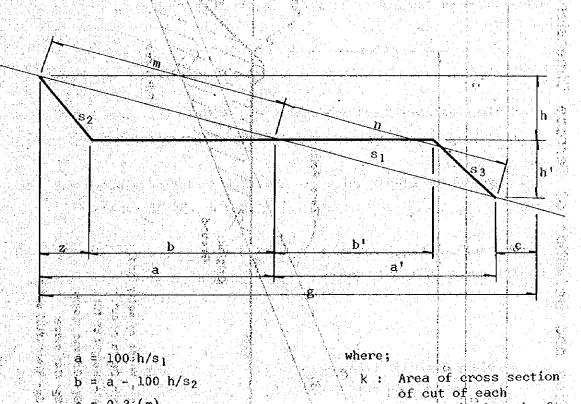
- (a) The maximum height of dike for terracing should not be oven 1.0 m. (See Figure 4D-28, h + h' \leq 1.0 m)
- (b) The minimum and maximum widths of terrace should be five meters and 30 meters, respectively; considering that farm mechanization will be introduced in the project. (See Figure 4D-28, W = b + b')
- (c) The riser slope for cut (S_2) and fill (S_3) required would be 1:1 depending on the stability of soils in the project area.
- (d) The maximum length of one plot of paddy field should no be over 100 meters long.

The construction cost of terracing would be shouldered by the farmers.

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Equation of Dimensions of Terraceable Area(Figure 4D-29)



$$m = (a^2 + b^2)^{1/2}$$

$$h' = \sqrt{0.9bh/(100/s_1 - 100/s_3)}$$

$$g = a + a' + c$$

$$g = a + a' + c$$

 $n = \sqrt{(a!)^2 + (h')^2}$

$$k = bb/2 \qquad (m^3/m)$$

$$g = a + a' + c$$

$$n = \sqrt{(a')^2 + (h')^2}$$

$$k = bh/2 \qquad (m^3/2)$$

$$J = 100(b+b')/g \qquad (%)$$

$$L = 10^{4}, k/g \qquad (m^3/2)$$

where;

- Area of cross section of cut of each terrace by length of
- the terrace Volume of excavation either per hectare of terraceable area
- : \ Parcentage of total surface area of leveling land which can be obtain from one hectare of gross area terraced

(%) adojs pue7

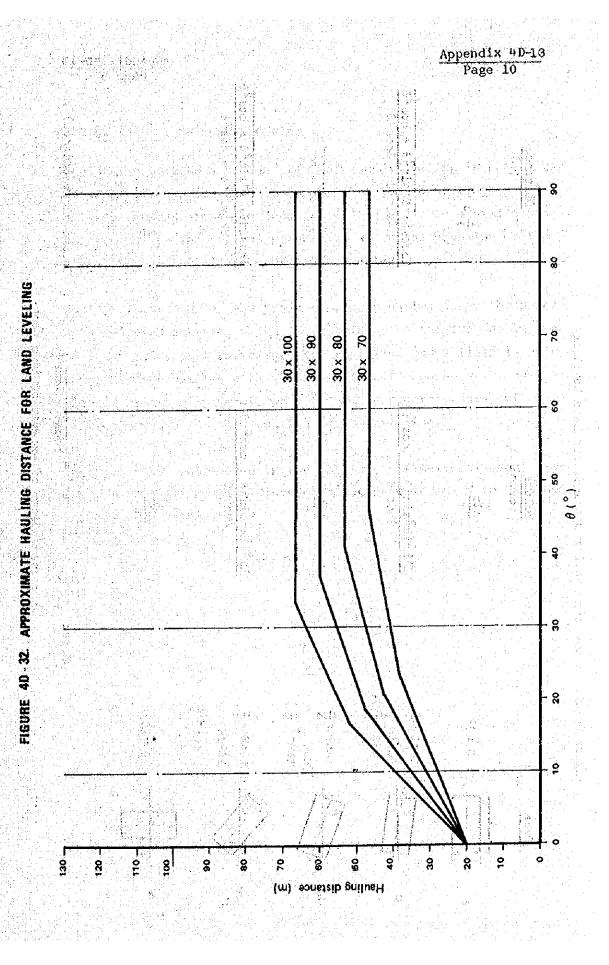
4. Hauling Distance of Earth Moving

The hauling distance of land terracing and leveling is calculated by the theoretic equation used in Japan. The length of plot to be reclaimed is located along the counter line in order to minimize the construction cost. The following table is shows the equation of the volume and the hauling distance of land leveling.

Typical land slope of the project area is estimated at three percent on a weighted average, which is calculated in the two sample areas. Therefore, width of plot for almost all reclaimed paddy field is able to give 30 m on an average with the type II mentioned above. The direction of length of plot of paddy field, in general, does not perfectly coincide with the direction of contour line.

Therefore, the value of Q in the table is estimated at about five degrees, and then the hauling distance could be calculated to be about 30 m. (refere to Figure 4D-32)

		$\frac{\theta + \cos^2 \theta}{3\cos^2 \theta}$		<u>θ + cos²θ</u> cos ² θ	Appendix Page (
Distance (m)	A NIO	2bcos0/ k*sin20 + cos k2sin20 + 3cos20	2 / 122 + 152 2	2kbsinev k ⁴ sin ² e 3k ² sin ² e + co	c/leo	Ground slope (degree)
P66		R)		***		1010t
for Land Levell		3008 ² 8)		$\frac{\cos^2\theta)}{\cos^2\theta}$		2h bcose + Asine excevation in
Volume (cu.m)	1 PASS	IXb ³ (K ² sin ² 0 + 24cos0	<u>h4b</u>	b ³ (3k ² sin ² 0 + c 24sin 0	€ 27 1	I = tani = ax. depth of
lume and hauli		All design of the second secon				where; $\lambda = \frac{2}{D}$
rigure +u-si. volume and Hauling	о П Ф	tan9 < 1 (05.9 < 1 (05.9 < 1 (05.0 < 1)	$\tan\theta = \frac{1}{k}$ $(\theta = \frac{1}{k})$ $\tan^{-1}\frac{1}{k})$	$tan\theta > \frac{1}{\lambda}$ $90^{\circ} \ge \theta > \frac{1}{\lambda}$ $tan^{-1} \frac{1}{\lambda}$	₹ •06 • •	
		削	61			



C. On-farm Facilities

1. Layout of On-farm Facilities

Layout of the on-farm facilities was planned based the selected two sample areas in the project area, of which survey has been carried out by NIA in 1977. One sample area (Area "A") is located on the area served by lateral irrigation canal of N-2 near Barrio San Isidro and the other sample area (Area "B") is located on the area served by lateral irrigation canal of B near Barrio Estaça. The land use of these sample areas are shown in Table 4D-10.

Basic conseption for layout of on-farm facilities are as follows:

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Charlet edgir

Farm ditches

- (a) The average distance between supplementary farm ditches in a rotation area is about 200 m,
- (b) Main and supplementary farm ditches should be located along tenant or lot boundaries and such location should be selected so that it can irrigate its service area at a minimum water surface in the farm ditch of 20 cm above the highest natural ground level in the area.
- (c) There should be one supplementary farm ditch for each rotation unit. However, a common supplementary farm ditch for two adjacent rotation units may be constructed depending upon the topography.
- (d) To have a permanent visual boundary between rotation units, the supplementary farm ditches should be located along sides of rotation units except when due to topography a farm ditch have to be located inside the rotation unit.

Farm drain the country and you to turing to take to the

Farm drains are to be provided at the lowest portion of the service area.

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是是在我们的情况和由于一种。

(unit: ha)

Farm road

Farm roads are to be provided along the main farm ditch when needed.

Turnout the borner thank the property of the contract of the c

J. P. P.

- The ideal location of a turnout is at the inlet of a check structure although in certain instances, when there is sufficient head and irrigable area is at the downstream side of the structure, it will be more economical to locate the turnout at the outlet of a road crossing provided with a check. internation of particular and a second of the second
- When turnout is necessary further upstream of a check structure, its operating head is to be based on a water surface elevation equal to the checking height of the downstream.

the appropriate the project of the project of the propriate propriate and the contract of the

Table 4D-10. Land Use within Sample Area

erania producera establistado Barros 1992 de la caractera establista	Sample	area "A"	Sample are	
Item	Present	Proposed	Jac 2 1	(oposea
Paddy field Rainfed	43	42 0	18	17
Irrigable 1/		92		. 81
Sub-total	43	134	18	98
Coconuts or bana area	.∂ ∀ 2 4 ⊜		ed him 2 2 to 2	3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
Grass land Others	122	224	106	18 ^{2/}
Residential area	pair frod 3 ur	nder 🥱 ve	production of the	. 0
Existing road	2	2 93/	0	847
Right of way	in the second	in when the Bishir	rgorio e X - Viladi .	
Sub-total	5	14	, \ . U	8
	real Balance	ाक्षराहरू होते स्टब्स् इ.स.च्या	(Bart Meischleurbert des Nachte	126
fotal		- 19th	$\frac{126}{2}$	126

1/ converted from grass land

u/ consist of right of way for on-farm facilities (4 ha) and riser area (4 ha)

^{2/} high land 3/ consist of right of way for on-farm facilities... (4 ha) and riser area (5 ha)

Table 4D-11. Land Slope Classification of Glassland

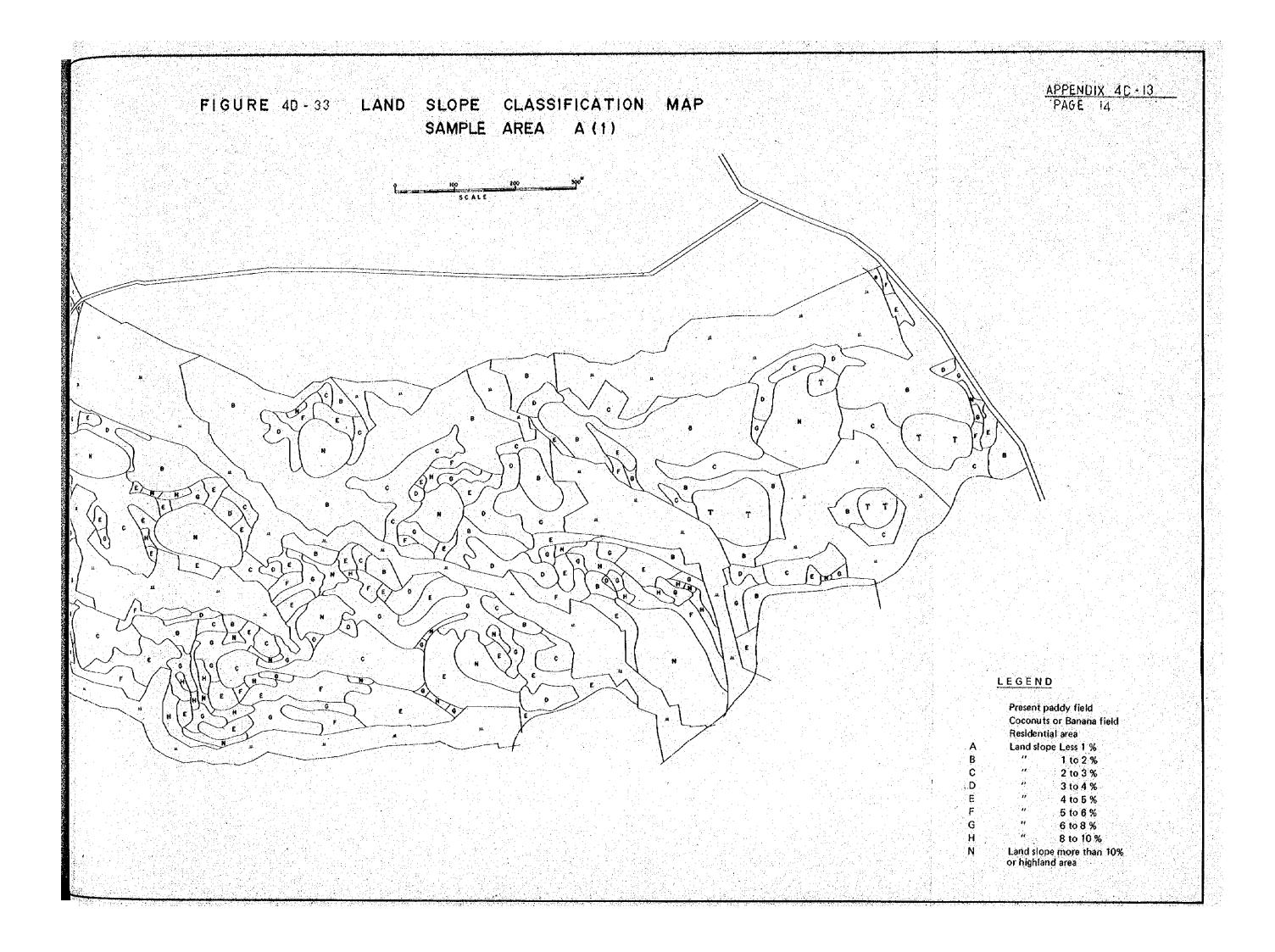
	Sample Are	a "A"	Sample A	rea "B"
<u>Item</u>	Present P	roposed	Present	Proposed
Less than 1%	7	6		
1 to 2%	32	29	20	18
2 to 3%	17	16	21	19
3 to 4%	12	11	19	17
4 to 5%	15	14	15	14
5 to 6%	6	6	6	6
6 to 8%	10	9	6	6
8 to 10%		1	1	1
More than 10%1	22		18	
Total	122	92	106	<u>81</u>

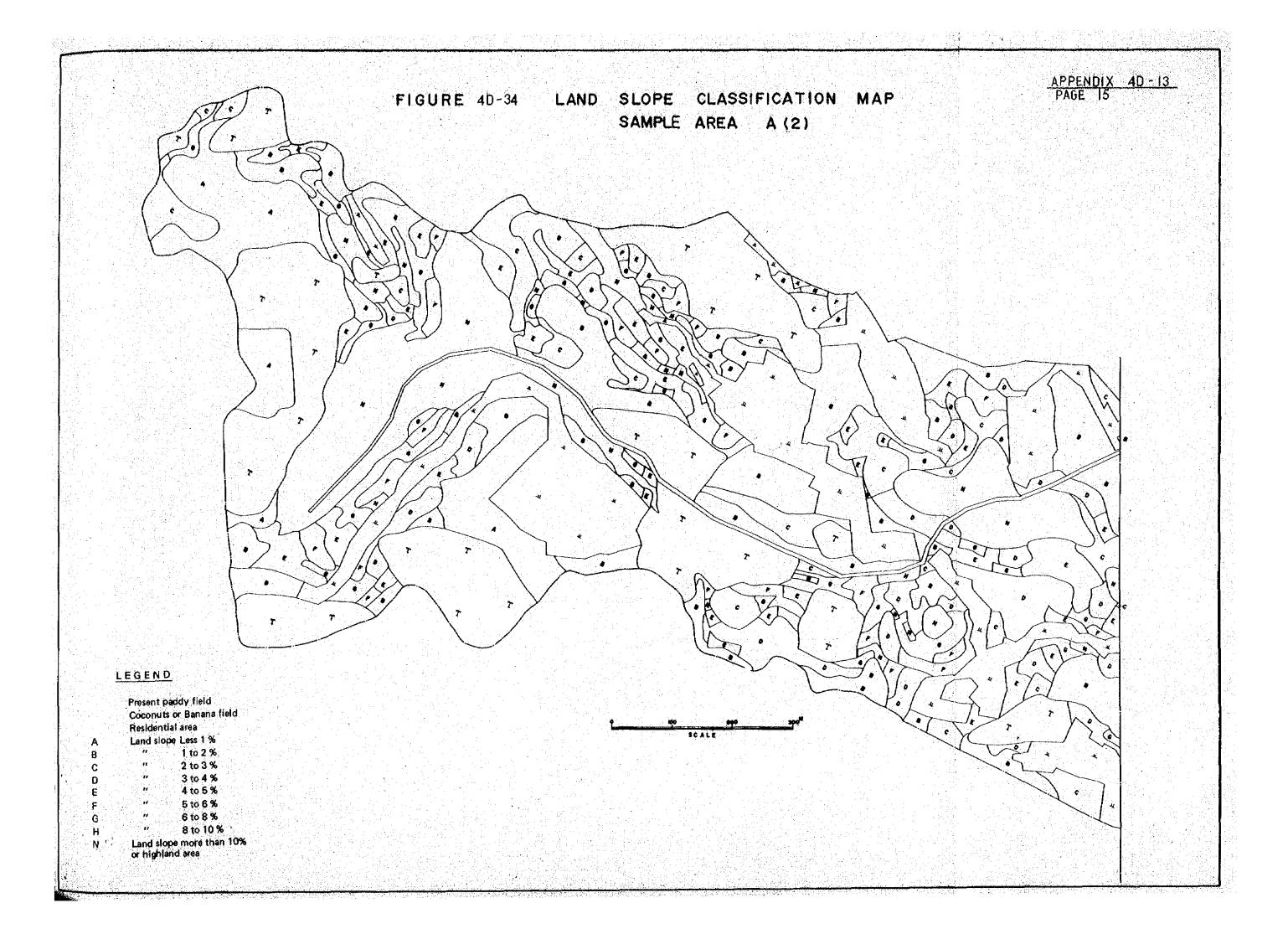
Note: 1/ including high land area estimated based on the land slope map of two Sample Areas (See Figure 4D-33 to 4D-35)

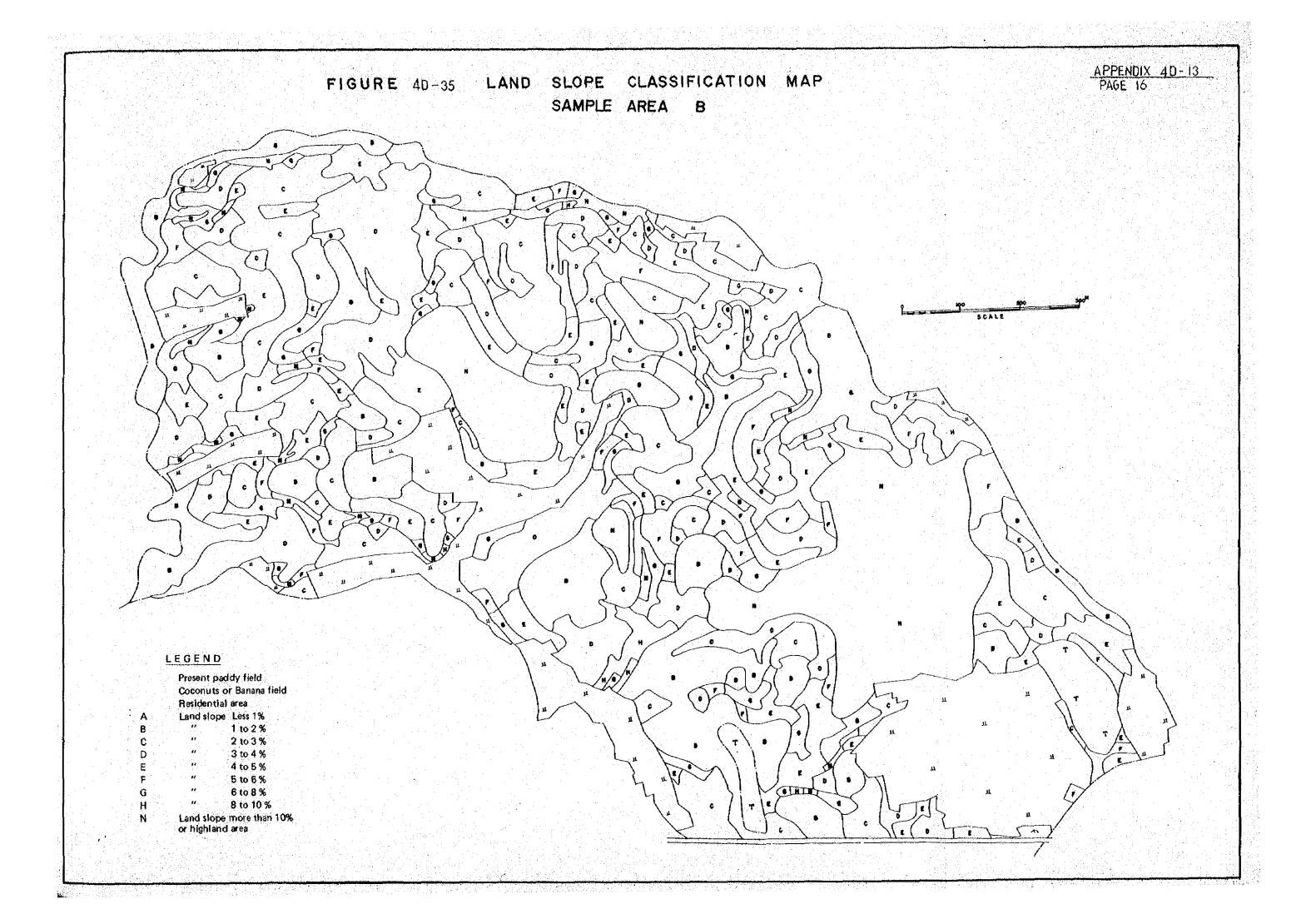
Table 4D-12. Area of Rotation Block in Sample Area (Unit:

(Unit: ha)

Rotation							
Block	<u> </u>	Rot	ation	Units			
No.	1	2	_3_	4	_5	Total	Remarks
Sample area	a "A"						
1	5.5	2.9	5.0	6.4	4.7	24.5	
2	2.1	8.7	7.4	5.0	5.0	28.2	할 수 없는 생각적
3	7.7	7.4	5,3	4.3	3.0	27.7	
4	10.1	6.5	3.7	5.0	9.3	34.6	
5	6.0	8.5	4.9	-		19.4	
Total						134.4	(say 134ha)
Sample area	'''B''		144				
1	5.2	5.2	5.5	5.1	5.6	26.6	
2	9.1	3.7	7.0	5.6	5.6	31.0	
3	2.9	3.6	3.7	3.6	3.5	17.3	
4	5.2	4.9	3.6	6.5	2.5	22.7	
Total						97.6	(say 98ha)







- 2. Oh-farm Facilities and Functions of the second of the s
- (a) Turnout Provided with a steel gate to control and regulate the

smolecular from the energy equal lead to the charge the leading and the charge between

(b) Measuring Device - Constant head orifice

A. C. St. W. S. P. Diplor, 19 A

- (c) Main Farm Ditch Conveys water from the turnout to the supplementary farm ditches.
- (d) Supplementary Farm Ditch Conveys water from the main farm ditch to the paddy in a rotation unit.
- (e) Division Box To check water from the main farm ditch and divert it to the supplementary farm ditch.
- (f) End Check To prevent escape of irrigation water in the supplementary farm ditch to the drainage ditch when it is needed in the paddies or to release irrigation water from same when not needed.
- (g) Farm Ditch Crossing Provide access of farm equipment from farm road to the paddies in a rotation area. This is to be installed only on main farm ditches. On supplementary farm ditches, equipment are allowed to cut across.
- (h) Farm Ditch Check and Drop In steep slopes, this is necessary to limit the flow of water in the frame ditch within the non-scouring velocity.
- (i) Farm Drain Drain the paddy field when necessary and to pass on surface runoff during floods.

(j) Farm Road - To operate division box and transport agricultural inputs and outputs.

The quantity of the proposed on-farm facilities is shown in following Table 4D-13 and 4D-14. These quantities were estimated based on the sample layout of the on-farm facilities.

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Facilities On-farm F of 0 Quantity Table 4D-13.

			ippendix 40-13 Page 19
its) Total	18 18 8 2 18 18 18 18 18 18 18 18 18 18 18 18 18	27 7 55 88 33 24 7 58 88 88 89	
ures (units Drop SFD2/ To	12 75 8 55 EV	T & & & &	
ed Structures 3/ Drop ing WFD-/ SF	8, 6, 6, 1, 7, 2	9 A 4 0 01	
Related A F.D.3/ ck Crossing	12 w w w t	й д д с у <u>г</u>	
sion End	ਜਿ.ਜਿ.ਜਿ.ਜਿ.ਐ! ਫ਼ਿਲਿਆ		
turn Division	[[] [] [] [] [] [] [] [] [] [6 6 6 6	
	23 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	242. - 1 778 1 178 1	(6.43) (4.3)
Farm Farm Farm Road	1,390 1,120 738 3,693		(30.8) (30.8) (m. ditch
Total	2,817 2,569 3,974 2,055 14,478	3,411 3,130 2,154 2,521 11,216	(110.7) m. ditch entary fa
Farm Ditch	2,094 1,590 2,097 2,789 1,518	2,411 2,277 1,376 2,136 8,197	178.8) (110.7) (30.8) 1/ Main farm ditch 2/ Supplementary farm ditch 3/ Farm ditch crossing
Far MFD1/ (m)	723 979 966 1,185 537	ဝ္ႏွင့္ ဆုု ဆုု ရေ	(31.9) (78.8) Note: 1/ Main: 2/ Supple 3/ Farm
Rotation Block No. MF (m Sample Area "A"	3 5 5 \$wb_total	Sample Area "B" 1 170 2 8 3 7 Sub-total 3,0 7	Intensity (m/ha)

Table #D-14. Proposed Le

Sub-total Total Drain 2,094 2,817 1,390 2,097 3,063 - 2,097 3,974 442 1,518 2,055 738 10,088 14,478 3,693 2,277 3,130 1,251 1,376 2,154 618 2,133 2,521 873 8,197 11,216 3,451	
가게 생활하는 것이 되었다. 그런 그는 그런 그는 그런	
Sub-total 2,094 1,590 2,097 2,097 2,097 2,097 2,097 1,518 10,088 2,277 2,277 2,277 2,277 8,197	
유일일 [21] 2일 시작 시작 보이면 큰 시작 시작 시작 시작 시	
325 348 267 267 790 1,730 405 330 4,78 4,78	- Peo
m Ditch 598 598 375 375 375 375 346 355 147 482	with farm road.
mentary Farm Ditch 3.30 598 468 477 440 375 692 345 692 345 654 654 1,795 363 355 316 147 443 482 1,528	length
Supplement nit. 2180 3 2180 482 550 482 5597 637 436 226 582 1,881 1,5	Figure in parenthesis shows the
Rotation unit 1 26 480 267 267 416 718 357 14639 1,639	in parenth
Main Farm Ditch 723 (293) 979 (-) 966 (-) 1,185 (-) 537 (-) 537 (-) 778 (778) 853 (-) 778 (778) 3,019 (1,198)	Note: Figure
Rotation Main No. Farm Di Sample Area "A" 1 723 (2 979 (4 1,185 (5 537 (Farm Di 1 2 956 (4 1,185 (5 537 (1 1,000 (2 853 (3 778 (4 388 (4 388 (4 388 (4 388 (4 388 (N.

1 parenthesis shows the length with farm road. in

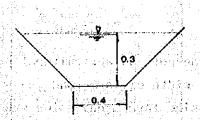
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3. Design Criteria

Farm Ditches

Design capacity of farm ditch is 1.39 lit/sec/ha. The permissible velocity in the canal should not be more than 1.0 m/s based on the soil texture. Manning Formula's roughness "no is 0.04 based on the NIA criteria. The maximum capacity of the farm ditch is calculated as follow;

equand differential est for in adults the state attained in fact, in a four field.



A = 0.21 sq.m
P = 1.249 m
R = 0.168

$$R^{2/3}$$
 = 0.305
Qmax = 0.210 cu.m/sec

Managary (1964年) 16 (1962) 第二次定理的复数

So that, when the water depth of the farm ditch is 30 cm, the maximum irrigable area served by the farm ditch is about 150 ha.

(0.210 cu.m/sec : 1.39 l/sec/ha : 150 ha)

The maximum longitudinal slope is as follow,

$$V = R^{2/3} \cdot I^{1/2} n$$
 $I = (\eta \cdot V/R^{2/3})^2$
 $I = (0.04 \times 1.0/0.305)^2 = 1.72 \times 10^{-2} = 1/58$

This farm ditch has a function of farm drain in Case "B", in which the maximum drainage area is estimated about 32 ha.

(0.210 cu.m/sec ÷ 6.6 l/sec/ha = 32 ha)

The area of the rotation unit is less than 11 ha so that the capacity of farm ditch is enough for irrigation and drainage when necessary.

Other dimensions of farm ditch are based on the NIA criteria, such as base width and side slope etc.

国金元为建设方面的大小公司

Farm Drain

The project area is mostly steep slope area, so that the excess water on the paddy field will be immediately drained to the down stream through the farm drain.

The high water level in flood period is determined as same as the ground of paddy field because it is no channel retarding. As the dimension of the cross section, the NIA criteria are adopted in consideration of the minimum construction size.

Farm Road

The farm road is also necessary to transport an agricultural products and input and output materials. The width of farm road is planned to be two meters, supposing small size farm machineries such as tractor (7 - 8 HP) can be passed.

भिन्ति । स्वर्वे क्षेत्रिके प्राप्ति के **स्वर्वे** किये के अस्त्री एक प्रकारक अनुकेश कर्ने देखेले के लेकारिक र

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																				Арр	end Pag	ix s I	[E-1]	
Currency (US\$ 1000)	(26)	(2,640)	(1,185)	(2,165)	(1224)	(398)	(328)	(169)	(7,463)	(863)	(89)	(203)	(426)	(633)	(773)	(179)	(10,608)	(1,591)	(12,199)	(6,212)	(18,411)			
Local	6T#	19,803	8,887	16,239	4,152	2.5/44	2,459	1,265	55,968	6,475	512	1,519	3,198	4,745	5,793	1,344	79,554	11,933	91,487	46,590	138,077	(42%)		
Currency (US\$ '000)	(24)	(2,569)	(1,575)	(568)	(211)	(+8)	(1,472)		(6,503)		(6,833)			(132)	(1,077)	(1,013)	(15,558)	(2,334)	(17,892)	(7,343)	(25,235)		ts:	
(P * 000)	183	19,264	11,814	4,262	L,583	629	11,040		48,775		51,250			666	8,081	7,599	116,698	17,505	134,203	55,070	189,273	(%85)	on equipmen	
(000, \$SD) ((80)	(5,209)	(2,760)	(2,733)	(765)	(420)	(1,800)	(Tea)	(13,966)	(863)	(6,901)	(203)	(426)	(765)	(1,850)	(1,192)	(26,166)	(3,925)	(30,091)	(13,555)	(43,646)		of construction equipments.	
10191 (1) (000, 4)	602	39,067	20,701	20,502	5,735	3,3/3	13,499	1,265	104,743	6,475	51,762	1,519	3,198	5,738	13,874	8,943	196,252	29,438	225,690	101,660	327,350	(%00T)		
$\frac{\texttt{Description}}{\texttt{1. Civil Works}^{\frac{1}{2}}}$	1-1. Preparation		. Diversion Dam			6 1		1-8. Pre-Engineering	Sub-total	2. Land Acquisition and Compensation	3. Construction Equipment	4. Agricultural Development	5. Operation and Maintenance Cost	6. Project Facility	7. Project Administration (8%)	8. Consulting Services	Sub-total (1 to 8)	9. Contingency (15%)	Sub-total (I to 9)	10. Price Escalation	Grand Total (1 to 10)		Note: 1/ exclusive of depreciation cost	

exclusive of depreciation cost of construction equipments.

1. Civil Works

					Total	Foreign	Currency		Local		
<u>Item</u>	Description	Quantity	Unit	Rate (P)	Cost (F '000)	Depreciation (F '000)	Material (F '000)	Total (F 1000)	Fuel Repair & Material (P '000)	Labor (* '000)	Total (P 000)
l. Civ	il Works										
1-1	, Preparation	L.S.			743	141	183	324	284	135	419
1+2	, Dam	L.S.			48,382	9,315	19,264	28,579	15,285	4,518	19,803
1-3	. Diversion Dam	L.S.			22,757	2,056	11,814	13,870	6,188	2,699	8,887
1-4	. Irrigation and Drainage Canals	L.S.			27,800	7,299	4,262	11,561	6,531	9,708	16,239
1-5	. On-farm	L.S.			9,469	3,734	1,583	5,317	1,863	2,289	4,152
1-6	. Roads	L.S.			8,281	4,908	629	5,537	964	1,780	2,744
1-7	. Hydro-power	L.S.			14,425	926	11,040	11,966	1,158	1,301	2,459
1-8	. Pre-Engineering	L.S.			1,265					1,265	1,265
	Total				133,122	28,379	48,775	<u>77,154</u>	<u>32,273</u>	23,695	<u>55,968</u>
				(US\$17,749.6	×10 ³)	(US\$10,287.2	x10 ³)	(US\$7,462.4x10 ³)

										pendix 4 <u>E-1</u> Page 3
			Rate (P)		Foreign Currency (F.C.)			Local Currency (L.C.)		
em Description	Quantity	Unit		Total Cost (F 1000)	Depreciation (P '000)	Material (F '000)	Total (F '000)	Fuel Repair & Material (* 1000)	Labor	Total
. Preparation									(P 000)	(₽ 1000)
1-1-1. Dam Road										
Access Road	1,500	m	169.1	253	87	70	157	77	1.9	96
Bridge	1	place	100,000	100				60	40	100
Sub-total				353	<u>87</u>	<u>70</u>	<u>157</u>	137	<u>59</u>	<u>196</u>
1-1-2. Diversion dams										
Malinao diversion dam										
care of river & diversion	1	set		252	32	82	114	93	45	138
Wahig diversion dam care of river & diversion	1	20±		90						
Pamacsalan diversion dam		set		82	13	18	31	32	19	51
care of river & diversion	1	set		56	9	13	22	22	12	34
Sub-total				390	54	113	<u>167</u>	147	<u>76</u>	223
Total				743	-141	183	324	284	135	
경제 강경 : 19 : 20 : 10 : 10 : 10 : 10 : 10 : 10 : 10				(US\$99.1xl	0 ³)					<u>419</u> (US\$55.9x10 ³
										보통하고 하는 등이 되었다. 연간 100mm (1915년 1917년 1917
Dam										
1-2-1. Diversion Open Excavation	9,500		ing Arangij Lastinas ing Arangij							
Open Concrete	930	cu.m	16,4 471	156 437	71 49	20 107	91 156	53	12	65
Tunnel Excavation (without Support	t) 9,350	11	138.3	1,293	228	296	524	217 695	64 74	281 769
(with Support)	1,510	***	159.4	241	42	66	108	116	17	133
Tunnels Concrete Back Grouting	2,757	U 11	501.7	1,384	214	425	639	656	89	745
Deformed Bar	119 66	ton	649.6 4,000	77 264		12	13	61	3	64
Support	102	set	2,639	269		132 170	132 170	132 99		132
Stone Masonny	L.S.			7 7		# ,0		3		99 7
Sub-total				4,128	604	1,228	1,833	2,032		
1-2-2, Foundation									<u>263</u>	2,295
Stripping	31,500	cu.m	12,2	382	1.00	l o	005			
Core trench	36,100	11	30.6	1,104	183 355	42 345	225 700	127 330	30 74	157
Boring (Open)	29,100	m	67.8	1,973	391	879	1,270	301	402	404 703
(Adit)	24,000	:	74,6	1,790	355	795	1,150	273	362	640
Grouting Adit Excavation	53,100	11	123.8	6,572	605	3,923	4,528	1,449	595	2,044
Adit Concrete	4,900 1,700	cu.m	138.3 501.7	678	120	155	275	364	39	403
나는 아이들 아이를 살아내면 가장 하지만 하는 것이 되었다. 그런 그는 사람들이 하면 되었다.			OOT.	853	132	262	394	404	55	459
Sub-total				13,352	2,141	6,401	8,542	3,248	1,562	4,810

										Appendix 4 Page 4
				mea.an	Foreign Cu	rrency (F	.c.)	Local Currency (L.C.)		
m <u>Description</u>	Quantity	<u>Unit</u>	Rate (P)	Total Cost	Depreciation		Total	Fuel Repair & Material	Labor	Total
1-2-3. Dam Body				(P 1000)	() (000)	(P 1000)	(₱ '000)	(<u>P</u> '000)	(F 000)	(P 1000)
Impervious (Core)	91,000									
Filter	34,000	cu.m	17.8	1,620	761	177	938	479	203	682
Pervious (Rock)	449,000	lf .	14.1 3.06	480	267	22	289	140	51	191
Coffer dam	15,000	ii ii	17.8	1,374 269	696	117	813	440	121	561
Sub-total			17.0		125	29	154	79	34	113
ome total				3,741	1,849	345	2,194	1,138	409	1,547
1-2-4. Spill Way								***************************************		
Common Excavation	43,500	cu.m	16.4	714			al talent			
Rock Excavation	316,900	u u	28.66	9,082	325	91	416	243	55	298
Concrete	14,700	n in	471.1	6,925	2,712 773	3,350	6,062	2,523	497	3,020
Deformed Bar	588	ton	4,000	2,352	7,73	1,690 1,176	2,463	3,437	1,025	4,462
Gate	90	B.	37,500	3,375		2,869	1,176 2,869	1,176 253	oro	1,176
Sub-total	원 타는 무사들은				0.010				253	506
<u> </u>				22,448	3,810	9,176	12,986	7,632	1,830	9,462
1-2-5. Intake Facility										
Concrete	1,770	cu.m	471.1	833	93	203	296		200	
Deformed Bar	44	ton	4,000	176		88	250 88	414 88	123,	537
Penstock (Step Pipe)	75	11	9,000	675		574	574		101	88
Cone Valve (700 m/m) Butter Fly Valve (700 m/m)	$oldsymbol{1}$, which is $oldsymbol{1}$. The $oldsymbol{1}$	set		405		344	344		61	101 61
그리 그는 그들은 살고 하는 물론하다를 가르는 모모에 놓는데 그	1	set		60		51	51		9	9
Sub-total				2,149	93	1,260	1,353	500		
1-2-6 Loft Doub (avenue fir oc						=3===	1,000	<u>502</u>	294	<u>796</u>
1-2-6. Left Bank (Above EL 250 Stripping										
Rock Excavation	10,500 60,900	cu.m	12.2	127	61	14	7 5	42	10	52
	00,900		28.7	1,745	5 2 1	644	1,165	484	96	580
Sub-total				1,872	582	658	1,240	526	106	
1-2-7, Road						 		320	106	<u>632</u>
Relocation Road	1,000	222	200.0							
	1,000	m	169.1	169	58	47	105	51	13	64.
Sub-total				169	<u>58</u>	47	105	<u>51</u>	13	
1-2-8. Temporary								- 	<u>13</u>	<u>64</u>
Transportation Road (No.1)	7 500									
(No.2)	1,500 1,500	m 11	169.1	253	87	70	157	77	19	96
그렇게 하시 하는 어떻게 하고 있는 것이 되었다.	£,300		169.1	253	87	70	157	77	19	96
Sub-total				506	174	140	<u>314</u>	154	38	192
1-2-9. Incidental Facility							. 			132
Observation holes	4 holes 160									
	4 liotes 100	m	106.2	17	4	8	12	2	. 3	5
Sub-total				17	<u>4</u>	8	12			
Total						-		2	<u>3</u>	<u>5</u>
고하는데 그 글로그램 일(로 프) 그 경우 그리고 있다. 1일 시간 대한 것이 참 해된 사람이 가입니다. 보		tu kriji i		48,382	9,315	19,264	28,579	15,285	4,518	19,803
				\$6,450.9x1			\$3,810.5×10			\$2,640.4 x

Material (F '000) 18 25 9 9 132 88 621 1,014 762 7	Total (F 1000) 119 163 164 126 193 140 860 1,914 762	Fuel Repair & Material (P '000) 32 85 9 9 52 396 1,123 3,152	Labor (F '000) 41 26 130 45 61 46 406 562	Total (F '000) 73 111 139 54
18 25 9 9 132 88 621 1,014 762	119 163 164 126 193 140 860 1,914 762	32 85 9 9 396 1,123 3,152	41 26 130 45 61 46 406	73 111 139 54 113
25 9 9 132 88 621 1,014 762	163 164 126 193 140 860 1,914 762	85 9 9 52 396 1,123 3,152	26 130 45 61 46 406	111 139 54 113 442
25 9 9 132 88 621 1,014 762	163 164 126 193 140 860 1,914 762	85 9 9 52 396 1,123 3,152	26 130 45 61 46 406	111 139 54 113 442
9 9 132 88 621 1,014 762	164 126 193 140 860 1,914 762	9 9 52 396 1,123 3,152	130 45 61 46 406	139 54 113 442
9 132 88 621 1,014 762 7	126 193 140 860 1,914 762	52 396 1,123 3,152	45 61 46 406	54 113 442
132 88 621 1,014 762 7	193 140 860 1,914 762	52 396 1,123 3,152	61 46 406	113 442
88 621 1,014 762 7	140 860 1,914 762	396 1,123 3,152	46 406	442
88 621 1,014 762 7	140 860 1,914 762	396 1,123 3,152	46 406	442
1,014 762 7	860 1,914 762	1,123 3,152	406	
762 7	762		560	1,529
7			302	3,714
4.557	66	762 8	61	762 69
4.557	1	ì	8	ğ
	4,557		506	506
3,240 169	3,240 169		360 19	360
810	810		90	19 90
45	54	9	27	36
11,506	13,338	5,638	2,388	8,026
	1		2	2
	2	1	6	7
co		100	2	2
				259 156
6	20	25	24	49
1	7	<u>1</u>	6	7
			and the second s	18 5
				6
13	13		1	1
171	305	324	1.88	<u>512</u>
	69 25 6 1 3 1 53	1 2 2 2 2 5 60 6 20 1 7 3 15 1 10 53 53 13 13	1 2 1 2 69 122 183 25 60 106 6 20 25 1 7 1 3 15 7 1 10 1 53 53 13 13 13	1 2 2 1 6 2 2 2 69 122 183 76 25 60 106 50 6 20 25 24 1 7 1 6 3 15 7 11 1 10 1 4 53 53 6 13 13 1

tem	Description	Quantity	Unit	Rate	Total Cost				Fuel Repair	urrency (
		Qualitaty	Olite	(F)	(P 1000)	Depreciation (P 000)	(P '000)	Total (P 1000)	& Material (P'000)	Labor (P 1000)	Total
	1-3-3. Pamacsalan Diversion Dam						(1)	(100)	(F 000)	(# 000)	() 1000)
	Earth Work										발생 수의 경우를 받는데 있다. 기타 등 기타 등 기타 등 등 등 등 등 등 등 등 등 등 등 등 등 등
	Excavation (common)	480	cu.m	7.2	3	1		•			
	Excavation (indurated)	320	i t	13	4.	$ar{\mathbf{i}}$		<u>.</u>		2	2 3
	Back fill	160	in .	7.5	1	$\bar{1}$		î		3	•
	Concrete "A" (3,000 Psi)	220	ft	1,155	254	36	45	81	123	50	173
	Concrete "A" (2,400 Psi)	180	11	1,028	185	30	22	52	91	42	133
	Rubble masonry	45	11	429	19	4	2	6	7	6	13
	Plain rip-rap Grouted rip-rap	50	TI Li	169	8	4		4		4	4
	Gravel blanket	80	ti	253	20	7	2	9	4	7	11
	Sluice gate	65		150	10	6	1	. 7	1	2	3
	Head gate	1,300 820	kg	34 34	44 00		40	40		4	1900 - 191 <mark>9 - 1</mark> 919 - 1919 -
	经证据 医抗血体病造物血病 电流流 人名格兰人	020		34	28		25	25		3	3
	Sub-total				<u>576</u> ·	<u>90</u>	137	227	226	123	349
	Total				22,757		11,814	しきゅう もっぱい とば もちだま しばい			il in Ba rra n de France
				e die eigen begin		2,056		13,870	6,188	2,699	8,887
					(US\$3,034.2	x10°)	4	US\$1,849.3x	.10 ³)		$(US$1,184.9x10^3)$
	rrigation & Drainage Canal										
1	-4-1. Main Canal										
	Earth Work										
	Ordinary excavation	393,000	cu.m	7.2	2,830	764	142	000			
	Compaction fill	217,000	. 11	7.5	1,628	830	142 49	906 879	113	1,811	1,924
	Concrete lining	1,500	11	831	1,247	237	87	324	49	700	749
	Class "A" concrete	2,480	ff	1,155	2,864	401	515	916	561 1,375	362 573	923
	Grouted rip-rap	2,500	11	253	633	234	51	285	127	221	1,948 348
	Sand and gravel under rip-rap	1,250	tt	143	179	91	11	102	14	63	77
	Pipe work ø 48"	1,200	m	621	745	134	142	276	320	149	469
	Check gate & installation	30	ton	34,000	1,020		918	918		102	102
	Miscellaneous metal work	6	51	18,000	108		54	54	43	11	54
	Sub-total		North Carlos		11,254	2,691	1,969	4,660	2,602	3,992	6,594
1	-4-2. Lateral Canal									<u> </u>	
	Earth Work										
	Ordinary excavation	050 000		= ^				in Asia			
	Compaction fill	259,000 132,000	cu.m	7.2	1,865	504	93	597	75	1,193	1,269
	Concrete lining	850		7,5 831	990 706	505	30	535	30	425	455
	Class "A" concrete	1,900	11	1,155		134	50	184	318	204	522
	Grouted rip-rap	2,000	H .	253	2,191 506	307 187	394 41	701	1,052	438	1,490
	Sand and gravel under rip-rap	1,000	11	143	143	73	9	228 82	101 11	177 50	278 61
347 N. J. J.	Pipe work \$4.36 "	1,800	m	430	774	139	147	286	341	147	488 488
of year. Julian	Head gate and installation	25	ton	34,000	850	~~	765	765	OTAL	85	400 85
	Miscelleous metal work	5	NT.	18,000	.90		45	. 45	36	9	45
- 7.5	Sub-total								n di kada an da Nasa. Ang pagana kadama da kada at d		
					8,115	1,849	1,574	3,423	1,964	2,728	4,692
74 Miles	보는 살 보고, 그는 어떻게 되면 보이라면 하는 사람들이 어느라는 말.								医乳球 医静脉性 医神经炎		4. 化黄色醇 信见的现在分词

										Page 7
					Foreign C	urrency (f	.c.)		Currency (L.C.):
tem Description	Quantity	<u>Unit</u>	Rate (P)	Total Cost (F 1000)	Depreciation (P 1000)	Material (₽ '000)	Total (F '000)	Fuel Repair & Material (P '000)	Labor (F '000)	Total (P 70000)
1-4-3. Sub Lateral			\F/	(F 000)	(F 000)		(F 000)	(F 000)	(2 000)	(F 10000)
Earth Work										
Ordinary excavation	2,000	eu.m	7.2	14	3	ĺ	4	1	9	10
Compaction fill	2,000	ii .	7,5	15	7	1	8	1:	8	7
Compaction fill with borrow	63,000	U	16.8	1,058	688	53	741	53	264	317
Concrete lining	450 550	11	831	374	71	26	97	168	109	277
Class "A" concrete Grouted rip-rap	550 600	58	1,155 253	635 152	89 56	114 12	203 68	305 31	1127 53	432 84
Sand and gravel under rip-rap	300	11	143	43	22	3	25	3	15	18
Pipe work ø 24"	1,250	$(\mathbf{u}_{i})_{i=1}^{n}$	257	321	58	58	116	138	67	205
Miscellaneous metal work	5	ton	18,000	90		45	45	36:	, 9	45
Sub-total				2,702	994	<u>313</u>	1,307	<u>736</u>	659	1,395
1-4-4. Main drainage canals										
Ordinary excavation	157,100	cu.m	7.2	1,131	305	57	362	45	724	769
Mass Concrete	580	et .	561	325	75	26	101	152	72	224
Grouted rip-rap	1,660		253	420	155	34	189	84 .	147	231
Drainage inlet	60	unit	450	27	#	5	9	12	6	.18
Sand and gravel bedding under ri Sub-total	p-rap 800	cu.m	143	114 2,017	58 597	7 129	65 726	9 302	40 989	49 1,291
1-4-5. Lateral drainage canals								<u> </u>	<u> </u>	-3,2,3,
Ordinary excavation	99,900	cu.m	7.2	719	194	36	230	29	460	489
Mass Concrete	2,140	11	561	1,201	276	96	372	565	264	829
Grouted rip-rap	4,900	11	253	1,240	459	99	558	248	434	682
Sand & gravel bedding under rip-	eap 2,450 260	unit	143 450	350 117	178 18	21 22	199 40	28 54	123 23	151 77
Drainage inlets Compacted fill	11,300	cu.m	7.5	85	43	3	46	3	23 36	39
Sub-total	<u></u>			3,710	1,168	277	1,445	927	1,340	2,267
							A S			
Total.				27,800	7,299	4,262	11,561	6,531	9,708	16,239
			((US\$3,706.7x	103)	•	US\$1,541.4x	10°)	((US\$2,165.3x10 ³)
-5. On-Farm		the section of								
1-5-1. On-farm facilities										
for paddy field (rainfed)	1,011	ha	910	920	201	21.3	414	261	245	506
for grass land, etc.	3,870	n i	2,209	8,549	3,533	1,370	4,903	1,602	23044	3,646
· Total	4,881	it .		9,460	3,734	1,583	5,317	1,863	2,289	4,152
	- 			9,460 (US\$1,262.5x)			(US\$708.9x1			(US\$553.6x10 ³)
在1967年 - 1967年 - 1967			•	, 0391, 20Z • 3XJ	LU ,		4000\00'AXT	U ,	· · · · · · · · · · · · · · · · · · ·	(094009'0YIA \
						•				

										nd1x 4 <u>H-1</u> ge:7
설계 전환 기계 등학자 시간				Total	Foreign C	urrency (F.		Local C Fuel Repair	urrency (1	c.)
Item Description	<u>Quantity</u>	Unit	Rate (P)	Cost (7 1000)	Depreciation (P 1000)	Material (P '000)		E Material (P 000)	Labor	<u>Total</u>
1-6. Roads						(F 000)	(# 000)	(8,000)	(P 1000)	(P '000)
Earth Work										
Compaction fill	349,000	cu.m	7.5	2,618	1,335	79	1,414	79	1,125	1,204
Gravel or selected material	surfacing 144,	,000 "	30	4,320	3,370	259	3,629	302	389	691
Class "A" concrete	620 350	cuim	1,155	716 196	100	129 16	229 61	ele a la calla de la calla		
Mass concrete Pipe work ø 30"	1,000	m	561 341	196 341	45 58	the state of the s		344 92	143 43	487 135
Miscellaneous metal work	5	ton	18,000	90	30	65 81	123 81	147	71	218
									9	one, posteri 9 success National and the second
				8,281	4,908	625	5,537	964	1,780	2,744
생각하는 나는 사람들은 얼마를 가는 것이다.				(US\$1,104.1	x10 ³)	((US\$738.2x10	3)	•	US\$364.9x10 ³
-7. Hydro-power										
1-7-1. Turbine and generator	2	set	4,871,000	9,742		9,742	9,742			
1-7-2. Crane	1	set		121		121	121			
1-7-3. Electric works	L.S.			1,290	112	478	590	281	419	700
1-7-4. CIF and delivery to site	L.S.			1,047	644		644			700
					•		044	15	388	403
1-7-5. Civil works										
Excavation (Common) Excavation (Rock)	4,000	cu.m	16	65	30	8	38	22	5	27
Concrete	2,000 960	ti -	30 471	60	20	19	39	17	4	21
Deformed bar	31	ton	4,000	452 62	50	110 31	160	224	68	292
Penstock (1 = 60m ø 24")	9	11	9,000	81		61	31 61	31	00	31
Crane assemble	1	set		36		~	O,L		20 3 6	20
Electric water supply & drainag	e L.S.			119				95	36 24	36 119
Sub-total				<u>875</u>	100	229	329	389	<u>157</u>	546
1-7-6. Trans-mission line	20	km	67,500	1,350	70	470	540	473	337	810
Total				The box	000	11 000	11 000			
[발발·발발·발발 : 10] [[[[[[[[[[[[[[[[[[14,425	926	11,040	11,966	1,158	1,301	2,459
			([S\$1,923.3x1	0°)	(U	S\$1,595.4x10	3 Y		US\$327.9x10 ³

		되면 이 등등 보다입니다. 나타 1 기계에 보고있다.				Appendix 4E Page 8
	요즘 100 전 100 전 100 전 100 전 10					
	보는 현실하는 사람들이 발매되었다. 그런 사람들은 사람들은 사람들은 사람들은 그렇다. 그렇게 하늘 사람들은 사람들이 사람들이 되었다. 그런 사람들이 사람들이 모르는 것이다.			Rate	Amount	
Item	Description	Quantity	Unit	F.C. L.C. (P)	F.C. L.C. (P '000)	
	re-Engineering					
1-8-1.	Survey Works Topographical Survey					
	Pamacsalan dam site (600m x 600m)	36	ha	200		
	Malinao diversion dam site (1,000m x 200m)	20.	ha	200		
	Profile survey Pamacsalan dam					
	Dam axis	1,200	m	1.0	지 얼마 이용된 아ુ리는 장사인	
	Spillway Diversion tunnel	450 600	m m	1.0		
	Access and relocation road	2,500	m	1,0		
	Malinao diversion dam	1,600	m .	1.0		
	Irrigation and drainage canals Cross section survey	229,100	m	0.8	183	
	Pamacsalán dam					
	Dam axis (llsections x 250m)	2,750	m	1.0		
	Access and relocation road (63sections Malinao diversion dam (40sections x 200m)	× 40m) 2,520 8,000	m M	1.0	3	
	Irrigation and drainage canals	286,400	m	0.8	229	
	(5,728sections x 50m)					
	Sub-total				<u>445</u>	
1-8-2.	Geological Investi Investigation				연고하다 눈물을 가면 없다	
	Pamascalan dam					
	Seismic exploration Electric resistivity survey	L.S.			5.	
	Bore hole drilling					
	Dam site Abutments	260	m	500	130	
	Spillway	750 60	n m	500 400	375 24	
	Diversion tunnel	60	m	400	24	
	Quarry site Aggregate	40 60	m m	400 300	16 18	
	Malinao diversion dam		III	300		
	Diversion dam site	180	m	500	90	
	Sub-total				<u>684</u>	
1-8-3. I	Material Investigation					
	Pamacsalan dam					
	Aggregate pite	L.S.			18	
	Insitu test Laboratory test	L.S. L.S.			10	
	Malinao diversion dam					
	Laboratory test	L.S.				
	Sub-total				<u>36</u>	
1-8-4.	oil Survey	L.S.				
	Sub-total				100 100	

2. Land Acquisition and Compensation				ate	Amo	
Item Description	Quantity	<u>Unit</u>	F.C. (₹)	L.C. (P)	F.C. (P '000)	L,C; (P 1000)
2-1. Land Acquisition						
2-1-1. Civil Works						
Irrigation canal 1/						
Main canal (lower area)	65.0	ha		10,000		650
Lateral canal (lower area) Sub-lateral canal (lower area)	68.6 24.4	ha ha		10,000		686։ 2 կ կ
Wahig canal (upper area)	17.4	ha		10,000		174
Pamacsalan canal (upper area)	4.8	ha		10,000		48
Sub-total						1,802
Drainage Canal						
Main canal (lower area)	6.7	ha		10,000	u de la filipia de la filipia. La fighta de la granda de la filipia.	67
Lateral canal (lower area)	15.9	ha		10,000		159
Sub-total						. <u>226</u>
ndige of the control						
Farm ditch	119.7	ha		10,000		1,197
Farm road	9.2	ha		10,000		92
Farm drain	47.9	ha		10,000		479
Sub-total						1,768
2-1-2. Agricultural Development						
Working station	0.5	ha		10,000		5.
Sub-total						<u>5</u>
2-1-3. Project Administration & Facilities						
Main project office	0.5	ha		10,000		5
Operation Office	0.1	ha -		10,000		1
Housing	0,9	ha		10,000		9
Sub-total						<u>15</u>

^{1/} including the right of way for service and access roads.

					Page 10
<u>Item</u>	Description	Quantity	<u>Unit</u>	Rate F.C. L.C. (F)	Amount F.C. L.C. (P 000) (P 000)
2-2. L	and Compensation				
2-2-1.	Compensation Cost for Pamacsalan Res	ervoir			
	Land			15,000	661
	Irrigated paddy field Rainfed paddy field	44,05 6,35	ha ha	5,000	32 ,,
	Coconut	57.15 x 60trees	ha	50	171
	Grass land and forest	97.88	ha	550	
	Building	45	house	16,200	729
	Housing Housing site	45 x 300	m ²	2,67	36
	Crops				
	Irrigated paddy field	44.50	ha	1,911 1,031	191 6
	Rainfed paddy field Coconut	6.35 57.15	ha ha	397	23
	Corn	80.0	ha	115	
	Sub-total				1,912
72-2-7	Compensation cost for Malinao Reservo	\mathbf{ir}			
	Land				
	Irrigated paddy field	19.09	ha	15,000	286
	Grass land and forest	73,28	ha	550	40.00
	Building	20	house	16,200	324
	Housing Housing site	20 x 300	house m²	2.67	16
	Crops				
	Irrigated paddy	19,09	ha	2,157 525	42 39
	Corm	$73.28 \times 0.6 \times 17$	ha	323	
	Sub-total	植物医皮肤 医骨髓			747
	Total				6,475
					(US\$863.3×10 ³

과 선생님 이 의원회 회원 회사의 공부 [편]	intificación de el maior de la compa			Pa	ndix 4E-1 ge 11
3. Construction Ed	quipment	i Santi			d warized
			Unit		
Equipment	Spec.	Number	Price' (P. 1000)	Amount (P '000)	Remarks "
Bulldozer	llton 90Ps	6	367	2,202	
Bulldozer	16ton 140Ps	1		525	
Bulldozer	22ton 180Ps	18		11,736	
Front end loader	1.4 m ³	6	382	2,292	
Front end Loader	1.8 m ³	1	502	502	
Front end:loader	2.2 m ³	2		1,394	uind Salpa Profit Albania
Dump truck	6 ton	12	120	1,840	
Dump truck	8 ton	12	150	1,800	
Dump truck	ll ton	19	240	4,560	
Back hoe	0.6 m ³	4	548	2,192	
Tire roller	8.5 - 20ton	6	270	1,620	
Motor grader	4.0 m	2	530	1,060	
Air compressor	110 Ps	ц	109	436	nda sa matakan Tabi debat debirah
Diesel generator	100 KVA	4	94	376 ,	
Diesel generator	30 KVA	1	8	8	
Crushing & Screening				다 이번 발생하다 사는 기가 발생했다	
Plant	40 ton/hr	1	2,400	2,400	
Mixing plant	30 m ³ /hr	1	846	846	
Truck mixer	3.0 m ³	5 -	279	1,395	
Vibrator	5.0 Ps	17	4	68	with engine
Blower	400mm 2x15KW	1	75	75	
Leg drill	2.7 m ³ /min	10	5	50	
Crower drill	10 m³/min	1	190	190	
Tamping roller	10 ton	1	262	262	
Vibrating roller	2.5 ton	1	148	148	
Vibrating roller	10 ton	1	456	456	pulling type
Boring machine		10	46	460	
Grout pump		5	66	330	with mixer
Pump	100mm 11KW	1	24	24	
Pump	125mm 15KW	1	35	3 5	
Rocker shovel	0.4 m ³	1	441	441	
Concrete pump car	40 m ³ /hr	1	522	522	

				Page 12
<u>Equipment</u>	Spec.	Number	Unit Price (* 1000)	Amount Remarks
Pick úp truck	4 ton	8	90	720
Stake truck	6 ton	4	150	600 with crane 1.5t
Water truck	10,000 l	2	150	300
Fuel truck	8,000 l	1	165	165
Truck-tractor & tra	ller 25 ton	1°	625	625
Concrete pot mixer	0,3 m ³	10	37	370
Portable belt convey	/er L = 7m	6	5	30 with engine
Concrete conveyer	L = 15m 5Ps	1	- 26	26 with engine
Lammer	90 kg	10	6	60
Welder	20 KVA	1	19	19
Lubricating car		1	360	360
Repair workshop		1	460	460
Utility jeep		16	75	1,200
Station wagon		4	100	400
Motór cycle	90'cc	40	6	240
Weeder cutter		30	N. 1,00 3	90
Laboratory equipment		. 1	1,000	1,000
Radio tranciver (Mobil station)		20	u Eksere Ro	80
Spair parts			SHIP OF	4,660
Transportation '			he only	512
Total		9.W	Signal of p	51,762
			11 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1	0 61 000
			(L.(3. 51,250)
				3. 512)
				The Line sections
		· ·	il anois.	
		11.		
		10	Y COT	

				Appendix 4E-1 Page 13	
4. Agricultural Development					
Item Description	Quantity	Unit	Rate F.C. L.C	$ \frac{Amount}{L, C_{\bullet}} $	
4-1. Cadustral survey	b.s.		(P) (P)	(₽ 1000) (₽ 1000 565)
4-2. Establishment cost of irrigators association	L.S.				
4-3. Communication system to farmers	24	barrio	6,250		
4-4; Working station Warehouse for palay	1,500(500x3)	m 2	50 0		
				1;519	
5. Operation and Maintenance Cost 5-1. Salary and Wage Main project office Malinao diversion dam	710,000x0.5 L.S.			355 43	
5-2. Equipment Operation Depreciation cost Main project office Malinao diversion dam	535,000×0.5 L.S.			268	
Fuel and oil cost	88,000x0.5		ामानुस्तर्भः । साम्राज्यस्य । तस्य अनुसर्वे । साम्राज्यस्य अनुसर्वे		
5-3. Materials and Supply Irrigation, drainage and road Building Others	330,000x0.5 L.S. L.S.			165 98 112	
	398x0.4			159	
5-4. Administration and General Expenditure				$\frac{1,279}{}$	
5-4. Administration and General Expenditure Sub-total					

					Append Page	dix 46-1 • 14
6. Project Facility						
The second se				ate	Amò	unt
Item Description	Quantity	Unit	F.C. (P)	L.C. (₽)	F.C. (P '000)	L;C. (P '000)
6-1. Building and Faniture						
Building						
Main project office Operation Office	1,500 250	m ² n2 m2		500 400		750
Housing Government staff	1 43					100
Guest house	750 200	m ² m ²		500 500		375 100
Equipment shed	3,000	m²		200		600
Furniture	L.S.					150
Sub-total					A State of the sta	2,075
6-2. Equipment						
Office equipment						
Leveling instrument with staff and steel tape Transit with staff and tape	2 2	set set	12,000 12,000		24	
Current meter	1	set	4,000		24 4	
Miscellaneous tools and equipment	L.S.		75,000		75	
Other equipment						
Radio tranciever Wireless telephone	3 1	set set	50,000 160,000	10,000 40,000	150 160	30
Wireless telephone	2	set	90,000	22,000	180	40 44
Emergency correspondence Observation instrument for dam body	1 L.S.	set	15,000 170,000	30,000	170	15
Water level gage for dam body	2	set	37,000	15,000	170 37	30 15
Meteorological equipment Seismic resistivity equipment	L.S.	set	34,000 75,000	16,000	34 75	16. 75
Jack for bearing capacity	1	set	15,000		15	15
Electric Processing equipment	1	set	45,000		45	45
Sub-total Sub-total					993	2,670
Total						
				(1):	<u>993</u> 3\$132.4x10 ³)	4,745 (US\$632.7x10 ³)
						(004002117410)
		•				

					Appendix 4E≈1 Page 15
8. Consulting Services					
Item Description	Quantity	Unit	F.C.	Rate L.C.	Amount F.C. L.C.
경영 전 경영 경영 및 중합 교육 경영 전 전 인 및 경영 프랑크 (1985년 - 1982년) 보통 리아스 (1984년) 중요 (1984년) - 1984년 - 1			(F)	(P)	F;C, L;C, (p 1000) (p 1000)
8-1. Foreign Exchange Cost					하기 되었다. 분층 (1) 12 (1) 2년(1) 1일 (2) 1일 (2
Final Design Consultant's remuneration					
International travel expense	43 10	mon-month trip	52,500 5,700		2,258 . 57
Miscellaneous & communication	L,S,				23
Sub-total					
Construction Supervision					2,338
Consultant's remuneration	96	mon-month	52,500		ALA
International travel expense Miscellaneous & communication	12	trip	5,700		5,040 68
항전 시간을 돌았다면요요 함께 시간들은 휴가를 들어 시작하다.	L.Š.				153
Sub-total					5,261
3-2. Local Currency Cost Final Design Local transportation Consultants per diem	30	trip		550	17
이 보통 회사를 가는 것이 하게 되었다면 보고 그 없는데 하다.	1,290	day		220	284
					<u>301</u>
Construction Supervision				in die der Albert der der Albert	그런 이 경찰 24 등 하는 함께 보다 일본 - 그는 것 있습니다.
Local transportation Consultants per diem	2 202	trip day		550 220	28
Housing and furniture	2,880 L.S.	ų uj		220	28 634 381
Sub-total					
강인이 글로로인하면서 숙취를 받는 모일수 없는					1,043
Total					
					7,599 1,344
				(US\$1,0	13.2x10 ³) (US\$179.2x10 ³)

Table 45-2 Labor and Material Cost

1. Làbor Cost

Laborer	Unit	Cost (胃)
26 로마스 클레이트 클리스 (Constitution) 전략 설명 근 (Constitution) 프로그램 (Constitution)	day	15.62
Worker		23.89
Forman (common)	主题是新工程的	23.89
Forman (construction)		24.87
Chief worker		21.28
Operator of vehicle	n	20.07
Assistant of vehicle		15.62
Operator of heavy equipment		23.89
Assistant of heavy equipment		21,28
Mason		21.28
Carpenter		21.28
Smith	"	21.28
Painter	•	21.28
Welder		23.89
Asphalt worker		15.62
Watcher		20.07
Head carpenter		23.89
Head smith		23.89
Head welder		24.87

2. Material Cost

法国际通知的信息 医克雷特氏征			ost (F)	J. 181 - A. B. B. S. S.				
Description	Unit	F.C.	L.C.	Total	Remarks			
Portland Cement	ton	93	409	502	dam site cost			
Sand	m ³	. 55	13	68				
Grável	0	40	20	60				
Deformed bar	ton	2,000	2,037	4,037				
Dinamite	kg		10	10				
ANFO		4		4.				
Gasoline	kl	850	900	1,750				
Diesel fuel		620	680	1,300				

Source: Project Development Department, NIA

Table 4E-3 Un	it Cost for On-farm	Developmo	nt Cost						Page	17
					Foreign (Currency			Currencý	
Item <u>Description</u>	Quantity	Unit	Rate (P)	Total Cost (P)	Depreciation (F)	Material (P)	Total (F)	Fuel Repair & Material (F)	Labor (F)	Total (P)
(1) Earth Works										
Excavation	3,157	cu.m	7.2	22,730	12,047	2,046	14,093	4,773	3,884	8,637
Embankment (Compacted Embankment (Normal)	3,590 5,860		7.5 4.4	26,925 25,784	13,732 6,188	808 1,289	14,540 7,477	808 1,031	.11,577 17,276	12,385 18,307
Back fill (Compacted)	22	0	7.5	165	84	5	89	5	71	76
Back fill (Normal)	2	0	4.4	8	2	$x_{i+1} = x^{i}$	2		6	. 6
Sub-total				75,612	32,053	4,148	36,201	6,617	32,794	39,411
(2) Concrete Works										
Class "A" concrete	25	cu.m	1,155	28,875	2,887	7,508	10,395	13,571	4,904	18,480
Grouted Riprap	70	10	253	17,710	6,553	1,417	7,970	3,542	6,198	9,740
Sub-total			ing service of the se	46,585	9,440	8,925	18,365	17,113	11,107	28,220
(3) Materials RC Pipe Ø 12" &=1.0 ^m Slide Steel gate	188 18	pe 11	138 3,500	25,944 63,000	4,670	4,410 31,500	9,080 31,500	10,896 25,200	5,968 6,300	16,864 31,500
Sub-total				88,944	4,670	35,910	40,580	36,096	12,268	48,364
Land leveling $\frac{2}{}$	158,600	cu.m	1.9	301,340	165,737	33,147	198,884	36,162	66,294	102,456
Sub-total				301,340	165,737	33,147	198,884	36,162	66,294	102,456
Total				512,481	<u>211,900</u>	<u>82,130</u>	294,030	95,988	122,463	218,451
for paddy field (Rainfed)				211,141	46,200	48,983	95,146	59,826	56,169	115,995
$(\text{per ha} \frac{1}{})$				(910)	(199)	(211)	(410)	(258)	(242)	(500)
for grass land etc.				512,481	211,900	82,130	294,030	95,988	122,463	218,451
(per ha $\frac{1}{}$)				(2,209)	(913)	(354)	(1,267)	(414)	(528)	(942)
				3232007	(310)	(001)	(x 9 c v /)	7.74.77	(020)	

Note: 1/ The total irrigable area of sample area is 232 ha which consists of sample area "A" (134 ha) and sample area "B" (98 ha)

2/ for area to be reclaimed, such as grass land, upland field etc.

Investment Cost of the Project (including Depreciation Cost) Table 4E-4

Description	Total	1.8	Foreign	Currency	Local Currency	urrency
	(000. 4)	(000, SSD)	(♣ 1000)	(000, SSA)	(000, ₹)	(000, SSD)
1. Civil Works						
1-1. Preparation	743	(66)	324	(64)	419	(95)
1-2. Dam	48,382	(6,451)	28,579	(3,811)	19,803	(2,640)
1-3. Diversion Dam	22,757	(3,034)	13,870	(1,849)	8,887	(1,185)
1-4. Imigation and Drainage Canals	27,870	(3,707)	11,561	(1,542)	16,239	(2,165)
1-5. On-farm	694,6	(1,263)	5,317	(108)	4,152	(254)
1-6. Roads	8,281	(1,104)	5,537	(138)	2,744	(398)
1-7. Hydro-power	14,425	(1,924)	11,966	(1,596)	2,459	(328)
1-8. Pre-Engineering	1,265	(163)	(1,265	(169)
Sub-total	133,122	(17,751)	77,154	(10,288)	55,968	(7,463)
2. Land Acquisition and Compensation	6,475	(873).	į	i	6,475	(863)
3. Construction Equipment	1	•	1	ŧ		1
4. Agricultural Development	1,159	(203)	.1.	,	1,519	(203)
5. Operation and Maintenance Cost	3,198	(426)	, I	F.	3,198	(426)
6. Project Facility	5,738	(765)	866	(132)	4,745	(633)
7. Project Administration (8%)	12,004	(J,600)	6,252	(834)	5,752	(166)
8. Consulting Services	8,943	(1,192)	7,599	(1,013)	1,344	(179)
Sub-total (1 to 8)	170,999	(22,800)	856,16	(12,267)	79,001	(10,533)
9. Contingency (15%)	25,650	(3,420)	13,800	(078,1)	11,850	(1,580)
Grand Total (1 to 9)	196,649	(26,220)	105,798	(14,107)	90,851	(12,113)
W/ Hdro-power	196,649	(26,220)	105,798	(14,107)	90,851	(12,113)
(- do - per ha)	(₹36,964)	(US\$4,828)	(₹18,887)	(US\$2,652)	(YZO, 71%)	(US\$2,277)
W/O Hdro-power	178,733	(23,831)	30,935	(12,124)	87,788	(11,707)
(- do - per ha)	(¥33,596)	(O85,480)	(\$57,093)	(US\$2,279)	(#I6,503)	(US\$2,201)

This table includes the depreciation cost of construction equipments and excludes the construction equipment cost and price escation. Note: 1

i Magazini kan sa Santan kang Santan San Santan Santan Santa		e e						A. J.						V 10	e, marghag
Ta	ble 4E-5	Disburs	ement Sched	nle											
				1 . 1											
						*									
		Total		(Jan.	lst Year	ec. 179)		2nd Year '80 - De	io (80)	(Jan	3rd Year . '81 - De	n 191)		4th Year	
Description	F.C.	L.C.	Total	F.C.	L.C.	Total	F.C.	L.C.	Total	F.C.	L.C.	Total	F.C.	L.C.	Dec. '82) Total
1. Civil Works	48,770	55,960	104,730	~	1,010	1,010	rie	250	250	10,140	5,570	15,710	5,690		
1-1. Preparation	180	120	600							80	140	220	70	200	
1-2. Dam	19,270	19,800	39,070				e Le ^a						2,480	3,980	14 S
1-3. Diversion Dam	11,810	8,890	20,700							10,060	5,430	15,490	1,440	2,600	4,040
1-4. Irrigation and Drainage Canals	4,260	16,240	20,500										1,110	4,220	5,330
1-5. On-farm	1,580	4,150	5,730										430	1,120	1,550
1-6. Roads	630	2,740	3,370							•			160	710	870
1-7. Hydro-power	11,040	2,460	13,500												
1-8. Pre-Engineering	-	1,260	1,260	. · · .	1,010	1,010	••• •••	250	250		-			_	
2. Land Acquisition and Compensation	r y Litera y ,	6,470	6,470			- -	· · · · · · · · · · · · · · · · · · ·	-			3,640	3,640	<u></u>	990	990
3. Construction Equipment	51,250	510	51,760					•		51,250	510	51,760		··	_
4. Agricultural Development		1,520	1,520			· = 1. 1	- -	260	260	- : - :	260	260		260	260
5. Operation and Maintenance Cost		3,200	3,200	•	_	<u> </u>	_				· . · · · · · · · · · · · · · · · · · ·	-			ing the second of the second o
6. Project Facility	990	4,750	5,740	990	2,370	3,360	· ' <u>-</u> .	2,380	2,380	·			· -	! -	-
7. Project Administration (8%)	8,080	5,790	13,870	80	270	350	-	230	230	4,920	7 90	5,710	450	1,130	1,580
8. Consulting Services	7,600	1,340	8,940	760	30	890	1,750	310	2,060	840	160	1,000	1,440	250	1,690
Sub-total (1 to 8)	116,690	79,560	196,250	1,830	3,780	5,610	1,750	3,430	5,180	67,150	10,930	78,080	7,580	15,460	23,040
9. Contingency (15%)	17,510	11,930	29,440	270	570	840	260	520	780	10,070	1,640	11,710	1,140	2,320	3,460
Sub-total (1 to 9)	134,200	91,490	225,690	2,100	4,350	6,450	2,010	3,950	5,960	77,200	12,570	89,790	8,720	17,780	26,500
						* .									
W. Price Escalation	55,070	46,590	101,660	260	540	800	430	840	1,270	23,940	3,900	27,840	3,620	7,380	11,000
Grand Total (1 to 10)	100.020	130 000	207 250	0 260	11 000	7 050	0 100	j. 700	7 000	101 360	36 1190	117 620	12,340	25,160	37,500
Grand Total (1 to 10)	189,270	138,080	327,350	2,360	4,890	7,250	2,440	4,790	7,230	101,160	16,470	117,630			

										Appendix Page 1	
			en e							1941 - 1941 1941 - 1941	
			(Unit	: ₽ '00	00)		1				
(Jan	4th Year . '82~ -	Dec. 182)	(Jan.	5th Year 183 - 1	r Dec. (83)	(Jan	6th Year 84 - 1	r Dec. 184)	(Jan	7th Year . 185 - I	o Dec. 185)
F.C.	L.C.	Total		L.C.	Total	F.C.	L.C.	Total	F.C.	L.C.	Total
5,690	12,830	18,520	16,310	11,060	27,370	11,850	15,780	27,630	4,780	9,460	14,240
70	200	270	,	-	_	30	80	110	, , ,	~ , ~ ~	
2,480	3,980	6,460	4,260	3,870	8,130	9,380	7,480	16,860	3,150	4,470	7,620
1,440	2,600	4,040		-	, 19 Sept.	310	860	1,170	-	_	-
1,110	4,220	5,330	1,110	4,220	5,330	1,280	4,870	6,150	760	2,930	3,690
430	1,120	1,550	440	1,160	1,600	430	1,120	1,550	280	750	1,030
160	710	870	160	710	870	190	820	1,010	120	500	620
٠.			10,340	1,100	11,400	230	550	780	470	810	1,280
·		-		-	. ~		_	· · ·	<u>.</u>		
										t.	€
	990	990		1,140	1,140		700	700	-	<u>-</u>	· . · - .
- .				-	· . · · -	-	- ·	1,1 - 1,1	-	· ·	
. -	260	260		260	260	_	260	260	- · · · · · · · · · · · · · · · · · · ·	220	220
	<u></u>									• •	
	_			1,200	1,280	••••••••••••••••••••••••••••••••••••••	1,280	1,280		640	640
-	. ·	<u>.</u>	 '		g g g		- .				-
450	1,130	1,580	1,300	1,100	2,400	950	1,440	2,390	380	830	1,210
.,440	250	1,690	1,440	250	1,690	1,290	230	1,520	80	10	90
						· .				•	
7,580	15,460	23,040	19,050	15,090	34,140	14,090	19,710	33,800	5,240	11,160	16,400
						-	· · · · · · · · · · · · · · · · · · ·				
,140	2,320	3,460	2,870	2,250	5,120	2,110	2,960	5,070	790	1,670	2,460
,720	17,780	26,500	21,920	17,340	39,260	16,200	22,670	38,870	6,030	12,830	18,860
											
,620	7,380	11,000	11,570	9,160	20,730	10,530	14,740	25,270	4,720	10,030	14,750
,340	25,160	37,500	33,490	26,500	59 990	26,730	37,410	64,140	10,750	22,860	33,610

Compensation

Basic plan for compensation for the farmers to be submerged.

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and be some more and resconsing the Charles are shifted with the highest historial

1. Scope of farmers to be compensationed:

Such farmers living in the reservoir area of Pamacsalan Dam are about 45 households, most of which have their houses above full water surface without direct sinking of them. But they will be enforced to immigrate to other land due to the sinking of their farms which are the base of their production.

Such farmers in the reservoir area of Malino diversion dam are about 20 household, whose houses don't sink and the condition is quite similar with above.

multiple of the filler of the sections beautiful and the files of the filler of the section of the files of

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2. Cases of immigration of farmers:

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CASE 1. Imigration of them to farms to be newly reclaimed in the Project area.

1. 1999 - 1999 - Paris Palinia (1995) - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 -

Stranger and the stranger of the

- CASE 2. Participation of them to the resettlement project schemed by Department of Agrarian Reform
 - CASE 3. Immigration of them to city quitting own farm

In CASE 1, some reconciliation by the related administration office is necessary to obtain landowner's approval. Whether they will be a land owner farmer or a tenant farmer will be decided upon their mutual will.

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regional carried against high man block qualificating but had in About it

In CASE 2, the procurement cost of land will be chiepper than that in CASE 1. A Farming size of 5 ha/household is considered to be favorable for immigrated farmer. For provision of needed fund the help by the Government will be easier to receive for them.

In CASE 3, Be careful that great pit halls will be waiting for

ones without firm mind and well preparation for new life and there have been many sad examples in the past.

At present, an immigration plan by the Department of Agrarian Reform is under processing as one of Bohol integrated development plan. If the sinking farmers are agree to join it, it will be a good chance for them.

South Representation for the bush of the problem of the factor of and the

og kada od pojetke dog og tuder gjettet dette frædt pletfordet. De skrifte Og engligtet en og gjettet det en troma til komplete kom endelde de

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3. Displacement cost items

est appear a teat in a contract.

The cost items to be considered when the Government positively want to immigrate them into a planned immigration land as in CASE 2 are as follow:

the first first of the second of the second

- 1) Land consolidation cost at immigrated land
 - a) Leveling field and road construction
 - b) House building
 - c) Drinking water facility ...
- 2) Reclamation of paddy and irrigation facility
- 3) Transplace cost (the total expence to be needed from present site to immigration site including living expence compensation unit the completion of one's immigration.)

By our investigation these cost could not be learned so that in this study the compensation shall be estimated in accordance with following system, when the farmers is taken to select CASE 1 or CASE 2.

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ong the land of the control of the configuration and the configuration of the configuration o

4. Compensation cost items:

- 1) The compensation for procurement of farm land
- 2) The compensation for procurement of house
- 3) The compensation during quitting period of farm

Decrease of income and fixed expense (taxes, depreciation).

Margra Belgist Franklig (1821) Myrilletta iki alif uzolak alikaliki jariba alifa (1

5. Schedule:

Pamacsalam dam will be closed by Jun. of 1985 and the water from the dam will be available from the dry season in 1985. Then the Palay will be cropped by the wet season in 1984.

If the Case I is chosen, the compensation for harvesting in the dry season in 1984 will be needed. Malinao diversion dam will be completed by December 1982 so that the farming at the paddy field to be sinked is expected by the wet season in 1982.

The sinking farmers chosen the CASE 1 will obtain their replace land during the period from 1983 to 1984. Therefore at least one year's compensation will be needed.

6. Resettlement Project by Department Agrarian Reform:

By the information at the Tagbilaran office of that Department, they say that they have an immigration plan at Bohol Province as follow:

The illegal settlers of 2,191 household in the government owned land of about 20,000 ha are scattering over the area of following Municipalities; Jetafe, Talibon, Trinidad, Buenavista, Dagohoy, Danao and San Migel etc. They are planning to make them a full owner farmer alloting a hand of 5 ha/household to them.

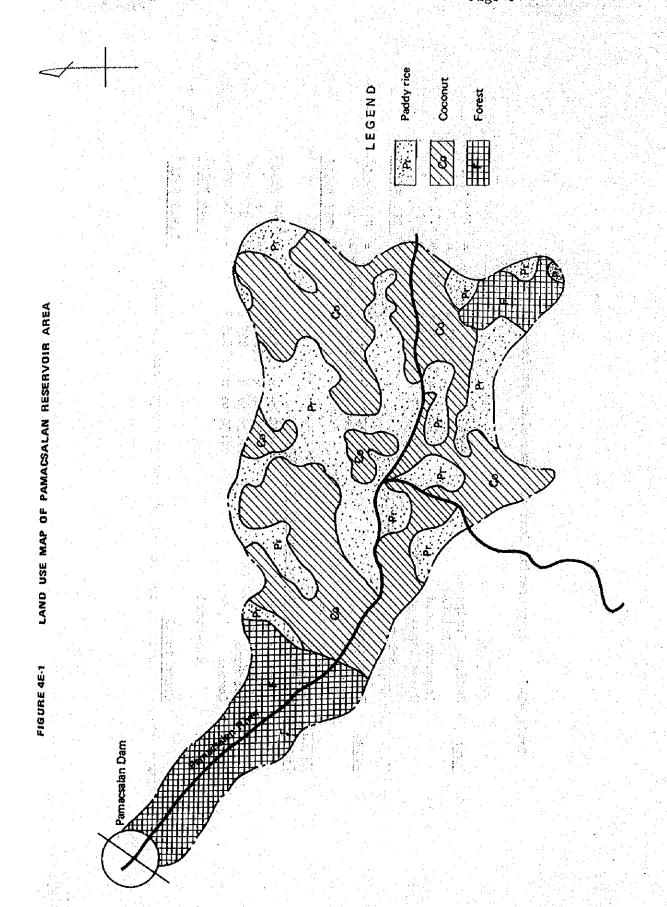
The person who are the object of this project are one's without farming lnad and with sincerity in personnal.

The groups of person who are chosen consist of 3 kinds as follows;

- 1) Inhabitants within the noticed area (above mentioned 2,191 households)
- 2) Inhabitants in such towns concerned this resettlement project.
- 3) Inhabitant who will be influenced by the irrigation project of NIA or other development project

	Reservoir of Malinao Diversion Dam (ha)	60. 60. 7.	73.28 <u>92.37</u> 20 house	two season of palay	. A great parts of fields according to Then a price of	n cost Decause of
Properties to be Compensated	Reservoir of Pamacsalan Dam (ha)	44.50 6.35 50.85 57.15	97.88 205.88 #5 house	of palay	ere surveyed by NIA, LRED. Pamacsalan Dam are upland for from the barrio captain.	was used as cassava lands. vere not estimated as compensation g on the new field.
Table we-6		ly: Irri Rain Sonuts fie	Grasslands and forest Grand total House building	Farm income during quitting period of farm	Carried Selver Service	grass lands was 1. Livestocks were the re-using on

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	Compensation Cost of Pamacsalan Dam Reservoir	ŀ
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	= 734 Px103 = 32 " = 171 " = = 54 " = 991 Px103	= 729 PX10 ³ = 36 " 765 PX10 ³	= 85 Px10 ³ = 6 n = 23 n = 42 n	156 Fx10 ³ 1,912 Fx10 ³	
Pamacsalan Dam Reservoin	44.50 ha x 16,500 m 6.35-ha x 5,000 m 57.15 ha x 60 trees x 50 m 97.88 ha x 550 m	45 house x 15,200 F 45 house x 300 m ² x 2.67 P	#4.50 ha x 1,911 F 6.35 ha x 1,931 F 57.15 ha x 397 F 80.00 ha x 525 F		
Compensation Cost of Pama).rest		ing period of fam	Sub-total total	
Table #E-7	1. Land Paddy: Irrigated Rainfed Coconuts field Grass lands and fe		6. Farm income during quitt: Palay irrigated Ralay rainfed Coconuts Corn	Sub-tot	

of Malinac Diversion De Compensation Cost of

				Appendix 4L-2 Page 6
The strong stron	ing of the second secon	te views in the Server 1950 of the Theorem 1960 of the		
	= 286 PX10 ³ = 40 " 326 PX10 ³	= 324 mx10 ³ = 16	525 P = 42 Px10 ³ 525 P = 39 " 81 Px10 ³	747 <u>PXIO</u> 3
ao Diversion Dam Reservoir	19.09 ha x 15,000 F	20 house × 16,200 mg 20 house × 300 mg × 2.67	9.09 ha x 2,157 # 3.28 ha x 0.6 x 1.7 x	
Table 45-8 Compensation Cost of Malinao	Paddy: Irrigated Grass lands and forest Sub-total			Grand Total

Alternative Cost Estimation

In estimating the project cost, following unit cost divided into two proportions of foreign and local procurements have been used;

Item :	Forei	gn Procureme	nt Local	Procuremen
		(%)		(%)
Cement (Portland))	20	14 fe - 14 fe - 15 fe	80
Cement (P.S. Slag		80		20
Tuel Oil		50	A Section of Section	50
Deformed bar	1.0	50		50
Explosive (Dynami	ite)	·		1.00
Explosive (A.N.F.		100		
Fuse, & Cap		100		- 3
Bit & Rod		100	ing the property of the section of t	.

However, as the afternatives, following three cases of unit costs are used for estimation of the project cast, and their results are summarized in Table 4E-9 to Table 4E-11.

Item		Foreign	Procurement	Local	Procurement
	the st	4. 1	(%)		(%)
a) Case 1				100	
Cement		160	0		100
0i1		1	100	1.55	0 0
Deformed	bar		50	er de la	50
b) Case 2	1.1		in the second se		
Cement			0		100
Oil	1 1	453	100		$\{ oldsymbol{0}_{i,j} \}_{i=1}^n$
Deformed	bar		100		0
c) Case 3					
Cement			0		100
Oil			50		50
Deformed	bar		50		50

Cost of the Project (Financial Cost) Investment Cost (Case tB-0. Table 4

		Appendix 4E-3 Page 2
	(13,966) (13,966) (5,209) (2,730) (2,733) (2,733) (1,800) (1,800) (6,901) (6,901) (765) (1,850) (1,350) (1,350) (26,166)	(30,091)
	Total 104,743 602 39,067 20,701 20,501 5,735 8,373 1,265 6,475 6,475 7,198 8,943 196,252	29,438
ial Cost)	Currency (\$7000) (\$700	(1,526) (11,696)
sct (Financial	10cal Curved (10cal Curved) 52,941 18,136 8880 15,744 2,466 1,265 1,265 1,265 1,519 3,198 2,745 5,551 1,344 76,285	11,443 87,728
of the Project 1)	Currency (\$7000) (6,997) (27,911) (2,576) (1,576) (1,471) (1,471) (6,833) (1,110) (1,110) (1,013)	(2,399) (18,395)
tment Cost of (Case 1)	Foreign (F '000) 51,802 183 20,931 11,821 4,757 2,348 11,033 11,033 8,323 7,599 1119,967	137,962
Table 4E-9. Investment	Description 1. Civil Works 1-1. Preparation 1-2. Dam 1-3. Diversion Dam 1-4. Irrigation and Drainage Canals 1-5. On-farm 1-6. Roads 1-7. Hydro-power 1-8. Pre-Engineering 2. Land Acquisition and Compensation 3. Construction 4. Agricultural Development 5. Operation and Maintenance Cost 6. Project Facility 7. Project Administration (8%) 8. Consulting Services Sub-total (1 to 8)	Contingency (15%) Total

															Ar		idi; ige	к 4 <u>1</u> З	3-3	
	Total	(\$,000)	(33,966)	(5,209)	(2,760)	(2,733)	(05#)	(1,800) (169)	(883)	(106,8)	(203)	(-765)	(3,850)	(1,192)	(26,166)	(3,925)	(30,091)			
	Tot	(000. d)	104,743	802 39 , 067	20,701	20°501 5,735	3,373	13,499 1,265	6.475	51,762	0015.T	5.738	13,874	8,943	196,252	29,438	225,690			
moial Cost)	Currency	(\$,000)	(6,529)	(2,232)	(1,079)	(T,952)	(288)	(321) (169)	(863)	(88)	(203)	(633)	(869 -)	(179)	(8,599)	(66,1,0)	(11,038)			
oject (Fina	Local Cu	(000₁∰)	48,366	419 16.740	8,095	3,240	2,158	2,404	6.475	512	1,519	4,745 4,745	5,233	4 4€.4	71,992	10,798	82,790			
Cost of the Project (Financial Cost	Currency	(\$,000)	(7,437)	(24)	(1,681)	781)	(162)	(1,479)		(6,833)		(000)	(1.152)	(1,013)	(16,567)	(2,486)	(19,053)			
Investment Cos	Foreign	(000 ₄ 4)	55,777	183	12,606	ങ് ഉദ്ദേ ആവ	1,215	11,095		51,250		(0 0	0.56 149.8	7,599	124,260	18,639	142,900			
Table 4E-10.	Description		1. Civia Works	1-1. Preparation	1-3. Diversion Dam	1-4. Irrigation and Drainage Canals		Hydro-power	•	3. Construction Equipment	4. Agricultural Development	5. Operation and Maintenance Cost	 rroject racinty Project Administration (8%) 	8. Consulting Services	Sub-total (I to 8)	9. Contingency (15%)	A Manual Manua			法,就是不是一个人,我就是一个人,我们就是一个人,我们就是一个人,我们就是一个人,我们们就是一个人,我们们们就是一个人,我们们们们们们们们们们们们们们们们们们们们们们们们们们们们们们们们们们们们

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Table 4E-11.			

	Appendix 4E-3 Page 4
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CHAPTER V. PROJECT IMPLEMENTATION AND OPERATION

Construction Planning of Major Civil Works

A. Pamacsalan Dam

(1) Workable Days for Construction Works

It is known that construction of fill-type dam is quite affected by the meteorological and seasonal conditions especially by rainfall. Actual workable days for the embankment works vary with kind of the embankment materials surface impervious, semi pervious materials and rock. In constructing of center core fill-type dam, it is usually required to embank various kind of the materials at the same elevation. Delay of impervious zone embankments which would be affected by weather might cause to delay the works for other zones of the dam embankments. Consequently planning of construction works should be made taking into consideration the workable days which would be affected by the seasonal conditions.

Workable days for the construction works were enumerated based upon the rainfall data for the period of 10 years from 1967 to 1976 (see Table 5A - 1). From this table, the workable days for impervious zone embankments of the Pamacsalan dam is estimated at 176 days per annum. And even in the wet season, 11 to 16 days of workable days exist. Therefore, monthly workable days could be considered; 15 days for impervious zone embankment and 25 days for other zones of embankments, concrete placing and earth works on average.

The daily working hours are decided at eight hours for normal works and seven hours for equipment operation considering the adjustment of equipments before operation.

(2) Construction Schedule

Judging from the above mentioned workable days, the construction works would be executed with heavy construction equipments. The construction schedule is planned after due consideration of various conditions such as proposed construction method, expected production rates

Table 5A-1 Workable Days for Construction Works

	Monthly Average Workable days	13	25						2	
	Annual Total	176	300	6 0						
	Pec.	#	25	daily rainfall data observed a 1967 - 1976), and the criteria ollows:	on in Alexandra Australije					
W	Nov	7	, 2 , 2 , 3	data ol and the				(A)		
Workable Days for Construction Works		77	28	ainfall c 1976), an		dày	S	for three days	r days	
ructio	Sep	'	25	ly rair 7 - 191 ows:	reektjei George	on that	two days	or thre	Non-workable for four days	
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ays for	ign () ()	ო ო		computed by using the station for 10 years (workable days are as 1	t: Workable	Non-workable	Non-workable	Non-workable	n-work	
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ole 5A-1	Apr	22	82	was c auge s n of w	material 1.0 mm	· · · · · · · · · · · · · · · · · · ·	.o	ı	T	
Table	Man	18	25	Workable days was Dagohoy raingauge for estimation of	· · · ·		30.0	50.0	lan 50.	
	Feb.	7	% %	Workable Dagohoy for estin	Impervious Less than	.1 to	10.1 to 30	30.1 to 50	More than	
	Jan.	al 12	25 55	Note: W			. 			
	Description	Impervious material	Pervious material) Concrete works Earth works							

of equipments and plants, and Figure 5A - 1 indicates the proposed construction schedule for Pamacsalan dam.

(3) Construction Equipment

Necessary construction equipments for the construction of Pamacsalan dam are estimated based upon the expected workable days and construction schedule. The proposed equipments and vehicles will be loaded in Tagbilaran, and then delivered to the construction site by trailers or trucks. To transport these equipments and vehicles to the site, improvement of the existing roads and bridges together with access roads should be completed prior to the commencement of construction works.

(4) Interest and Repair Cost of Construction Equipment

The interest and repair costs of construction equipments are estimated by the following method;

a) Interest

 $I = C \times P \times (A + B + E + F)$

where: I: interest

A: B:

C: Purchase price of equipment

P: Percentage of original cost

Useful Life		Percentage						
(Year)		of Purchase	Price					
2		75.00						
3		66.67						
tţ		62.50						
5		60.00						
6		58.33						
7		57.14						
8		56.25						
9		55.55						
10		55.00						
Percentage	of	interest	7%					
Percentage			1%					
Percentage			0					
Percentage			2%					

FIGURE 5A-1 CONSTRUCTION SCHEDULE FOR PAMACSALAN DAM

Discription	Q'ty		· · · · · · · · · · · · · · · · · · ·	1980			ļ		198					···	82					983					190						1985	-	
. Construction Works for \	Vhole Project								.	•			_															-					
2. Diversion Tunnel	(L=385 m)																				1					Ì							
Excavation	10,860 m ³	1 1	*.													.]				1		.	-		Ì	1							
Concrete	2,760 "						-							;								.											
3. Foundation Works																	\ \																
Stripping	31,500 m ³								-																		-						
Core trench	36,100 "						-																	ĺ		l							
Grouting	53,100 "														•														一十	=			
4. Dam Body																																	
Core	91,000 m ³							1							` }												+	十			.	1	
Filter	34,000 "	1							.				:															十					
Rock	449,000 "	1	1										1																				-
Coffer dam	15,000 "														[.			.						
5. Spill Way																																	ļ
Common excavation	43,500 m ³							. [l						.					
Rock excavation	316,900 "		:					.				.													_	-				-			
Concrete	14,700 "										.]					72							Ma	nu fa	cture		+	_					
Gate	3 sets	1		1	1										Ī				1				+			•	-	-	-	-	~		
6. Intake Facility Concrete	1,770 m ³							-			ļ			1	-																		1
Cone Valve	1 set	1			1			.	1											<u> </u>						M							
Butterfly Valve	1 set					.																			- +		nutac	T	-				
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7. Left Abutment								.																	İ						1.71		
Stripping	10,500 m ³								}			-	•												.					-			
Rock excavation	60,900 "								1	•					-											-				* .			
8. Road			Ì	\\				. }										} .	} '														
Relocation road	1,000 m																					. }	.								•		
Access road	1,500 "												1	.												.							.
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		Appendix 5A-1
		Page 5
Table 5A-2 List of Required	Construction Equip	ment
Equipment	Specification	Numbers
Bulldozer	22 ton	2
Bulldozer	16 ton	1
Bulldozer	11 ton	6
Front-end-Loader	2.2 m ³	2
Front-end-Loader	1.8 m ³	1
Front-end-Loader	1 .11 m3	3
Dump truck	11 ton	11
Dump truck	8 ton	6
Dump třučký.	6 ton	11
Air Compressor	110 PS	y
Diesel generator	100 KVA	j
Diesel generator	30 KVA	1
Crushing & Screening Plant	40 t/br	1
Mixing, plant	30 m³/hr	
Truck mixer	3.0 m ³	3
Concrete pump car	40 m³/hr	1
Vibrator	Engine type 5PS	5
Rocker shovel	0.4 m³	1
Blower	400 m/m 15KWx2	1
Leg drill	air-2.7 m³/min	10
Crawler drill	air 10 m /min	1
Tamping roller	10 ton	
Vibrating roller	2.5 ton	1
Vibrating (pulling)	10 ton	1
Boring machine	1984 E. M. (178)	10
Grout-pump	w/mixer	5
Motergrader	4.0 m	
Tractor trailer	25 ton	1
Pump	100 m/m 11 KW	1.6 (2)
Pump	125 m/m 15 KW	1
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	Appendix 5A-1
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Table 5A-3 Quantity of Const	ruction Works
Description	Quantity
1. Dam	
1-1. Diversion Tunnel	
Common excavation	9,500 m ³
Open concrete	930 ^{††}
Tunnel excavation	10,860 "
Tunnel concrete	2,760 "
1-2. Foundation	of the first state of the second
Stripping	31,500 m ³
Coretrench	36,100:#
Grouting	53,100 m
	The Company of the State of the Company of the Comp
1-3. Dam body Impervious material	91,000 m ³
Filter	34,000 10
Pervious material	449,000 "
Cofferdam	15,000 tr
1-4. Spill Way	43,500 m ³
Common excavation	316,900 "
Rock excavation	14,700 "
Concrete	3 sets
Cate	order og skille for til flytte fra flytte fra 1900 og filler og filler og filler og filler og filler og filler Filler
1-5. Intake Facilities	en e
Concrete works	1,770 m ³
Penstock	Legacian la set,
Core Valve	a _{ng} an 1 _{ng} a _{ng} an i
Butterfly Valve	
1-6. Left Excavation (above EL 25	
Stripping	10,500 m ³
Rock excavation	60,900 "
1-7. Roads	
Access road	1,500 m
Relocation road	1,000 "
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·夏季的主义的主题,并不是自己的主义的主义。	

b) Minor repair cost

$$A = C \times H$$

where: W: minor repair cost

d: purchase price of equipment

H: percentage of depreciation 30% Depreciation (D)

$$D = (C - S)/Y$$

D: depreciation cost

C: perchase price of equipment

Si salvage value of the unit price 10%

Y average life of equipment (year or hour)

B. Malinao Diversion Dam

(1) Construction Sheedule

The construction schedule of the Malinao diversion dam is decided considering the protection from flood and construction cost of cofferdam for alternation of the water course. The concrete works of dam body will be carried out for four months from February to May in extending two years, and the excavation and grouting of base for dam body which should be finished before the concrete works will be constructed untill the end of January in each year.

Construction of Malinao diversion dam will be started from October in FY 1980, and completed at the end of FY 1982, as shown in Figure 5A-2.

(2) Construction Equipment

Necessary construction equipments for the construction of Malinao diversion dam are estimated based upon the construction schedule and work volumes. (See Table 5A - 4) Most of the equipment and vehicles will be loaded in Tagbilaran, and then delivered to the construction site.

CONSTRUCTION SCHEDULE OF MALINAO DIVERSION DAM

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1980						1		1997/7 199 7/1		• • • •				1000 (1 			in in
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Quantity		20,200 m ³	24,700 "	40,400 "	10,700 "		4,250 m	4,250 "	ongo Sila Sila Sila	4,750 m ³	16,700 "		3 æt	**		800 m	000,1
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Discription	Earth Works	cavation (Co	cavation (In	ompaction fil	Borrow fill	undation Wor	Boring	Grouting	Concrete Works	Concrete (A)	Concrete (C)	Gate	Gate	Bridge	Others	Plain rip-rap	Sodaing
	Outputity 1980 1980 1980 1980 1980 1980 1980 1980	Output(ty 1980)	Common) 20,200 m ³	(Common) 20,200 m ³ (Indurated) 24,700 "	(Common) 20,200 m ³ (ndurated) 24,700 "	(Common) 20,200 m ³ 24,700 ° 10,700 °	mon) 20,200 m ³ 1980 1981 10,700 °C 1981	(Common) 20,200 m ³ (Motive tea) 24,700 m ³ (Motive tea) 40,400 m ³ (Motive tea) 4,250 m ³ (Motive	mon) 20,200 m³ ated) 24,700 " 40,400 "	mont) 20,200 m ³ 20,200 m ³ 40,400 " 10,700 " 4,250 m	mon) 20,200 m ³ ated) 40,400 m 4,250 m 4,750 m ³	mon) 20,200 m ³ arted) 24,700 " 40,400 " 4250 m 4,750 m ³	Works 20,200 m³ wation (Common) 20,200 m³ paction fill 40,400 " ow fill 10,700 " sting 4,250 m³ creæ (A) 4,750 m³	Works 1980 1981 Works 20,200 m³ 20,200 m³ wation (Indurated) 24,700 " 40,400 " pagetion fill 10,700 " 4,250 m³ ree Works 4,250 m³ 4,750 m³ cree (A) 4,750 m³ 3.5tt	Works 1980 1981 1982 Works 20,200 m³ 24,700 " 24,700 " 24,700 " 24,700 " 24,700 " 24,700 " 24,250 m² 24,250 m² 24,250 m² 25,250 m	Works 20,200 m³ 1980 1981 1982 Works 20,200 m³ 20,200 m³ 24,700 m³ 24,700 m³ 24,700 m³ 24,200 m³ 24,250 m³ 24,250 m³ 24,250 m³ 24,250 m³ 25,250 m³ 25	1982 1982 1987 1988

Table 5A-4. List of Required Construction Equipment

Equipment .	Specification	Quantity
Bulldozensky same by was an	The second of the second	ag (ge 38 m 3 m
Bulldozer	16 ton	
Crawler-tractor-mounted show		3
Dump truck		- Jan 1987
Air compressor	110 PS	2
Diesel generator	100 KVA	4
	30 KVA	1
Crushing & Screening plant	30 t/h	1
Concrete Mixing Plant	30 m ³ /h	l .
Truck mixer	72 7 1 2 3 . O m ³ 1 201	ું શાહુ સુધાનું મહાલું મહિલ્લા
Vibrator	Engine type 5PS	
Leg drill	air 2.7 m ³ /min	b
Vibrating roller	10 ton	Ţ
Tracter (to two the vibrating Boring machine	g roller) 11 ton	$\overset{1}{2}$
Grout pump w/mixer		1
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	新加州·马克克 (1914年)	医凯尔马氏性畸胎
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Table 5A-5. Ouar	itity at Construction Wo	kyster i 1900 -

Table 5A-5. Quantity at Construction Works

	Description	Qùanti	<u>ty</u>
1.	Earth works		
	Excavation (common)	20,200	m ³
	Excavation (indurated)	24,700	if
**:	Compaction-fill	40,400	11
€.	Borrow-fill	10,700	0
2	Foundation & Concrete		
	Boring	4,250	j m (2004) je je
	Grouting	4,250	ii.
	Concrete A (3,000 psi)	4,750	e <mark>ff</mark> icación a casa
	Concrete B (Mass. Con.)	16,700	. 11
	Deformed bar	381	ton
	Plain riprap	800	∖ д 3
	Sodding	1,000	
3.	Gate		
	Sluice gate (2 x 13.00 x	7.00) 135	ton
-	$^{\rm n}$ (1 x 13.00 x		
	Bridge (steel gater)	30	, 43
	Head gate (3 x 1.50 x	1.50) 5	If
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C. Irrigation and Drainage Canal

(1) Construction Schedule

The construction of irrigation and drainage canal will be started from FY1982 on the same schedule of on-farm development, and will be completed in FY1985. Yearly construction of irrigation or drainage canals including those of the upper area are as shown below;

Construction Schedule of Irrigation and Drainage Canal

		Irrigation	Canal	Draina	ge Canal
Year	Main	Lateral	Sub-lateral	Main	Lateral
	<u>(m)</u>	(m)	(m)	(m)	(m),
1982	5,300	14,230	15,720	12,800	6,000
1983	7,300	13,780	4,260	-	23,000
1984	3,700	11,720	8,360	5,000	18,400
		(13,880)			
1985	11,060	6,460	11,520	-	22,000
		(4,050)	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	te de la constitución	
Total	27,360	64,120	39,860	17,800	69,400
				10 To 10 TO	:

(2) Construction Equipment

Necessary construction equipments for the construction of irrigation and drainage canals are estimated as follows, based on the construction schedule and work volumes.

sar ang dad

Table 5A-6. List of Required Construction Equipment for Irrigation and Drainage Canals

			조현원 (19.7일 원래원) (3. 120 원조 최조 전기 (2.4)
Equipment	Specification	Quantity	
Bulldozer Bulldozer Dump truck	11 ton 2 ton 6 ton	20 4 4	Maria (1864) maria (1864)
Back hoe Tire roller	0.0 111	- 4	
Front-end-lorder Concrete pot mixer	0.3 m ³	2 10	
Portable belt conveyer Lammer	L = 7 m 90 kg	6 10	

d Construction Fault Table 5A-7. List of Required Construction Equipment for Road Construction

	Specification Quantity
	22 ton 3
Dump truck	The state of the s
Front-end-loader	**************************************
Motor grader	$(\cdot,\cdot)^{2}$ in $(\mathfrak{p}^{\mathfrak{l}}_{\mathfrak{m}})$ is then $(\mathfrak{p}^{\mathfrak{l}}_{\mathfrak{m}})$ is $(\mathfrak{p}^{\mathfrak{l}}_{\mathfrak{m}})$
Tire roller	8.5 √ 20 ton

D. On-farm Development

(1) Construction Schedule

Lower Area

On-farm development of the lower area will be started from FY 1982 which corresponds to just one year late from the commencement of the diversion dam, and will be completed in FY 1985. Yearly on-farm development areas to be reclaimed is decided as shown below through the study on expectable irrigation water after completion of the diversion dam.

On-farm Development Area in Lower Area

Year	Area to be reclaimed (ha)	Cropping / Wet Season	Dry Season
1982	1,365		3,365
1983	1,392	1,365	2,757
1984	1,198	2,757	2,757
1985	845	2,757	4,800

As is seen in the above table, the area of about 2,760 ha will be planted by the 2nd paddy crop (dry season paddy) from October in 1983, but the cropping area which could be irrigated by the constructed diversion dam will not be increased up to the 1st paddy crop (wet season paddy) due to lack of irrigation water, although the reclamation area will be increased year by year. However, after implementation of Pamacsalan dam in June 1985, the reclaimed area of 4,800 ha will be fully used for the 2nd paddy crop.

Yearly extent of reclamation area from 1982 to 1985 is shown in Figure 5A-3 and Table 5A-8.

Upper Area

Since the upper area is situated at an independent areas without relation to the proposed Malinao diversion dam, the construction of

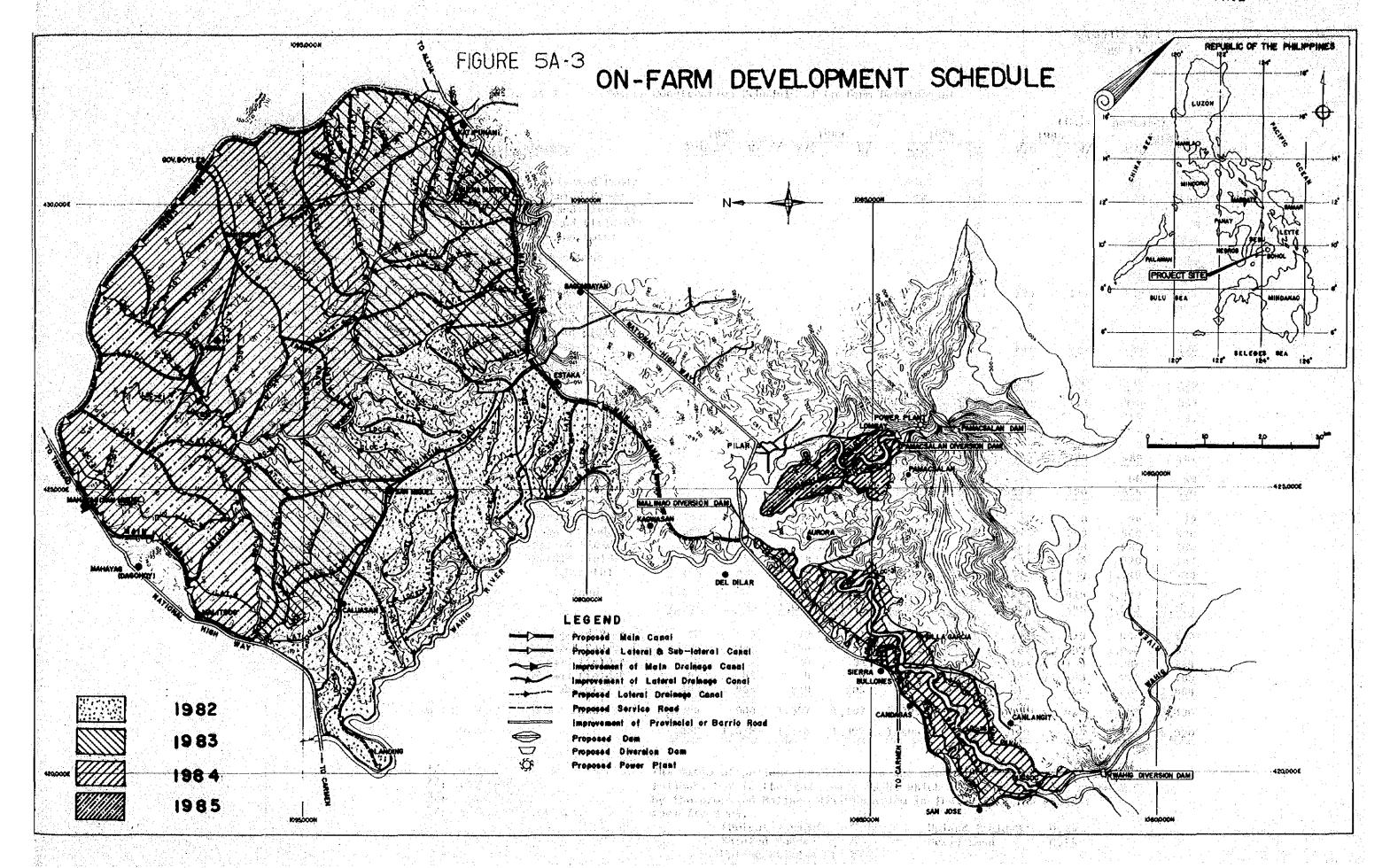
farm land development of the area, which consists of almost rehabilitation of existing irrigation and drainage systems, is scheduled to be carried out in 1984 for the Wahig upper area and in 1985 for the Pamacsalan upper area.

(2) Construction Equipment

Necessary construction equipments for the construction of the farm land development are estimated as follows, based upon the construction schedule and work volumes.

List of Construction Equipment

Equipment	Specification	Quantity		
Bulldozer	22 ton	9		
Dump truck	6 ton	1		
Back hoe	0.6 m ³	1		



Yearly Construction Schedule of On-farm Development Table 5A-8.

			j	1982	1	983		984		(Unit:		otal
Area	Present Land Ca	tegory	<u>W/0</u>	<u>W/</u>	2/ W/O	<u>W/</u>	W/0	W/	<u>w/o</u>	<u>W/</u>	W/O	<u>W/</u>
Upper Area Wahig	Cultivated	Irrigated Paddy Rainfed Paddy Upland Field-A ³ / Upland Field-B ⁴ / Sub-total					264 83 - 3 350	256 82 3 341			264 83 3 350	256 82 3 341
	Un-cultivated Sub-total	Grass Land					66 416	59 400			66 416	59 400
Pamacsalan	Cultivated	Irrigated Paddy Rainfed Paddy Upland Field-A Upland Field-B Sub-total							130 9 - 139	111 9 - 120	130 9 - 139	111 9 - 120
	Un-cultivated Sub-total	Grass Land							139	120	139	120
Sub-total	Cultivated	Irrigated Paddy Rainfed Paddy Upland Field-A Upland Field-B Sub-total					264 83 3 350	256 82 - 3 341	130 9 - 139	111 9 - 120	394 92 3 489	367 91 - 3 461
	Un-cultivated Sub-total	Grass Land	· .				66 <u>416</u>	59 <u>400</u>	139	120	66 555	59 520
Lower Area	Cultivated	Irrigated Paddy Rainfed Paddy Upland Field-A Upland Field-B Sub-total	47 395 - 51 493	46 376 - 43 465	12 164 39 4 219	11 156 34 4 205	7 156 84 114 361	7 148 71 97 323	8 253 164 51 476	8 240 139 43 <u>430</u>	74 968 287 220 1,549	72 920 244 187 1,423
	Un-cultivated Sub-total	Grass Land	1,059 1,552	900 1,365	1,397 1,616	1,187 1,392	1,029	875 1,198	488 964	415 845	3,973 5,522	3,377 4,800
<u>Total</u>	Cultivated Un-cultivated	Irrigated Paddy Rainfed Paddy Upland Field-A Upland Field-B Sub-total Grass Land	,47 395 51 493 1,059	46 376 - 43 465 900	12 164 39 4 219 1,397	11 156 34 4 205 1,187	271 239 84 117 711 1,095	263 230 71 100 664 934	138 262 164 51 615 488	119 249 139 .43 550 415	468 1,060 287 223 2,038 4,039	439 1,011 244 190 1,884 3,436
	Total	orass halla	1,552	1,365	1,616	1,392	1,806	1,598	1,103	965	6,077	5,320

Note: 1/: without project
2/: with project
3/: upland rice
4/: corn, cassava etc.

The ratio of project facilities to the area before construction is as follows, but in the upper area 19 ha which is the areas to be submerged by the proposed Malinao diversion dam is included in the project facility area.

Irrigated Paddy: 0.02 Rainfed Paddy : 0.05 Upland Field-B: 0.15 Grass Land : 0.15

Upland Field-A : 0.15

Additional Investigation (Pre-Engineering Works)

1. Survey and Investigation for Civil Works

A. Pamacsalan Dam

Additional topographical, geological and embankment materials investigations for the proposed Pamacsalan dam will be needed at both field and laboratory in order to obtain sufficient data prior to preparation of the more detailed design works.

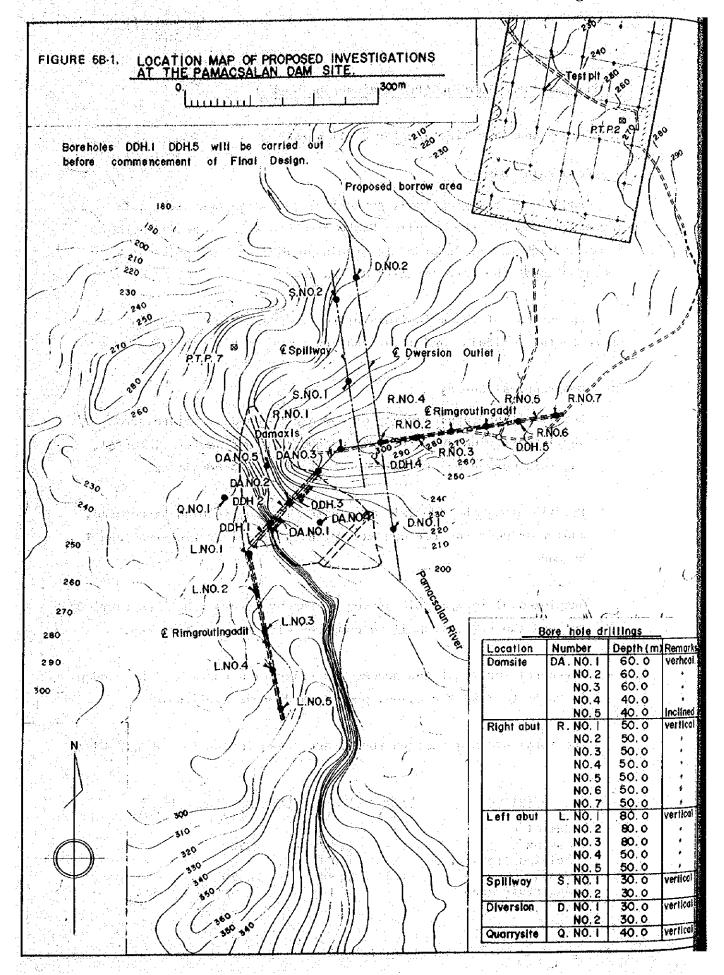
An outline of the main items of recommendable investigations are shown in the following and locations are drawn in Figure 5B-1.

1. Topographical Survey

- Operailed topographic survey of dam and related structure areas shall be carried out with grid method of twenty meters interval, and main survey points shall be kept with good condition.
- Profile along the dam axis and center line of related structures, and cross sections for dam axis with twenty meters interval shall be made.
- Out and the results shall be compared with the existing map.
- A general survey of the access and relocation roads will be needed in order to make the plane, profile and cross sections.

The total amounts of each survey are shown in the following table;

Location	Plane	Profile	Cross Sect	ion Check
	(ha)	(m)	(m)	200 (m)
Dam s ite	36	-	·	·
Dam axis	· · · · · · · · · · · · · · · · · · ·	1,200	2,750	200 - E
Related structures	* ¹	1,050	_	
Roads	1.3	2,500	2,520	e di ke in ke in di ke
Reservoir area	-	<u>-</u>	~	50



2. Geological Investigation of the second se

(a) Seismic Exploration

Prospecting in bore holes shall be performed along the dam axis and center line of rim grouting in order to grasp the geological structure and location of sink holes and Karstic cavities. Also prospecting on ground surface is recommended along the river course, center line of spillway and diversion tunnel. These investigations will be performed by Consultant's Engineering Geologist and Counterparts with the prepared equipment during design stage and measurement length of the prospecting for each site is recommended as follows;

Prospecting M	lethod Damsite	Abutments	Spillway	Diversion
n. 2 francis	(km)	(km)	(km)	(km)
On ground	0.2		0.6	0.6
In bore ho	les	0:7	$= - \left(\frac{1}{2} \right) \right) \right) \right) \right)}{1} \right) \right)}{1} \right) \right)} \right)} \right)} \right)} \right)} \right)} \right)} \right) \right)} \right)}$	and 🕶 the per

a de la combinação de la calendar de la compansión de la calendar periodo. En calendar de la calendar de la ca

(b) Electric Resistivity Survey

Electrical prospecting with specific resistivity method should be carried out along the dam axis, center line of rim grouting and related structures in order to obtain the underground condition by analysing information of the geoelectrical difference between layers. This survey will be performed by Consultant's Engineering Geologist and Counterparts with the prepared equipment during the design stage and measurement length of the prospecting for each site is recommended as follows:

Damsite	Abutments	Spillway	Diversion
(km)	(km)	(km)	(km)
0.2	0.7	0.4	0.4

(c) Bore Hole Drilling

o Five bore holes of two slight angle inclined and three vertical are recommended around dam site with coring and water-pressure test.

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- o Twelve bore holes with fifty meters interval are recommended along the center line of rim grouting for the prospecting in bore holes. The depth will be desirable down to reach the alternation of sandstone and shale through the limestone formation, however it will not be exceeded about eight meters and total length of drilling can be expected about seven hundreds and fifty meters.
- o Four bore holes for the spillway and diversion structures are recommended at the entrance and outlet portions with vertical for a depth of thirty meters in each.

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- o Since the quarry site for rock material will be selected above dam crest portion at both abutment, the data of core-borings at the dam site and both abutment can be utilized as the quarry site data. Therefore, one bore hole is recommended at the left abutment with vertical down to reach the dam crest for a depth of forty meters.
- Symmetrically distributed six bore holes are recommended near the Manaba river mouth with vertical for a depth of ten meters in each.

 Total length of bore hole drillings at the each site are shown in following table.

Dam site	Abutments Spillway	Diversion	Quarry site	Aggregate
(nosm)	(nosm) (nosm)	(nosm)	(nosm)	(nosm)
5-260	12-750 2-60	2-60	1-40	6-60

kala diselektra kali peranjektir kali kalik diselektra karangin di kejer antak bara 1991 di kalik berandan li

3. Material Investigation

(a) Rock Quarry

Some blasting at the out crops will be desired to grasp experiment explosive and characteristic of the quarried rock. Samples of blasted rock and boring core should be sent to the laboratory for the soil tests.

Bibliography of without the first win to be a depth figure of this make the

(b) Borrow Area (Impervious Materials)

Exploratory pits with fifty meters interval grid are recommended to obtain the total amount of available materials and to gather all the needed samples for soil tests. The grid will be extended on the hilly slope of the right abutment from the downstream around existing test pit No.2. The digging depth will be necessary to reach the bed rock or coarse material in bottom, it will not be exceeded about five meters. The total number of pits will be established during the investigation, however it can be expected a total of about thirty holes. Samples should be collected from each pit at various depth, especially where some change in textures seems to appear.

(c) Aggregate pit

Two exploratory pits will be digged to gather all the needed samples for concrete aggregate tests near the Manaba river mouth. Also digging of four exploratory pits will be performed along the Pamacsalan river banks at the upstream of damsite to confirm the amount of available deposited gravel and cobble, and to smaple for concrete aggregate tests. The digging depth of all exploratory pits will not be exceeded about three meters.

(d) Insitu Test

Insitu bed-rock tests such as shearing and plate loading test should be carried out in the exploratory adits at the both dam abutment in order to obtain the bearing capacity, shearing resistance, modulus of elasticity and modulus of deformation for the bedrock. Insitu tests will be performed by Consultant's Engineering Geologist and Counterparts with prepared equipment during the design stage. Test embankment with full scale is desirable to obtain the most suitable compaction method and compacted properties of impervious clay, transition materials and shell rock, however these tests may be difficult to carry out during the design stage.

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(e) Laboratory Test

Laboratory tests shall be performed on smaples from the different borrow areas. The physical tests are required for promising sampled materials and dynamic tests with large scale testing equipment are also recommended for typical samples. A detail test programs will be established during the progress of investigations, however it can be expected as shown in the following table. Laboratory tests will be performed by Consultant's Soil Mechanical Engineer and Counterparts with prepared equipment during the design stage.

Laboratory Tests for Dam Construction

	<u>Items</u>	Impervious Materials (samples)		Materials	Aggregate
a)	Physical Test		1997 - 19 9 1 se		
	Specific Gravity		9 9	4	· · · · · ·
	Moisture Content Grain Size Analys	15 20	ita x so <mark>g</mark> ara		-
	Atterberg Limit	And a 16 20 dfs	afultin #dis	dan di f ire	ing a se t iga sa Tanan
b)	Dynamic Test 1/ Compaction Triaxial Compress Direct Shear Consolidation Permeability	ion 10	9.	7	
c)	Rock Test Absorption Los Angleles Abra			5 5	4 4 4
	Sulphate Soundnes Compressive Stren	ath .	, sala og p e kale Hala sala a sala	1 1/ 5	en de M ejar La Santana

Note:

- 1/ tests shall be performed with large scale testing equipment
- 2/ mixed with fine materials and blasted rock materials in three proportions

3/ blasted rock materials

B. Malinao Diversion Damed engine describing a ground applications

the Continues and the first of the second

1. Topographical Survey

O Detail topographic survey of the proposed diversion dam shall be carried out with grid method of forty meters interval.

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Profile along river at the proposed site and dam axis and also cross sections for these sites shall be made with 40 meter interval.

The total amounts of each survey are shown in the following table.

Location	Plane	Profile	Cross Section
	(ha)	(m)	estituese(m) efetigie i ti
Diversion Site	20	← ·	y garana a n Bagadaa
Dam axis and lon tudinal section	gi-	1,600	8,000 (40 sec x 200m)

2. Geological Investigation

• Two bore holes of vertical drilling with 30 meters at the river bed of the proposed diversion site and two drillings at each abutment of it are recommended with coring and water-pressured test.

3. Materials Investigation

As same as the laboratory test in case of dam construction, the laboratory tests such as physical test, dynamic test and rock test shall be performed on smaples. A detail total programs will be established during the progress of investigations, however, it can be expected as shown in the following table.

Composite Committee Committee

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Laboratory Tests for Diversion Dam Construction

Items	Impervious Materials (samples)	Concrete Aggregate (samples)
a) Physical Test Specific Gravity Moisture Content Grain Size Analysis Atterberg Limit		
b) Dynamic Test Compaction Triaxial Compression Direct Shear Consolidation Permeability	2 2 2 2 2	ing of the second secon
c) Rock Test Absorption Los Angeles Abrasion Sulphate Soundness Compressive Strength		the state of the state of the state of

C. Irrigation and Drainage Canals

The profile and cross section surveys for the proposed main, lateral and sub-lateral irrigation and drainage canals shall be performed for the detail design of the canals and related facilities. The following table shows the proposed length of survey.

Item	Profile	Cross Section
· · · · · · · · · · · · · · · · · · ·	(km)	(km)
Irrigation Canal	131.3	164.2 (3,283 sec x 50 m)
Drainage Canal	97.8	122.2 (2,445 sec x 50 m)

The second of the second second second of the second of the second of the second of the second second of the second secon

II. Hydrological Observation

The punctual observation of meteorology and hydrology by the newly installed raingauges and water level gauges is very important to justfy the project in the final design stage, so that such observations shall be conducted.

 Sediment sampling is necessary to estimate the sedimentation in the proposed dam. Especially, sediment sampling during high flood is needed.

III. Agricultural Survey

A. Soil Survey

O Soil survey and chemical analysis shall be made at sample spots in the whole Project Area which is selected at every 30 - 50 ha and land classification map indicating land capability and soil suitability for crops to be introduced shall be prepared based on the result of survey.

B. Cadastral Survey

Cadastral survey covering the whole Project Area shall be implemented at the early stage of the construction, and the present status of land tenure shall be clear for smooth execution of organization of compact farming systems to be introduced after the completion of on-farm development.

		aj esployador Victoria	Toyan (1973)
. Irrigation			egina (i i i i i i i i i i i i i i i i i i i
. Salaries and Wages		en en en en en en en en en en en en en e	
<u>Items</u>	No. of Personnel	Salary per Annum (P)	Total Salary per Annum (P 1000)
ain Project Office			(F 000)
Irrigation Superintendent	1	16,130	16.1
Asst. irrigation supt.	2	12,360	27.9
Agriculturist	1	12,360	12.4
Administrative officer	1	9,410	9.4
Supervising water management Technologist	2	8,270	16.5
Water management technicians	12	7,190	86.3
Dichtenders	60	5,110	306.6
Instrumentman	ı	7,190	7.2
Casher I	1	8,270	8.3
Accounting clerk I	1	6,320	6.3
Store keeper II	1	5,910	5.9
Clerk II	1	5,910	5.9
Clerk I	1.	5,510	5.5
Bill collector	2	6,320	12.6
Billing clerk	2	5,910	11.8
Seculity guard	3	5,910	17.7
Janitor	1	4,440	и. ц
Driver	8	5,910	47.3
Heavy equipment operator	ц	7,190	28.8
Auto mechanician	1	5,910	5.9
Survey alde	2	5,510	11.0
Sub-total			653.8

Casual employees for repair works (60day per year)

a. Cons't foreman	$1 \times 25 =$	25	e tropical state for	The selection of the se
b. Mason foreman	1 x 25 =	25		
c. Skilled labor	$8 \times 21 = 1$	68		r (m. 1975). 1847 (Setting), medicina
d. Laborers	20 x 16 = 3			
	ting grant and the	38		0.5
			900	
Pamacsalan Dam and	\$40 x 1 1 1 1		i divini di	and the state of t
Malinao Diversion Dam O	peration Offi	ce	profit the state of	ent state of
Pamacsalan Dam:	Branch Maria		e e e e	service and control of
Superintendent		· T	16,130	16.1
Mechanical engineer		1.	12,360	12.4
Gate Keeper	er englisher Tanggar	1	7,190	7.2
Electrical engineer	er (filtiger en la la la la la la la la la la la la la	1	12,360	12.4
Driver	ing the second of the second o	1	5,910	5.9
Janitor	u Dielegen van de State van de State van de State van de State van de State van de State van de State van de S Dielegen van de State van de State van de State van de State van de State van de State van de State van de Sta	. 1	5,910	5.9
Watchman		6	5,910	35.5
Sub-total		ere dia Berraya	ar i kalentij i Si den skalase iden	138.6
Malinao Diversión Dam:	188,213H		t oute Chate is	A Parish
Mechanical engineer	enter (m. 1800). Onter (m. 1800).	1	12,360	12.4
Gate Keeper		1	7,190	A. 7.2
Driver		1	5,910	5.9
Watchman	$\mathcal{F}_{i}(\mathcal{F}_{i}) = \mathcal{F}_{i}(\mathcal{F}_{i})$	3	5,910	17.7
Sub-total			e programa de la composição de la compos	43.2
			Harry and the second	The state of the s
Total			er og skille till ender en	891.8 = 892
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			and the secretary	

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2. Equipment Operations

a). Depreciation Cost

Machinaries	Quantity	Unit Cost (P)	Total Cost (P 1000)	Depreciation Cost (P '000)
Main Project Office	: •	(1)	(# 000)	(F 000)
Dump truck (8 ton)	2	150,000	300	
Truck, Flatbed 6ton	1	110,000	110	11.
Station Wagon 4 x 4	i	100,000	100	10.114
Jeep Utility Vehicle 4 x 4	5	75,000	375	68
Motorcycle, 90cc	110	9,000	360	81
Mixer, concrete, 0.3cu.m	2	37,000	74	8
Water pump, 2-4" size	2	8,000	16	2
Weed cutter	30	3,000	90	27
Radio transciever	3	60,000	180	18
Meteorological station	2	15,000	30	3
Leveling instlement with sta and steel tape	ff 2	12,000	24	3
Transit with staff and tape	2	12,000	24 (37)	3
Current meter	1	4,000	4	$v_{i} = \hat{\chi}_{i} \cdot v_{i} \cdot \hat{v}_{i} \cdot \hat{v}_{i} \cdot \hat{\boldsymbol{J}}_{i} \cdot \hat{\boldsymbol{J}}_{i}$
Miscellaneous tools and equipment	L.S.		75	() 11
Wireless telephone	. 1	200,000	200	30
Wireless telephone	2	112,000	224	34
Emergency correspondence	1 .	15,000	15	2
Front end loader (1.4 cu.m)	1	382,000	332	38
Motor grader (& = 4.0m)	1	530,000	530	53
Tractor crawler (16ton)	1	525,000	525	53
Spare part (10%)	L.S.			49
Sub-total	·			535
Pamacsalan Dam and Malinao Diversion Dam				
Pamacsalan dam:				
Jeep, utility vehicle	1	75,000	7 5	14
Motor vehicle	1	9,000	9	3

e je da briki majega e. Prografia			Appendi: Page	
Machinaries	Quantity	Unit Cost	Cost	preciation Cost
		(P) (- 1000)	(P '000)
Malinao diversion dam:		75,000	75	14
Jeep, utility vehicle Motor vehicle		9,000	/3 9	 3
$(4,+,-)_{i,j}(x_i,x_j) = (2,-1)_{i,j}(x_i,x_j)$. .	3,000		•
Sub-total	erkapit Marington	es es es es es es es es es es es es es e		34
and the second of the second o		regional de la Santa. Vegas de Santa	and the second	
b) Fuel and Oil Cost				
P16.55 x 5,320ha =	¥88,046			88
Total:			ه طور د د د د د د د د د د د د د د د د د د د	657
。 1987年 - 1984年 - 東京大阪村、東京大阪大阪大阪大阪大阪大阪大阪大阪大阪大阪大阪大阪大阪大阪大阪大阪大阪大阪大阪			(05\$	87,600)
The second of th				
3. Materials and Supplies			engelot kom in	
a) Irrigation, drainage and	Road Systems	in a 1 Ber Wei Mille	tropic dispersion	
a) Irrigation, drainage and	and the state of t			
Excavation of irrig	ation and dra	inage cana		178
the control of the co	ation and dra	inage cana		178 178
Excavation of irrig 2.0m x 0.1m x 18 Gravel pavement of	ation and dra 9.28m x P4.7/ roads	inage cana 'm³ = P177.	92	178
Excavation of irrig 2.0m x 0.1m x 18	ation and dra 9.28m x P4.7/ roads	inage cana 'm³ = P177.	92	178 153
Excavation of irrig 2.0m x 0.1m x 18 Gravel pavement of	ation and dra 9.28m x P4.7/ roads 18,300m x P18	inage cana m³ = P177.	32 53,200	
Excavation of irrig 2.0m x 0.1m x 18 Gravel pavement of 3.5m x 0.02m x 1	ation and dra 9.28m x P4.7/ roads 18,300m x P18	inage cana m ³ = P177. 1.5/m ³ = P1	32 53,200	153
Excavation of irrig 2.0m x 0.1m x 18 Gravel pavement of 3.5m x 0.02m x 1	ation and dra 9.28m x P4.7/ roads 18,300m x P18	inage cana m ³ = P177. 1.5/m ³ = P1	32 53,200	153
Excavation of irrig 2.0m x 0.1m x 18 Gravel pavement of 3.5m x 0.02m x 1 Sub-to b) Building Main Project Office	ration and dra 9.28m x P4.7/ roads 18,300m x P18 tal	inage cana m ³ = P177. 1.5/m ³ = P1	32 53,200	153
Excavation of irrig 2.0m x 0.1m x 18 Gravel pavement of 3.5m x 0.02m x 1 Sub-to b) Building	ration and dra 9.28m x P4.7/ roads 18,300m x P18 tal	inage cana m ³ = P177. 1.5/m ³ = P1	32 53,200	153
Excavation of irrig 2.0m x 0.1m x 18 Gravel pavement of 3.5m x 0.02m x 1 Sub-to b) Building Main Project Office	ation and dra 9.28m x P4.7/ roads 18,300m x P18 tal	inage cana m ³ = P177. 1.5/m ³ = P1	32 53,200	153 -331
Excavation of irrig 2.0m x 0.1m x 18 Gravel pavement of 3.5m x 0.02m x 1 Sub-to b) Building Main Project Office 1,500m ² x P600/m Operaton Office	ation and dra 9.28m x P4.7/ roads 18,300m x P18 tal	inage cana m ³ = P177. 1.5/m ³ = P1	32 53,200	153 -331
Excavation of irrig 2.0m x 0.1m x 18 Gravel pavement of 3.5m x 0.02m x 1 Sub-to b) Building Main Project Office 1,500m ² x P600/m	ation and dra 9.28m x P4.7/ roads 18,300m x P18 tal	inage cana m ³ = P177. 1.5/m ³ = P1	32 53,200	153 331 36
Excavation of irrig 2.0m x 0.1m x 18 Gravel pavement of 3.5m x 0.02m x 1 Sub-to b) Building Main Project Office 1,500m ² x P600/m Operaton Office 250m ² x P500/m Housing	ation and dra 9.28m x P4.7/ roads 18,300m x P18 tal 2 x 4% = P36,	inage cana m ³ = P177. 1.5/m ³ = P1	53,200	153 331 36 5
Excavation of irrig 2.0m x 0.1m x 18 Gravel pavement of 3.5m x 0.02m x 1 Sub-to b) Building Main Project Office 1,500m ² x P600/m Operaton Office 250m ² x P500/m	ation and dra 9.28m x P4.7/ roads 18,300m x P18 tal 2 x 4% = P36, 2 x 4% = P5,	inage cana m ³ = P177. 3.5/m ³ = P1 0000 0/m ² x 4% =	92 53,200 ₽18,000	153 331 36
Excavation of irrig 2.0m x 0.1m x 18 Gravel pavement of 3.5m x 0.02m x 1 Sub-to b) Building Main Project Office 1,500m ² x P600/m Operaton Office 250m ² x P500/m Housing	ation and dra 9.28m x P4.7/ roads 18,300m x P18 tal 2 x 4% = P36, 750m ² x P600 200m ² x P600	inage cana m ³ = P177. 1.5/m ³ = P1 0.000 0.000 0.000 0.000	\$2 53,200 \$18,000 \$P4,800	153 331 36 5
Excavation of irrig 2.0m x 0.1m x 18 Gravel pavement of 3.5m x 0.02m x 1 Sub-to b) Building Main Project Office 1,500m ² x P600/m Operaton Office 250m ² x P500/m Housing Government Staff Guest house Consultants	ation and dra 9.28m x P4.7/ roads 18,300m x P18 tal 2 x 4% = P36, 750m ² x P600 200m ² x P600 320m ² x P800	inage cana m ³ = P177. 1.5/m ³ = P1 1.5/m ³ = P1	\$2 53,200 \$18,000 \$10,240	153 331 36 5
Excavation of irrig 2.0m x 0.1m x 18 Gravel pavement of 3.5m x 0.02m x 1 Sub-to b) Building Main Project Office 1,500m ² x P600/m Operaton Office 250m ² x P500/m Housing Government Staff Guest house	ation and dra 9.28m x P4.7/ roads 18,300m x P18 tal 2 x 4% = P36, 750m ² x P600 200m ² x P600 320m ² x P800	inage cana m ³ = P177. 1.5/m ³ = P1 1.5/m ³ = P1	\$2 53,200 \$18,000 \$10,240	153 <u>331</u> 36 5
Excavation of irrig 2.0m x 0.1m x 18 Gravel pavement of 3.5m x 0.02m x 1 Sub-to b) Building Main Project Office 1,500m ² x P600/m Operaton Office 250m ² x P500/m Housing Government Staff Guest house Consultants Equipment shed 3	ation and dra 9.28m x P4.7/ roads 18,300m x P18 tal 2 x 4% = P36, 750m ² x P600 200m ² x P600 320m ² x P800 ,000m ² x P200	inage cana m ³ = P177. 1.5/m ³ = P1 1.5/m ³ = P1	\$2 53,200 \$18,000 \$10,240	153 331 36 5 18 5 10
Excavation of irrig 2.0m x 0.1m x 18 Gravel pavement of 3.5m x 0.02m x 1 Sub-to b) Building Main Project Office 1,500m ² x P600/m Operaton Office 250m ² x P500/m Housing Government Staff Guest house Consultants	ation and dra 9.28m x P4.7/ roads 18,300m x P18 tal 2 x 4% = P36, 750m ² x P600 200m ² x P600 320m ² x P800 ,000m ² x P200	inage cana m ³ = P177. 1.5/m ³ = P1 1.5/m ³ = P1	\$2 53,200 \$18,000 \$10,240	153 331 36 5 18 5 10 24

				Appendix Page 5	5C-1
				rage J	
	randi Artista Karanta da Kung				
c) Others	x 40% = P172,00	0		Hong Digital	172
	Sub-total		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	gasta byetti k	172
	Total				601
				(US\$80	,100)
4. Administration	and General Ex	penditures			
P891,800	\times 30% = $P267,5!$	10	in the second		268
				(US\$35	,700)
			As a state of the	345 b	
B. Hydro-Power	in .	, c	Salary	Total Sala	ทบ
	and the second of the second o	o. of ersonel p	er Annum	per Annu	m
1. Salary and Was	ge		(P)	(P '000)	
Mechanical	engineer	1	9,410	9.4	
Electrical	engineer	- A	6,320	6.3 - 100 y 1 7 2 4	
Mechanical	operator	6 grade	5,910	35.5	
Electrical		3	5,910	17.7	60
	Sub-total			<u>68.9 ≑</u>	
	ar francisco	4		331	
2. Power plant	$14,425 \times 10^3$	x 1.15 X 0	UZ =	201	
3. Allocated cos	t of Damansalan	dam and			$c_{i,j}$ c_{j}
Malinao diver	sion dam	dan and	i dina. Ngjaran	en en en en en en en en en en en en en e	
	294.5 x 10 x	0.085 =	en en en en en en en en en en en en en e	25	
			ing the sector of the sector o	425	
	Total				
	Total	n de la companya de la companya de la companya de la companya de la companya de la companya de la companya de La companya de la co		e _n tia	
	Total			eg ^{tra}	

Torms of Reference for the consultant's Services

1. Objectives

The purpose of the consultant's services is to assist the Government in the effective implementation of the Integrated Agricultural Development Project in the Project Area.

The Consultant's services are divided into 3 phases as follows:

(1) The final detailed designs of the Project as well as the preparation of tender documents. It would cover about 43 man-months periods starting in June 1979. Highly qualified experts will be engaged including irrigation engineers, (team leader), engineering geologist, soil mechanical engineer, hydrogist, design engineers, and economist.

, id to the tipe to the particular test of the control of the cont

- (2) Construction supervision and training of local counterparts personnel in all phases of project activities. The service period extend over 61 man-months from January 1981 to February 1985. The required experts would be project engineers, and engineering geologist.
- (3) A plan of Agri-institutional establishment covering all agricultural institutional development program and training. It would cover about 35 man-months. Highly qualified experts will be engaged including a agronomist, agri-institutional expert and water and farm management expoert.

2. Specific Terms of Reference

The consultants will provide a team to undertake the followings of the consultant's services.

areal, here are provided base than and have against a supplied in a popular constitution of

The contracting the contract of the contract o

(a) To assist the prepation of detailed design, cost estimates, specifications and tender documents for civil works and for procurement of operation and maintenance equipments, construction machineries, construction materials and other goods and instruments necessary for the project;

- (b) To assist BIADP in the supervision of construction works under the project.
- (c) To assist and advise the Project Manager in preparing monthly construction schedule and work records;
- (d) To assist the relevant Government agencies to prepare agri-institutional establishment program which will include provision for:
 - (i) effective education of farmers in the project area through intensive demonstration and other means to enable them to adopt new cropping systems, diversify crops, use improved varieties of crops and improve cultivation practices;
 - (ii) strengthening of existing farmer's organizations and establishment of new organizations, of local farmers for the effective channelling of agricultural services;
 - (iii) adequate supply of agricultural credit and production requisites to these farmers as required for the recommended system of intensive cropping; and

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- (e) To train local counterpart personnel in all phases of project activites.
- 3. Expertise
- (a) Senior Irrigation Engineer with sufficient experience in the planning, design, and operation and maintenance of irrigation and drainage system and with sufficient seniority to function as team leader.
- (b) Design Engineer with sufficient experience in the planning, design and construction of the dam, diversion dams, and hydropower.

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- (c) Engineering Geologist with sufficient experience in the geological investigation for the major structures such as dam, diversion dam, canal structures, bridge and etc.
- (d) Soil Mechanical Engineer with sufficient experience for soil mechanical investigation and test and stability analysis of dam and foundation by applying computer.
- (e) Hydrogist with sufficient experience in evaluation the climatical and hydrological data and also analysing run-off discharge and reservoir operation.
- (f) Agronomist with sufficient experience in the crop and soil management under paddy irrigation and upland crops at the farm level as well as in agricultural supporting services for integrated agriculture.
- (g) Agri-institutional Expert with broad experience in the agricultural supporting services for integrated agriculture.
- (h) Economist with sufficient experience in the establishment of farm budgets, marketing and credit services and in the evaluation of economic and financial viability of the integrated agricultural development project.
- 4. Services to be provided by the Government

 The Government will provide the following for carrying out the
 Consultant's services.
- (a) All available documents, drawing, maps, statistics, data and other information related to the Integrated Agricultural Development Project in the Project Area.
- (b) Suitable full-time counterparts personnel, including engineers, technicians and professionals, as required for the project; and

- (c) To exempt the Consultants from (or bear the cost of) any taxes, duties, fees, levies and other impositions imposed under its laws and regulations in the respect of;
 - (i) any payment made to the Consultants in connection with the carrying out their services;
 - (ii) any equipment and materials and supplies brought into the territories of the Government for the purpose of carrying out the services; and
 - (iii) any property brought by the members of the Consultants for their personnel use and consumption.

Figure 5D-1 shows the proposed schedule for the Consultant's services.

FIGURE 5D-1 PROPOSED SCHEDULE FOR CONSULTANT'S SERVICES

	Year		19	7.8	T		19	7 9	T			980				1981				19	8 2	19.		1 :	983				198				198		Remark	
Description	1001	1 3 2 4	5 7 6	8 to	11 1 12	- 3- 2 4	6- 7- 6	- 9- 8 10	11 1	- 3 2 4	5- 6	7- 9 8	11 10 1	2 2	3- 5	7- 6 8	9~ 10	11 1 12	- 3- 2 4	5- 6	7 9 8 1	11- 0 12	1-3	6 4 6	7 8	9 - 11 10 1	1-2	3- ₄ 5-	- 7- 6 ε	9- 10	11 1 12 2	3- 5	- 7- 6 8	9- 11- 10 12	nemark	>
Feasibility Study			H																																	
J. Final Design					4.	.										2										•										Months
1. Team Leader		: .					+		4							. .																			1-1	12
2. Engineering Geologist							+	1		7		•				.					. .														1-2	5
3. Soil Mechanical Engineer					1					\dashv								٠ .						.											1 - 3	3
4. Hydrologist							-	-																											1.4	3
5. Design Engineer (Dam)				: 			.						4,	1																					J - 5	9
6. Design Engineer (Diversion D)am)									4							1																		1-6	5
7. Design Engineer (Hydro-pow	ver)	11										111	4																						1.7	4
8. Economist													.		1.											.									1-8	2
																																				43
II. Construction Supervision					,					:																										
1. Project Engineer (1)																																			11 - 1	36
2. Project Engineer (2)	•				1.		: 	:						-	7	(_			+-						II · 2	22
3. Engineering Geologist																						1			-	┥									11 - 3	3
										-							· i																			61
III. Supporting Services																																	,			
1. Agronomist							1			-			Ì													+	+									12
2. Agri-institutional Expert							•			◀																+									III · 2	11
3. Water and Farm Management	t Expert																																		()] - 3	12
																																	- 			35_
																																				139

CHAPTER VI. PROJECT JUSTIFICATION

Gross Production, Gross Production Value and Production Cost

Quickly benefit formation is not expected without better close and timely connection on the construction schedule between Main Dam and Diversion Dam and on-farm works.

On-farm works would be executed from 1982 to 1985, then constructed farm are decided into 4 blocks.

Growing of project benefit start from dry season in 1982 and wet season in 1983. The irrigable area by Malinao Diversion would be even until the completion of Pamacsalan Dam in 1985, June.

Gestation period which all benefited area reach to target yield will be projected in 9 years from 1982 to 1990 years.

Application volume of fertilizers which correlate annual target yield would reach to the target application in the third years.

										Append Page	ix 6D-1 2
		Table	6D-1 G	ross Produ	ction with	Project -	· Wet Seaso	n Palay			
			1982	1983	1984	1985	1986	1007	1000	1000	
								1987	1988	1989	* <u>1990</u>
(A) (Benefited Fields) No.1	Area Yield	(ha) I (ton)		943 2.4	943. 2,9	943 3.4	943 3.7	943 3.8	943 3.8	943	943 3:8
		(ton)		2,263	2,735	3,206	3,489	3,583	3,583	3,583	3,583
Reclaimed	Ama n	(ha)			1 000	2 005					
(Block) No.2		(ton)			1,225 2,4	1,225 2.9	1,225 3.4	1,225 3,7	1,225 3.8	1,225 3,8	1,225 3.8
	G.P.	(ton)		•	2,940	3,553	4,165	4,533	4,655	4,655	4,655
									\$ 13.05	4,200	1,000
No.3	Area	(ha) (ton)					1,043 2.4	1,043	1,043	1,043	1,043
	G.P.			•			2,503	2.9 3,025	3,4 3,546	3.7 3,859	3,8 3,963
		i i i i Atrisi Girin German		en de la companya de la companya de la companya de la companya de la companya de la companya de la companya de La companya de la co						201807	
No.4	Area	(ha) (ton)			***	•	597	597	597	597	597
		(ton)	-				2,4 1,433	2.9 1,731	3.4 2,030	3.7 2,209	3.8 2,269
		Aires		$\{\varphi_{k}\}_{k=1}^{n}$					410	2,203 1,59	2,209
Irrigated Paddy to be	Area	(ha)	atika jidi. Tab	46	57	313	439	439	439	439	439
benefited		(ton)		3.1	3.4	3.6	3.7	3.8	3.8	3.8	3.8
	G.P.	(ton)		143	194	1,127	1,624	1,668	1,668	1,668	1,668
Converted from rainfed	Area	(ha)		376	532	532	929	929	929	929	929
to irrigated	Yield		.	2.5	3.1	3.4	3.6	3.8	3.8	3.8	3.8
	G.P.	(ton)	-	940	1,649	1,809	3,344	3,530	3,530	3,530	3,530
Benefited Area	Area	(ha)		1,365	2,757	3,013	5,176	5,176	5,176	5,176	5,176
(Sub-total)	Yield	(ton)									
	G.P.			3,346	7,518	9,695	16,558	18,070	19,012	19,504	19,868
(B) (Remining field)	je – Kurris Bulgi Li	D. May	on (stance) Quinting		or or state.						
Irrigated wet season	Area	(ha)	449	402	390	126					
and the second of the second o	Yield G.P.	(ton) (ton)	2.6 1.167	2.7 1,085	2.8 1,092	2.8 353		· · · · · · · · · · · · · · · · · · ·	_		
		i. Tiyyeri	4. 红色学生		1 N. 4						
Reinfed Wet season	Area		1,060	665	501	501	-				
	Yield G.P.		1.6 1,696	1.7 1,131	1.7 852	1.7 852		<u>.</u>	-	.	-
					3.354						
Remining field (Sub-total)	Area		1,509	1,067	891	627		=		•	
	G.P.		2,863	2,216	1,944	1,205			•		
Palay total	Area	(ha)	1,509	2,432	3,648	3,640	5,176	5,176	5,176	5,176	5,176
(A + B)	G.P.		2,863	5,562	9,462	10,900	16,558	18,070	19,012	19,504	19,668

Table 60-2 Gross Production with Project - Cry Season Paley										Append Page	dix 6D-1 3 3	
Table 6b-2 Cross Production with Project - Dry Season Pajay 1982 1983 1984 1985 1986 1987 1988 1988										7		
(A) (Benefited Field) Mo.1 Yield (ton) 948 943 943 943 943 943 943 943 943 943 943				•	and the second second							
(A) (Benefited Field) Area (ha) 943 943 943 943 943 943 943 943 943 943			Table 6D-	2 Gross F	roduction v	with Projec	ct - Dry S	eason Palay	n en la la la la la la la la la la la la la		and the second	,
(A) (Benefited Field) (Benefited Field) (A) (Area (ba) 943 943 943 943 943 943 943 943 943 943					n formalist and section of the secti		er en					
(A) (Benefited Field) No. 1		Subjects of the control of	The Market		g in the second							
No.1 Yield (ton) 2,7 3,2 3,6 4,0 4,2 4				1982	1983	1984	1985	1986	1987	1988	1989	
No.1 Yield (ton) 2,7 3,2 3,6 4,0 4,2 4	(A) (Benefited Field)	Area (ha	943	911.3	оца	943	оца	оиз	dii a	Olia	
Reclaimed Area (ha) - 1,2546 3,018 3,395 3,772 3,961 3,961 3,961 3,961 3,961 (Block) Ro.2 Yield (ton) - 2,7 3,2 3,6 4,0 4,2 4,2 4,2 4,2 6,0 - 2,7 3,2 3,6 4,0 4,0 4,2 4,2 4,2 4,2 4,2 4,2 4,2 4,2 4,2 4,2												
Reclaimed Area (ha) - 1,225 1,225 1,225 1,225 1,225 1,225 1,225 (Block) No.2 Yield (ton) - 2,7 3,2 3,6 4,0 4,0 4,2 4,2 4,2 5,145 5,1												
(Block) No.2 Yield (ton) - 2.7 3.2 3.6 4.0 4.2 4.2 4.2 4.2 G.P. (ton) - 3,308 3,920 4,410 4,900 5,145		Dalaimad	Andreas		1 005	3.005	3 000	1 005	1 005	2 000		1999 - 1
G.P. (ton) - 3,308 3,920 4,410 4,900 5,145 5,145 5,145 Area (ha) 1,105												.*
Area (ha)		, Discours										
No.3 Mold (ton)	•									• •	7,2.7	
Area (ha)		7.77 (1.17)			<u>-</u>							+ 1
Area (ha)		NO.3			· -	÷						
No.4 Yield (ton) G.P. (ton) 2.7 3.2 3.6 4.0 4.2 G.P. (ton) 1,612 1,910 2,149 2,386 2,567 Irrigated Paddy to be benefited Yield (ton) 3.2 3.6 3.9 4.1 4.2 4.2 4.2 4.2 G.P. (ton) 147 205 222 1,800 1,844 1,844 1,844 1,844 1,844 1,844 1,844 1,844 1 4 1,644 1,844			J.1. (to	•			2,304	0,000	0,570	7,720	4,041	
G.P. (ton) 1,612 1,910 2,148 2,386 2,507 Irrigated Paddy to be benefited Yield (ton) 3.2 3.6 3.9 4.1 4.2 4.2 4.2 4.2 4.2 4.2 4.2 4.2 4.2 4.2								597	597	597	597	* **
Irrigated Paddy to be Area (ha) 46 57 57 139 139 139 139 139 139 139 139 139 139		No.4				•						
Irrigated Paddy to be benefited Area (ha) 46 57 57 439 449 444 444 444 444 444 444 444 444 444 444			G.P. (to	the state of the s		-	1,612	1,910			100	
benefited Yield (ton) 3.2 3.6 3.9 4.1 4.2 4.2 4.2 4.2 4.2 G.P. (ton) 147 205 222 1,800 1,844 1,846 1,846 1,846 1,868 1,8	· .		n de la companya di sanggaran di sanggaran di sanggaran di sanggaran di sanggaran di sanggaran di sanggaran di Sanggaran di sanggaran di sangga							45,7734		
G.P. (ton) 147 205 222 1,800 1,844 1,444 1								439 h o 7		439		
Converted from rainfed to irrigated Yield (ton) 2.8 3.3 3.7 4.0 4.2 4.2 4.2 4.2 4.2 6.P. (ton) 1,053 1,756 1,968 4.04 4.246 4.246 4.246 4.246 4.246 4.246 (Sub-total) G.P. (ton) 3,746 8.287 9,505 18,622 20,397 21,323 22,004 22,344 (B) (Remining Field) Irrigated Dry season Area (ha) 402 390 383 G.P. (ton) 925 936 919 G.P. (ton) 532 400 276 G.P. (ton) 532 400 276		Denetited										
to irrigated	•	ej i di karangan da k	834 FE T						214			
to irrigated		Converted from rainfed	Area (ha	376	532	532	1.011	1,011	1.011	1.011	1.011	
Benefited Area (Sub-total) G.P. (ton) 3,746 8,287 9,505 18,622 20,397 21,323 22,004 22,344 (B) (Remining Field) Irrigated Dry season Area (ha) 402 390 383			Yield (to	i) 2.8	3,3			4.2				. **
(Sub-total) G.P. (ton) 3,746 8,287 9,505 18,622 20,397 21,323 22,004 22,344 (B) (Remining Field) Irrigated Dry season Area (ha) 402 390 383		Control of the second	G.P. (to	1,053	1,756	1,968	4,044	4,246	4,246	4,246	4,246	
(Sub-total) G.P. (ton) 3,746 8,287 9,505 18,622 20,397 21,323 22,004 22,344 (B) (Remining Field) Irrigated Dry season Area (ha) 402 390 383		Benefited Area	Area (ba	1.365	2 757	2 7 57	5.320	5 320	5 320	5 320	5 320	
G.P. (ton) 3,746 8,287 9,505 18,622 20,397 21,323 22,004 22,344 (B) (Remining Field) Irrigated Dry season Area (ha) 402 390 383			inca (na		2,707		10014	3,020	3,020	1,020	3,020	
Irrigated Dry season Area (ha) 402 390 383			G.P. (to	3,746	8,287	9,505	18,622	20,397	21,323	22,004	22,344	
Irrigated Dry season Area (ha) 402 390 383							2 0				and the state of t	
Yield (ton) 2,3 2,4 2,4 -	(B)											
Rainfed Dry season Area (ha) 665 501 345		Irrigated Dry season						-	= 1.55			
Rainfed Dry season Area (ha) 665 501 345							-	• • • • • • • • • • • • • • • • • • •	-			
Yield (ton) 0.8 0.8 0.8				320	3.33	313				1.50 (1894)		est villa
G.P. (ton) 532 400 276		Rainfed Dry season					_	- 1				
Remining field Area (ha) 1,067 891 728							-	. – ; † †	그런 이 현 설립	· • • • • • • • • • • • • • • • • • • •		
Remining field Area (ha) 1,067 891 728					400	276	- -		-		-	
(Sub-total) G.P. (ton) 1,457 1,336 1,195		Remining field			891	728	-		-			i i
(A + B) G.P. (ton) 5,203 9,623 10,700 18,622 20,397 21,323 22,004 22,344							- /	- .	- : :	- 'v	– 84	
(A + B) G.P. (ton) 5,203 9,623 10,700 18,622 20,397 21,323 22,004 22,344						· 100						
											5,320	•
en de la composition br>La composition de la		(A + B)	G.P. (tor	i) 5,203		10,700	18,622	20,397	21,323	22,004	22,344	
				en de la companya de la companya de la companya de la companya de la companya de la companya de la companya de La companya de la co		45 - 124.96		en de la companya de la companya de la companya de la companya de la companya de la companya de la companya de La companya de la co			A Property of	

Table 60-3 Gross Froduction - Upland Crops 1986 1987 1988 1989 1989 19											Appendi Page		
1982 1983 1984 1985 1986 1987 1988 1989			Table	6D-3	Gross Pr	roduction -	Upland C	rops					
Upland Palay Yield (ton) D.8							1984	1985	1986	1987	1988	1989	
Upland Palay			Area	(ha)									
Area (ha) 133 129 40 120	Upland Pal	ay	Yield	(ton)	0.8	0.8	8.0			_			
Corn					the second		Company of the						
Cassava Area (ha) 49 47 15 15 15 15 15 15 15 1	on Normania (n. 1865). Douglas de la Corno de Co											· ·	
Cassava Yield (ton) 1.1 1.1 1.1							20			· · · · · · · · · · · · · · · · · · ·			
Sweet Potato									· 特别保持。		1、数数3次数数4 2、2		
Area (ha) 92 90 28 7 7 7 7 7 7 7 7 7	Cassava	Participants (A)			4 1 3 3 3 3 4						·		
Sweet Potato Yield (ton) 0.6 0.6 0.6 1.7 1.7 1.7 1.7 1.8 1.9 1.9 1.9 1.8 1.8 1.8 1.8 1.8 1.9			4 L	200	1.34								
Table 6D-4 Gross Production - without Project 1962 1983 1984 1385 1986 1387 1988 1989	Sweet Pota	The second secon	Yield	(ton)	0.6	0.6	0.6	•			÷	-	
1982 1983 1984 1985 1986 1987 1988 1989	and Agriculture of the Control of th	等也,但一类聚合的维护。 在1995年1月1日	G.P.	(ton)	, 55 ,	54	17						
1982 1983 1984 1985 1986 1987 1988 1989				4 - •			• . • . • . • . •		18				
1962 1963 1964 1965 1966 1967 1968 1969 1966 1967 1968 1969			Table	6D~4		oduction -	without F	roject					
Wet season Yield (ton) 2.6 2.7 2.8 2.8 2.9 2.9 3.0 3.0 Palay G.P. (ton) 1,217 1,264 1,310 1,357 1,357 1,404 1,404 Irrigated Area (ha) 468						1983	1984	1985	1986	1987	1988	1989	
Palay G.P. (ton) 1,217 1,264 1,310 1,310 1,357 1,357 1,404 1,404 Irrigated Area (ha) 468 468 468 468 468 468 468 468 468 468				and the second second	and the second s		the state of the s				· ·	the state of the s	
Irrigated			*	and the second second									
Dry season Yield (ton) 2.3 2.4 2.4 2.5 2.5 2.6 2.6 2.7						• • • • • · · · · · · · · · · · · · · ·							
Rainfed Area (ha) 1,060 1,060 1,060 1,060 1,060 1,060 1,060 1,060 1,060 1,060 Wet season Yield (ton) 1.7 1.8 1.8 1.8 1.9 1.9 1.9 2.0 Palay G.P. (ton) 1,802 1,908 1,908 1,908 2,014 2,014 2,014 2,120 Reinfed Area (ha) 1,060	Dry seas	on	Yield ((ton)	2.3	2.4	2.4	2.5	2.5	2.6	2.6	2.7	
Wet season Palay Yield (ton) 1.7 (1.8 1.9 1.9 1.9 2.0 6.P. (ton) 1,802 1,908 1,908 1,908 1,908 2,014 2,014 2,014 2,014 2,120 1.9 (1.9 2,014 2,014 2,014 2,014 2,014 2,120 2,014 2,014 2,014 2,120 2,014 2				,									
Palay G.P. (ton) 1,802 1,908 1,908 1,908 2,014 2,014 2,014 2,120 Reinfed Area (ha) 1,060 1,060 1,060 1,060 1,060 1,060 1,060 1,060 1,060 Dry season Yield (ton) 1.6 1.7 1.7 1.7 1.7 1.8 1.8 1.8 1.8 Palay G.P. (ton) 1,696 1,802 1,802 1,802 1,802 1,908 1,908 1,908 1,908 Area (ha) 287 287 287 287 287 287 287 287 287 287													
Dry season Yield (ton) 1.6 1.7 1.7 1.7 1.7 1.8 1.9 1.90	The second secon												
Palay G.P. (ton) 1,696 1,802 1,802 1,802 1,302 1,908 1,908 1,908 1,908 Area (ha) 287 287 287 287 287 287 287 287 287 287													
Upland Palay Yield (ton) 0.8 0.8 0.8 0.8 0.8 0.8 0.9 0.9 0.9 0.9 0.9 0.9 0.9 0.9 0.9 0.9													
Upland Palay Yield (ton) G.P. (ton) 230 230 230 230 230 230 230 230 230 230		era i ku i salaha 18 di Kirila	100	Alan A					5 × 3	and the second second	The State of the S		
Palay G.P. Sub-total G.P. (ton) 6,021 6,327 6,373 6,420 6,573 6,726 6,801 6,954 Area (ha) 173 173 173 173 173 173 173 173 Corn Yield (ton) 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5	Upland Pala	y	Yield ((ton)	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.9	
Area (ha) 173 173 173 173 173 173 173 173 173 173				 4 2 3 3 							7 T.,		
Corn Yield (ton) 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5	Palay G.P.		•			19.	the second section		4 444	45, 45, 5			
G.P. (ton) 87 87 87 87 87 87 87 87 87 87 87 87 87	Corn												•
Area (ha) 63 63 63 63 63 63 63 63 63 63 63 63 63	na na katana na matana na mata Na matana na				87					87	87		
G.P. (ton) 69 69 69 69 69 69 69 69 69 69 69 69 69					63				63	63	63		
Area (ha) 120 120 120 120 120 120 120 120 120 120	Cassava												
Sweet Potato Yield (ton) 0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.6 0.6					and the second	the first property	A STATE OF THE STA	11.0	1.0			the transfer of the	
G.P. (ton) 72 72 72 72 72 72 72 72 72 72 72 72 72	Sweet Potat	o .	Yield (ton)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	
	Travitation of the second	And the	G.P. (ton)	72	72	72	72	72	72	. 72	72	
Total Area (ha) 3,699 3,	Total					3,699	3,699		3,699	3,699	3,699		

								A second		• .	8		
1 4 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1							•				Append Page	ix 6D-1.	
	•										. 450		
		e de la companya de l		Table (SD-5 Gros	s Producti	on Value w	ith Project	(Pesc	x 10 ³)			
				1982	1983	1984	1985	1986	1987	1988	1989	1990	
	Palay Wet season Dry season Sub-total G.P.V. (A)	Unit Price G.P. G.P. G.P. F x 10 ³	(P/ton) (ton) (ton) (ton)	1,290 2,863 5,203 8,066 10,405	1,320 5,562 9,623 15,185 20,044	1,340 9,462 10,700 20,162 27,017	1,375 10,900 18,622 29,522 40,593	1,375 16,558 20,397 36,955 50,813	1,375 18,070 21,323 39,393 54,165	1,375 19,012 22,004 41,016 56,397	1,375 19,504 22,344 41,848 57,541	1,375 19,668 22,344 42,012 57,767	
	Upland Palay G.P.V. (B)	Unit Price G.P. P x 10 ³	(P/ton) (ton)	1,290 230 297	1,320 198 261	1,340 131 176	- 12						
	Corn	Unit Price	(P/ton)	1,100	1,120	1,130	• • • • • • • • • • • • • • • • • • •	-				_ _ _	
	G.P.V. (C)	G.P. P x 10 ³	(ton)	67 74	65 73	20 23	<u>-</u> -		. -	, - .	· · · · · · · · · · · · · · · · · · ·		
	Cassava	Unit Price G.P.	(P/ton) (ton)	450 54 24	450 52 23	450 17 8	- 	<u>-</u> -	<u> </u>			- -	
	G.P.V. (D) Sweet Potato	P x 10 ³ Unit Price	(P/ton)	350	350	350		-		P4		-	
	G.P.V. (E)	G.P. ₱ x 10 ³	(ton)	55 19	54 19	17 6		<u></u>		· +	• • • • • • • • • • • • • • • • • • •	• • • • • • • • • • • • • • • • • • •	
G. I	P.V. (A - E)	₽ x 10 ³		10,819	20,420	27,230	40,593	50,813	54,165	56,397	57,541	57,767	
		Å.	Table	e 6D-6 Gi	ross Produc	tion Value	without F	Project	Peso x 10	3	e e e		
	•			1982	1983	1984	1985	1986	1987	1988	1989	•	,
4. 184. 4.	Palay	G.P. Unit Price G.P.V.	(ton) (P/ton) (10 ³ P)	6,021 1,290 7,767	6,327 1,320 8,352	6,373 1,340 8,540	6,420 1,375 8,828	6,573 1,375 9,038	6,726 1,375 9,248	6,801 1,375 9,351	6,954 1,375 9,562		•
	Corn	G.P. Unit Price G.P.V.	(ton) (P/ton) (10 ³ P)	87 1,110 97	87 1,120 97	87 1,130 98	87 1,135 99	87 1,135 99	87 1,135 99	87 1,135 99	87 1,135 99		
	Cassava	G.P. Unit Price G.P.V.	(ton) (P/ton) (10 ³ P)	69 450 31	69 450 31	69 450 31	69 450 31	69 450 31	69 450 31	69 450 31	69 450 31		
	Sweet Potato	G.P. Unit Price G.P.V.	(ton) (P/ton) (10 ³ P)	72 350 25	72 350 25	72 350 25	72 350 25	72 350 25	72 350 25	72 350 25	72 350 25		
•	Total	G.P.V.	(10 ³ ₽)	7,920	8,478	8,694	8,983	9,193	9,403	9,506	9,717		
							•		•				ř

Table 6D-7 Production Cost per ha with Project - Wet Season Palay

		lst Year			2nd Year			3rd Year	
	Volume	Unit Price	P.C.	Volume	Unit Price	P.C.	Volume	Unit Price	P.C.
(Wet Season)									•
Seeds	45 kg	1.6 P/kg	72	45 kg	1.6 ₽/kg	72	45 kg	1.6 P/kg	72
Fertilizer N P K	35.3 kg 20.6 kg 20.6 kg	3.6 P/kg 3.6 P/kg 1.4 P/kg	127 74 29	40.3 kg 23.5 kg 23.5 kg	3.6 P/kg 3.6 P/kg 1.4 P/kg	145 85 33	50,4 kg 29,4 kg 29,4 kg	3.6 P/kg 3.6 P/kg 1.4 P/kg	181 106 41
Pesticides Liquide Granular	2.2 Qt 3.5 kg	38 P/Qt 7 P/kg	84 25			84 25			84 25
Herbicides Liquide Granular	25.0 kg	4.6 P/kg	115			115			115
Land preparation Animal (Hallow) Machinary (Plow)	(100%) (100%)	₽/ha ₽/ha	82 75			82 75			82·7 75
Threshing Pedal Power	(50%) (50%)	P/ha P/ha	6 59			6 59			6 , 59 .
Drying Dryer	(50%)	₽/ha	46			46		· ·	46
Miscellaneous	above items	cost x 0.03	30			30			32
Total			824			849			924

Note: 1. Figures in parentheses indicate the ratio of coverage area.

^{2.} Land preparation, threshing and drying cost not include the labor cost.

^{3.} Miscellaneous was counted at 3% of gross value of production.

^{4.} P.C. indicate the Production Cost.

^{5.} Animal and machinery would be used in the hallowing operation and plowing respectively. Threshing and drying cost was counted considering the ratio of coverage area.

Table 6D-8 Production Cost per ha with Project - Dry Season Palay

		labie e	v-8 ← Producti	on cost pe	er na with Proje	ct - Dry Seaso	n Paray			
		Volume	lst Year Unit Price	P.C.		2nd Year hit Price	P.C.		3rd Year nit Price	P.C.
	Seeds	45 kg	1.6 P/kg	72	45 kg	1.6 P/ kg	72	45 kg	1.6 P/kg	72
	Fertilizer N P K	51.0 kg 20.6 kg 20.6 kg	3.6 P/kg 3.6 P/kg 1.4 P/kg	184 74 29	23.5 kg	3.6 P/kg 3.6 P/kg 1.4 P/kg	210 85 33	29.4 kg		262 1Q6 41
	Pesticides Liquide Granular	2.2 Qt 3.5 kg	38 P/Qt 7 P/kg	84 25			84 25		30、大概 30基本 (1) 在大量数据 (2)第 (2)	. 7 Julius (163) 84 (144) 156 225
	Herbicides Liquide Granular	- 25.0 kg	4.6 ₽/kg	115			115		THE STATE	115
	Land preparation Animal (Hallow) Machinery (Plow)	(100%) (100%)	₽/ha ₽/ha	82 75			82 75			82 75
#0. 111 ##1. ##4.21	Threshing Pedal Power	(50%) (50%)	P/ha P/ha	6 59	era i deseg allo i de ser	1000 1 (1000) 1000 - 1000	6 59		Jack Ask. Ask Sept.	6 1 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
	Drying Dryer		₽/ha	46			46	Alle Maria Carana Alle Maria Carana Alle Maria Carana	A MARKET AND A SECOND	46
	Miscellaneous	987 x 0.03		30	1,028 x 0.03		30	1,109 x 0.03		33
	Total		1984 (1984) 1984 (1984)	881	• • • • • • • • • • • • • • • • • • •		922	en view en Herrina En	1	,006

Table 6D-9 Production Cost per ha without Project

en en en en en en en en en en en en en e	•				F	Palay	Irrigate	d .	1 							
				Wet Seas	on		Take the	У <u>1145</u>		4 14		ry Sea	son			
		1982	19	83	1984		1985		1982		1983		1984		1989	
	Unit Price	Volume P.	C. Volum	e P.C.	Volume	P.C.	Volume	P.C.	Volume	P.C.	Volume	P.C.	Volume	P.C.	Volume	P.C.
Seeds	1.6 P/kg	60 kg 96	60 k	g 96	60 kg	96	60 kg	96	55 kg	88	55 kg	88	55 kg	88	55 kg	88
Fertilizer N	3.6 ₽/kg	34.9kg 126	35.9k	g 129	37.0kg l	L 33	38,1kg	137	41.8kg	150	43 kg	155	44.3kg	159	45,6kg	164
P	3.6 ₽/kg	25.6kg 92	26.4k	g 95	27.2kg	98	28.0kg	101	26.5kg	95	27.2kg	98	28.1kg	101	28.9kg	104
K	1.4 ₱/kg	25.6kg 36		g 37	27.2kg	38	28.0kg	39	26.5kg	37	27.2kg	38	28.1kg	39	28,9kg	40
Pesticides Liquide	38 P/ Qt	1.2Qt 45	5 1,3Q	t 49 .	1.3Qt	49	1.3Qt	49	1.5Qt	57	1.6Qt	61	1.6Qt	61	1.6Qt	61
Granular	7 P/Qt			•		- .	 	-	-	-	<u>.</u> .	-		. :	ja sak	
Herbicides Liquide	27 ₱/Qt	<u>-</u> -	- -	-		- .	e Titala	-	-	-		- :		-	7	
Land preparation Animal	82 ₽/ ha	(93%) 76	5.3 (92%) 75.4	(91%)	74.6	(90%)	73.8	(93%)	76.3	(92%)	75.4	(91%)	74.6	(90%)	
Machinery	75 ₽/ha	(7%) 5	6.3 (8%	6.0	(9%)	6.8	(10%)	7.5	(7%)	5.3	(8%)	6.0	(9%)	6.8	(10%)	7.5
Threshing Pedal	11 ₽/ha	(75%) 8	3.3 (80%) 8,8	(85%)	9,4	(90%)	10.0	(75%)	8.3	(80%)	8.8	(85%)	9,4	(90%)	10.0
Power	116 P/ha	· <u>-</u>							***		 '		-		-	
Drying Dryer	92 ₽/ ha	(2%) 1	.8 (3%) 2.8	(4%)	3.7	(5%)	4.6	(2%)	1.8	(3%)	2.8	(4%)	3.7	(5%)	4.6
Miscellaneous		. 14	!	15		15		1.6		16		17		17		17
Total		500)	514	r,	518		534		535		550		560	·	570

Note: Figures in parentheses indicate the ratio of coverage area.

Land preparation, threshing and drying cost was counted considering such ratioes.

									an tertor y gar
				e de Britania de B				Appendix 6	D-1
								Page 9	
		Table	e 6D-10 Produ	ction Cost per l	na without Proj	ect - Continue 1	Ĺ		
							*		
					Palay Rain	fed			na di kacamatan di Kabupatèn Kabupatèn Kabupatèn Kabupatèn Kabupatèn Kabupatèn Kabupatèn Kabupatèn Kabupatèn K Kabupatèn Kabupatèn
			Wet Se	ason			Dry Sea		
	Unit Price	1982 Volume P.C.	1983 Volume P.C.	1984 Volume P.C.	1985 Volume P.C.	1982 Volume P.C.	1983 Volume P.C.	1984 Volume P.C.	1985 Volume P.C.
	The second secon	P	P	P	P	P	Volume P.C.	PART OF FREE DE	
Seed	1.6 ₽/kg	58 kg 93	58 kg 93	58 kg 93	58 kg 93	50 kg 80	50 kg 80	50 kg 80	50 kg 80
Fertilizer									
N	3.6 ₽/kg	14.2kg 51	14.3kg 51	14.3kg 51	14.6kg 53	14.6kg 53	14.7kg 53	14.8kg 53	15 kg 54
P	3.6 ₽/kg	13.5kg 49	13.6kg 49	13.6kg 49	13.9kg 49	13.9kg 50	14.0kg 50	14.1kg 51	14.3kg 51
K	1.4 P/kg	13.5kg 19	13.6kg 19	13.6kg 19	13.9kg 19	13.9kg 19	14.0kg 20	14.1kg 20	14.3kg 20
Pesticides	00 040	0.70		0.001.00	0.004.00	0 501 30	0.00	0.00+.00	0.00+.00
Liquide	38 ₽/Qt	0.5Qt 19	0.6Qt 23	0.6Qt 23	0.6Qt 23	0.5Qt 19	0.6Qt 23	0.6Qt 23	0.6Qt 23
Granular	7 ₽/kg	0.03kg 1	0.04kg l	0.04kg 1	0.04kg 1	0.5kg 4	0.6kg 4	0.6kg '4	0.6kg 4
Herbicides Liquide	27₽/Qt	0.11Qt 3	0.11Qt 3	0.12Qt 3	0.12Qt 3	0.08Qt 2	0.12Qt 3	0.12Qt 3	0.12Qt 3
Land preparati	on	w w					anderson in de la companya de la companya de la companya de la companya de la companya de la companya de la co	erikan di Kabupatèn Balanda Balanda	
Animal	82 ₽/ ha	(96) 79	(95) 78	(95) 78	(95) 78	(96) 78	(95) 78	(95) 78	(95) 78
Machinery	75 ₽/ha	(4) 3	(5) 4	(5) 4	(5) 4	(4) 3	(5) 4	(5) 4	(5) 4
Threshing Pedal	11 ₽/ ha	(71) 8	(74) 8	(78) 9	(80) 9	(71) 8	(74) 8	(78) 9	(80) 9
Power	1 16 ₽/ha	-	-	-	<u>-</u>		-	~	-
Drying Dryer	92 ₽/ ha			<u>-</u>			- 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1		
Miscellaneous		10	10	10	. 10	10	11	11	11
	×1	- -		e e e e e				a Maria de La Caractería de Ca	
Total		335	339	340	340	327	334	336	336
			er en en en en en en en en en en en en en		na an an t-aire San tagaige ann an t-àir		and the state of t		
			to the second second second	Angele (Albert et al. 1997). Talan		•			
	· · · · · · · · · · · · · · · · · · ·					•			
							· · · · · · · · · · · · · · · · · · ·		

Table 6D-11 Production Cost per ha without Project - Continue 2

	10 m		Upland Palay	1984	Corn	Cassava	Sweet Potato
	Unit Price	1982 Volume P.C	1983 Volume P.C.	Volume P.C.	Volume P.C.	Volume P.C.	Volume P.C.
	Oute Price	P		P	P	P	P
Seed		52,5kg 84	52.5kg 84	52.5kg 84	16.7kg 20	2,928piece 29	4,965piece 15
Fertilizer					a tagana a sa kabana a sa Kabana a sa kabana a sa ka		Massage Company
N	3.6 ₽/kg	6.7kg 24	6.8kg 24	6.8kg 24	2.4kg 9		3kg 11
P	3.6 ₽/kg	6.7kg 24	6.8kg 24	6.8kg 24	2.4kg 9	_	3kg 11
К	1.4 P/kg	6.7kg 9	6.8kg 10	6.8kg 10	2.4kg 4	1	4 45 3kg 4 455
Pesticides							
Liquide	38 ₽/Qt		. -	 			•
Granular	7 P/kg	- .	`	-	0,13kg 1		
Herbicides Liquide	27 F/ Qt	. .		2			
Land preparation Animal	82 P/ ha	(100%) 82	(100%) 82	(100%) 82	(100%) 82	(100%) 82	(100%) 82
Machinery	75 P/ha	<u>-</u>	<u>-</u>				45.
Threshing Pedal	11 ¥/ha						
Power	116 F/ha	<u>-</u>	<u>-</u>		or trades	1	
Drying	92 F /ha		-	-			
Miscellaneous		7	7	7	5	5	5
Total		230	231	231	130	. 116	129

Note: Unit price of seed are 1.6 P/kg of Upland Palay, 1.1 P/kg of Corn, 1 P/100pieces of Cassava and 0.3 P/100 pieces of Sweet Potato.

Table 6D-12 Gross Production Cost with Project

 10^3 Peso .

and the second s		f	the state of the s			and the second second			
	1982	1983	1984	1985	1986	1987	1988	1989	1990
Wet Season Palay	580	1,558	2,681	2,929	4,618	4,660	4,783	4,783	4,783
Dry Season Palay	1,635	2,874	3,008	5,140	5,209	5,352	5,352	5,352	5,352
Upland Crops	101	91	49			-	· •		uw.
G.P.C.	2,316	4,523	5,738	8,069	9,827	10,012	10,135	10,135	10,135

Table 6D-13	^	Production	^ 4		
Table 544 13	CMAGG	レンハイリクチェクス	1 001	111111111	UMATAAL

					10 Peso				
	1982	1983	1984	1985	1986	1987	1988	1989	1990
G.P.C.	1,298	1,324	1,333	1,346	1,346	1,346	1,346	1,346	1,346

Parties sold a land a succession

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Economic Evaluation of Commodities Price

The valuation of benefit and cost may be done by dividing the different items into: a) traded or non-traded goods, and b) services.

The traded goods may be generally values at c.i.f. prices in the case of imports or import substitutes, and f.o.b. in the case of exports or potential exports, with an allowance for domestic transportation and distribution costs.

Traded goods to be evaluated to shadowprice are palay, corn, fertilizer and oil.

Government of the Philippines has approved the first rice export to Indonesia as of November 18, 1977.

It may be considered that the country has attained a comfortable degree of self-sufficiency in this staple food.

Importation, however, is imperative in the interim that the country is yet in the process of attaining self-sufficiency in the production of both food grains and feedgrains. The capability of the stabilized export must be ensured by a certain level of stock and to raise productivity which is still below those of some nearby countries. And it must be noticed that the food production is not sufficient to solve the problem of malnutrition.

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Table 6D-14 Rice Price Structure, 1977 and 19851/

		19	7.7	1985		
	our militario film militario di Salamania. Salamania in terreta di Salamania di Salamania di Salamania di Salamania di Salamania di Salamania di Salamani	#/ton	US\$/ton	P/ton	US\$/ton	
1)	Export Price of Thai 25-35% broken, f.o.b. Bangkok	1,840	2457/	2,110	281 <u>8</u> /	
2)	Ocean freight and insurance to Cebu Port2/	135	18	145	19	
3)	Port handling charge	55	7	55	7	
и)	Price of rice, Cebu	1,975	270	2,310	307	
5)	Average Cost of Transport to selling center3/ (Area-Cebu)	-60	하하 <u>구</u> 용하기보다 하하 <u>구</u> 용하기보다	-60	- 8 0-50	
	Area-Taribon (truck) Taribon - Cebu Handling Taribon Freight Charge Handling Cebu	(30) (9) (13) (8)				
6)	Price milled rice, area	1,915	262	2,250	299	
7)	Paddy equivalent price Area (0.63)	1,205	165	1,420	188	
8)	Milling costs less value of by-products 4	-40	11. ≃5 .0000 11.0000	-40	-5	
9)	Transportation cost (farm-mill)	-5	- 1	-5	-1	
10)	Farm gate price of paddy	1,160	159	1,375	182	
	(Financial farm-gate price)	$(1,020)^{5}$	Antonio en en en en en en en en en en en en en	(1,375)	<u>3</u> /	
11)	P/cavan	58		69	Popularia La companya	
• •		(51)		(69)	e sakon y	

1/ P/ton and US\$/ton values at 1977 constant prices. Peso shadow priced at exchange rate of US\$1.00 = P7.5, though IBRD use a shadow exchange rate of US\$1.00 = P8.33 in the economic analysis.

P/ton figures rounded to nearest 5 pesos.

A selling center where the additional rice production would be sold is projected as Cebu City.

Transportation Cost to selling center is evaluated via Tubigon Port.

Milling Cost is larger than by products.

The basic data is as follows.

5/ 1977 financial price is actual 6/ 1985 financial price calculated by using the official exchange rate of US\$1.00 = \$7.5

7/8/ Export Price of Thai 25-35% broken, f.o.b. Bangkok was estimated as follows. Basic data: Milling Costs less value of by products

Milling Cost (obtained in NGA, Tagbilaran)

50 kg of rice -2 - 76.050 kg of rice -79 kg of Palay (50 + 0.63) Milling cost of 1,000 kg of Palay: $6.0 \times \frac{1,000}{79} = 76$ Pesos

By Products

Bran one sack (40 kg) is gained from 10 bag of 50 kg green rice Unit price of bran per kg are \$0.5 to 0.7

Price of Bran one sack (40 kg) is \$20 to \$28

One M ton of Palay milled recover 630 kg of rice
630 kg of rice recover bran

as
$$P20 \times \frac{630 \text{kg}}{500 \text{kg}} = P25$$

 $P28 \times \frac{630}{500} = P35$

Milling Costs less value of by products

76 - 35 = 41 = 40 Pesos

Basic data: Export Price of Thai 25-35% broken, f.o.b. Bangkok

Export Price of Rice, Thai, Milled 5% broken, f.o.b. Bangkok was based on the Official Memorandum, World Bank, May 17, 1976.

1) Commodity prices and price projections:

	1976	1977	1985
in Current Dollars \$/MT	300	340	679
in 1976 Constant Dollars	300	313.5	359.4
in 1977 Constant Dollars		3401/	3902/

o Inflation factor 1976 = 100, 1977 = 108.4 (Official Memorrandum)

各种的经验和自由的基础的 建氯化物 医多种性 医皮肤皮肤

2) Rice, Thai, Milled 25-35% broken, f.o.b. Bangkok:

	<u> 1977</u>	1985		
5%	340	390		
25-35%	245	281		
(34	0 x 0.72)	(359.5 x	0,72)	er V
		Annual Control		to the second

Raito of milled 25 percent broken rice price to 5 percent price:
IBRD 1985 forecast in constant end 1974 prices

5% broken US\$285/MT ----(1)

25% broken US\$206/MT ----(2)

(2) ÷ (1) 72%

Source: "Price forecast for main primary commodities"
July 1975. IBRD.

Table 6D-15 Corn Price Structure, 1977 and 19851/

	ato at a conclusion in a concessor is taken 1977.		1985		
The state of the state of the second of	₽/ton	US\$/ton	P/ton	US\$/ton	
1) Export price, US No.2 yellow f.o,b. Gulf2/	900	120	945	126	
2) Ocean freight, insurance to Jago	a 205	27	210	28	
3) Import price c.i.f. Jagna ³ /	1,105	147	1,155	1.7.154	
4) Jagna handling charges	60	8	, 60.		
5) Price of Corn, Jagna	1,165	155	1,215	162	
6) Less average cost of transport, mill to Jagna	+15,			i () (6 5)? (
7) Corn price, ex-mill project area	1,150	153	1,200	160	
8) Less milling and packaging cost	-60				
9) Less average cost of transport farm to mill	-15	2	. 215		
0) Farm gate corn price	1,075	144	1,135	<u>151</u>	
(Financial farmgate price)	(1,070)	•/	(1,135) ⁵	je dina Gravata (

- 1/: P/ton or US\$/ton at Constant June 1977 prices. Peso shadow-priced at an exchange rate of US\$1.00 = P7.5, though IBRD use US\$1.00 = P8.33.
 Peso figures rounded to nearest 5 pesos.
- Peso figures rounded to nearest 5 pesos.

 2/: Due to unavailability of price data on white corn, the projection for yellow corn is used. US\$/ton was based on the NISIP:1, Appraisal Report by IBRD.
- 3/: Jagna port locate in the nearest place to the Project Area from Gulf.
- 4/: 1977 financial price is actual.
- 5/: 1985 financial price calculated at the official exchange rate of US\$1.00 = \$7,50

Table 6D-16 Fertilizer Price Structure, 1977 and 19851/

A, <u>Orea Case 1:</u> Distribution Center would still locate in Cebu City in future. Import Europe Urea.

a sa taliffa Ta		19	77	1985		
		P/ton	US\$/ton	P/ton	US\$/ton	
1)	Export price, f.o.b. Europe	1,240	165			
	bagged			english (1)	on and the	
2)	Ocean freight and insurance	270	1984. 36 [[3	285	-5 to 38 F	
	to Cebu Port	:		State State		
3)	Handling charge Cebu Port	45	F 167 650	145 to 145 to 15	6	
4)	Price of Cebu Port	1,555	210	1,720	230	
5)	Transportation Cost to distribu-	15	0.38 (1.11.11. 2 (1.28)	15	2	
	tion center, Cebu City2/	Spirit se				
6)	Cost of handling at distribution	ц5	6	45	6	
	center					
7)	Ex-warehouse price for implemen-	1,615	<u>215</u>	1,780	238	
	tation by manufacture/importer Ceb	<u>u</u>				
8)	Transportation Cost from Cebu to	59	8	59	8	
3. 精制	Project Area	^ለ	andria. National American	a diakataw		
	of which: Handling Cebu Port Freight Charge	(13)	194 - pri			
	Handling Talibon Port3/	(8)	elener er er.			
eren eran. Generalise	Talibon to Area (Truck)	(30)		i Burang da Mi		
9)	Cost of handling by dealers at	30	 [4] Ho 4 (\$6)	30		
3,	Project Area#/	A Kabilan				
10)	Transportation Cost dealers to	일하 2 8	s Bysomia in	<u> (8</u>	1	
107	farmer			fig. Description		
11)	Farm gate price of Urea	1,710	228	1,875	<u>251</u>	
	(Financial farm-gate price)	1,750	Ya terrai	$1,875\frac{6}{2}$		
121	N/kg	3.8	in Political Common to	4.2		
26)		3.9		4.2		

P/ton and US\$/ton values at constant 1977 prices. Peso shadow priced at exchanged rate of US\$1.00 = \$7.5 P/ton figures rounded to nearest 5 pesos.

consistent of the property of the second second property of the second s

- The fertilizer manufacturers/importers who has been approved the ex-warehouse prices by the Fertilizer Industry Authority locate at Cebu, Ormoc and Gogo in Southern Island District. Such manufacturers/importers would be the distribution center of fertilizer for the Project Area.
- Talibon port locates in the nearest place from the Project Area.
- The numbers of dealers/sub-dealers of fertilizers and farm chemicals who was accredited by Bohol Provincial Office amount to two persons of Pilar and one of Sierra Bullones. At present, fertilizers which were sent from the distribution center in Cebu City to the Project Area are selled to farmers the of the first contact to the him at the contact of by those dealers.
- of the "Administrative that there will be used the second of the 1977 financial price is actual

° Farm management: 45-0-0 87.5 ₱/bag (bag=20kg)

9 BAEX, Tagbilaran:

83.6 P/bag

° F.I.A. Sep. 27, 1976:

76.45 P/bag

Ex-warehouse prices for implemental and prices have taion by all fertilizer manufacturer/importers, Cebu

6) 1985 financial price calculated by using the official exchange rate of US\$1.00 = P7.5

Urea Case 2: It is assuming that new distribution center will be established in Tagbilaran City in future.

Import Europe Urea.

		198	5.
W.	all takylise a sawa asin addi yaddi ladi yadigar shaf		US\$/ton
1)	Export price, f.o.b. Europe	1,390	185
2)	Ocean freight and insurance in Tagbilaran	285	3 8
3)	Handling Charge Tagbilaran	45	6
4)	Price of Tagbilaran Port	1,720	<u>230</u>
5)	Cost of handling at distribution Center, Tagbilaran	94 5. 14	
6)	Ex-warehouse price for implementation by manufacturers/importers Tagbilaran	Address to	235
7)	Transportation Cost to Project Area by Truck		
8)	Cost of handling by dealers (or-Cooperative) At Project Area	. 20	4
9)	Transportation Cost, dealers (or-Cooperative) to farmer		
10)	Farm gate price of Urea		245
er Selekt	(Financial farm gate price)		**, *
11)	N/kg	1	

Urea of Philippines will be imported from ASEAN Urea Plants of Malaysia & Indonesia after 1981. Distribution center is Cebu City.

	198	
andria de la companya di mangantan di mangantan di mangantan di mangantan di mangantan di mangantan di mangant Minangan mangantan di mangantan di mangantan di mangantan di mangantan di mangantan di mangantan di mangantan d	P/ton	US\$/ton
1) Export price, f.o.b., Jakarta bulk!	1,275	300 (2 170) 200 (f
2) Ocean freight and insurance to Cebu Port	142	19 Short views (V
3) Handling Charge Cebu Port	45	6
4) Price of Cebu Port	1,462	<u>195</u>
5) ibid Case 1	15	2
6) ibid Case 1		30 (10 (30) 60 (30) 6 (30)
7) ibid Case 1	1,522	205
8) ibid Case 1	68	9 24 - 1 - 1 - 1 - 1 - 1 - 1 - 1
9) ibid Case 1	30	III (Massal)
10) ibid Case 1		n nagaraka (h.
11) Farm gate price Urea	1,630 1,630	219
(Financial farm-gate price)	ានសារិទី ភូមិមាន	in versionali. 19. Produktorak
12) N/kg	3.6	
The state of the s		ter et skrivet i de skrivet i de skrivet i de skrivet i de skrivet i de skrivet i de skrivet i de skrivet i de Skrivet i de skrivet

The Indonesia's indicative price of urea at \$175 per mt, FOB, bulk is not accepted by Philippines. Then, some price less than \$175 would be forecasted. In this case \$170 would be assumed. (Source: PPA). The second was assumed to mention

De assumed: (bour ov. 1)	•••		17 W. J. 18 P	.1974.45.1	2, 12, 13, 14, 14	
Philippines importable vo	lume i	s shown	in bell	ows:	i Se de gas	
	1981	1982	1983	1984	1985	
Importable Volume 10 ³ MT	322	242	257	278	339	
Malaysian ASEAN Plant	161	121	128	139	169	
Indonesian ASEAN Plant	161	121	128	139	169	٠.

B. Triple Super-phospa

				Appendix Page 1	
			855		
B.,	Triple Super-phospate	国 福祉 经基础	ajež 38 46 1	12	
		197 P/ton		198 P/ton	
	Export price, f.o.b. U.S. Gulfbulk		132	1,238	165
2)	Ocean freight and insurance to Cebu Port	203 203	27	210	28
3)	Handling Charge Cebu	45	6	45	6.00 (a.
4)	Price of Cebu Port	1,240	165	1,495	<u>199</u>
5)	Transportation Cost to distribu Center, Cebu	tion 15	2	15.	2,
6)	Cost of handling at distribution Center, Cebu	տ 45	6	45	36 000 (数) - 10 6 00 5000 (数)
7)	Ex-warehouse price for implementation by manufacture/importer	- 1,300 Cebu	173	1,555	207
8)	Transportation Cost to Project			59	
	Area (Cebu-Area)			00	ya de 11.
9)		a ora njestr	ar Projectical		
10)	Transportation Cost, dealers to farmer (Cooperative-farm)	24 (144 kg) 284 \$2600 (44 (8 14 4 624 (149)	645 6 1 15.	9040 - 1 8 0	1
11)	Farm gate price of Phosphate	1,400	186	1,652	220
	(Financial farm-gate price)	1,450		1,652	
12)	·P/kg	3.1	3 (14 t) - 1	3.6	
	(1) (1) (1) (1) (1) (1) (1) (1) (1) (1)	Hill (Angle) Transfer			
100					
		and the second of the second of	and the second second		

				Page 1	
c.	Potash				
		o'%u 1 9	177	198	5 alvar 3:
			US\$/ton		
1)	Export price, f.o.b. Vancouver bulk	495	66	503	67
2)	Ocean freight and insurance to Cebu	1	18 ,55	143	
3)	Handling Charge Cebu	45	6	45	6
4)	Price of Cebu Port	<u>675</u>	90	<u>691</u>	(92)
5)	Transportation Cost to distribution Center, Cebu	15	i de ? jon Sidektari	15	2
6)	Cost of handling at distribution Center, Cebu	45	6	45	6
7)	Ex-warehouse price for implementa- tion by manufacturer/importer Cebu	735		751	100
8)	Transportation Cost to Project Area (Cebu-Area)	59	8	59	8
9)	Cost of handling by dealers at Project Area (Cooperative)	30	de military.	30	ц
10)	Transportation Cost, dealers to farmer (Cooperative-farm)	8	1	8	1
111	Farm gate price of Potash	835	111	850	113
	(Financial farm-gate price)	1,200	**************************************	850	
12)	P/kg	$\frac{1.4}{2.0}$		1.4	

Pasic data: Fertilizer o Commodity prices and price projection

	1976	1977	1985
UREA)			
in Current Dollars	137	165	
in 1976 Constant Dollars	137	152.1	170.6
in 1977 Constant Dollars		165	185 - 185 - 181 (1811 A) (1811 A) (1811 A) (1811 A) (1811 A) (1811 A) (1811 A) (1811 A) (1811 A) (1811 A) (1811 A)
TSP)			
in Current Dollars	115	132	288
in 1976 Constant Dollars	115	121.7	152.4
in 1977 Constant Dollars		<u>132</u>	<u>165</u>
	e i	too he die te	ga kstankir da skorti (ladod (Logera ski
Potash)			119
in Currency Dollars	60	66 40) 34) 40) 53	11.7 Fra 1911 (1.18)
in 1976 Constant Dollars	60 🛷	60.9	61,94
in 1977 Constant Dollars		<u>66</u>	e militatelanes (

Source: Official Memorandum, World Bank, May 17, 1976.

Table 6D-17 Petroleum Price Structure, 1977 and 1985

	jag altina samiking kalabah di jerjaja ba Akanti dijat tengah angsal altin nagtin	1977		19	85
:	rangen vir hag by Skiper and the Siving	P/10 ³ L.	US\$/10 ³ &	P/10 ³ &	US\$/10 ³ L
1)	Saudi Arabian light crude oil 34° average realized	730	97	730	.97
	price f.o.b. Ras Tanural/			가면 시민이네.	
2)	Ocean freight, insurance and ocean loss to Manila Port2/	180	24	195	26
3)	Price of light crudeoil,	hanshi s	भूमिता, हेर्यह, स	e kaj ji justija	
. :	Cavite refining factory	As remak.			no: 20 (\$

- 1) Based on Office Memorandum, May 17, 1976, YBRD
 - 2/ Ocean freight value was assumed referring to freight values of other commodities.

Insurance and ocean loss was each computed at 0.2% and 1.0% of CIF price.

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Fig. 16 1 West Super or many ways sugar that of shoots on his

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Economic Costs of Farm Labor

Methods of Estimation

Pricing of farm labor is the assessment of the opportunity cost. The opportunity costs are estimated in the following general criteria.

The broil and the for floridogades, englassing and

The opportunity for off-farm employment Point A:

During the "non-peak" period farmers can, and often do, undertake activities like fishing, carpentry, home repairs, wood gathering, cottage industries like hat weaving and basket making, construction work and other casual labor. Wage rates of these jobs are unclear. NIA, however, surveied the important information on farm labor wages. According to this labor wage survey, the meal cost for hired labor is 2 peso. The value of the incremental caloric intake demanded by changes in labor activity would be considered 2 peso. बिद्धकार (१९९७) हेर्ड कुलिक्स है जिससे के अने के बेरिट के एक सिंह के अने कि एक स्वरूप के लिए हैं। एक से उपस्थित

Point B: The farm work season as usual (non-peak period) Printed the late of the filter that seems the state of the late of the late and the

The opportunities for work would compete with the permanent off-farm employment opportunities. The less productive off-farm employment is scarce, the more farm labor force is drawn into farm work.

Point C: The full employment peak periods

At the employment level corresponding to full employment. peak periods, the opportunity cost is equal to the observed market wage rate. Average farm hired labor wage of 6.5 peso in the Project area is considered as market wage rate.

Point D: The attractive farm wage rate for outside labor market

Labor would be hired under the more demand than the full employment for farmers themselves. Then wage rate go up. The opportunity cost of alternative labor pool correspond to the highest level of farm labor wage in the Project area.

It is postulated that the marginal opportunity cost of labor supplied for farm work in the Project area can be represent by an "S-shaped" curve which is drawn in Figure 6D - 1 and 6D - 2 using Point A, B, C and D as mentioned above.

2. Available Farm Labor Force

Farm labor forces to be available in the Project area will be depended upon labor inside and outside the Project Area. Table 6D-18 and 6D-19 indicate the mandays per month of full time and part time farmer with and without Project inside the Project area. Table 6D-20 explain available farm labor force outside the Project area. Both side labor are summed up Table 6D-21.

3. Total Labor Demand by Month

The labor demand by month which are shown in Table 6D-22 and 6D-23 was calculated based on the data of labor distribution by crops. These man days by month are converted to percentage of potential full employment as shown at Table 6D-24 and 6D-25.

4. Wage Rate by Month

Wage rate, namely, marginal opportunity cost are assumed by application of percentage of potential full employment to "S-shaped" curve. (Table 6D-26 and 6D-27.)

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			Appendix 6D-3 Page 3
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	Farm household 2,069 2,069 2,069 2,125 2,125 2,262 2,289		

e Project Area Labor Force Inside the Farm -19 Available F Table 6D-19

Project --Without

	Page 4
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Table 6D-20 Available Farm Labor Force Outside the Project Area

Year	Unemployment	Mandays per Month
		10 ³ man days
1977	1,700	₩
1978	1,730	45
1979	1,760	46
1980	1,790	47
1981	1,820	48
1982	1,850	49
1983	1,890	50
1984	1,930	51
1985	1,970	52
1986	2,010	53
1987	2,050	54
1988	2,090	55
1989	2,130	56

Note: 50 % of unemployment in municipalities adjacent the Project area was assumed to be hired in the Project area.

Annual growth rate is 1.9 %.

g areas 10³ man-days) Month including Surrounding Areas (unit: 10³ man

Inside		Without Project Outside	<u>Total</u>	Inside	(unit: 103 man-days, With Project Outside	-days)
6	5. W. C.		65 To 100 To 1			138
o	ស៊	45	140	π6	ន្តភ	139
on		.94	ፒተፐ	#6	97	7#0
10	0	m2	747	100	47	7#7
100	9	8 7	148	700	87	348
100	9	6 1	149	102	6 1	149 149
100	00	50 %	150	115	50	165
100	200	51	151	118	51	169
001	000	52	152	131	5.2	183
27.	105	53	158	131	53	187
105)5	54	159	137	ST.	191
105)5	55	160	137	55	192
31	105	56	161	641	5.5	661

1987 Note	Dec. Total	33 283
Jan. Feb. Mar. Apr. May 35 8 7 34 13 te: It is assumed that the labor de is constant in the conditions o	Nov.	38
Jan. Feb. Mar. Apr. May 35 8 7 34 13 te: It is assumed that the labor de is constant in the conditions of	Oct.	18
Jan. Feb. Mar. Apr. May 35 8 7 34 13 te: It is assumed that the labor de is constant in the conditions of	Sep.	m
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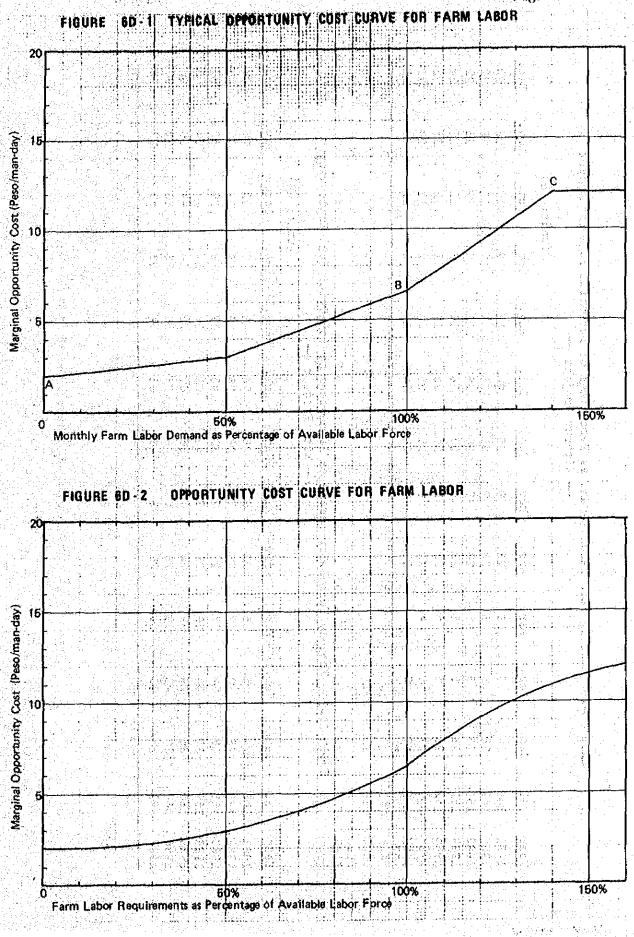
			(8:0	5.0)	1.7)	(2,4)	1.5)		
		Total	283 ((384 (611 (765 ()	.) 868	1,067	1,067
		Dec.	ဗ္ဗ	69	111	107	176	176	176
ď		Nov.	38	09	82	ြွ	127	133	133
ject an an	oject	Oct.		77	24	7.5	85	119	113
the Project area	Month with Project	Sep.	က	ന		ं 24	25	47	7,7
ing in ject.		Aug.	16	7,4	28	7	9 #	63	83
or farm	mand by	Jul	6£	88	7.	115	113	171	171
emand for with	abor De	j.	39	7	\$2	70	99	_ თ	- 6 ₁
the labor demand for farming in conditions of without porject.	Tactal Labor Demand by	May	13	10	12	13	on	74	† .⊤
	D-23 T	Apr.	#£	ထင္က	47	42	84	84	8
umed th nt in t	Table 6	Mar.	7	ဗ္ဗ	61	09	108	108	108
is ass consta		Feb.	ω	12	23	75	35	36	36
Note: It is assumed that is constant in the		Jan.	35		57	23	65	99	99
X		A.	345	941	165	169	183	184	181
		Year	1881	1982	1983	1981	1985	1986	1987

Note: Ai; Available Labor Forces (inside and outside the Project area)

The figures in parentheses indicate the labor required for construction works of the Project, and was exclude from total figures because of small numbers.

Appendix 6D-3
Page 8

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	Appendix 6D- Page 10
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Month without Project Ą Costs] Labor Total Table 6D-28

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Labor Costs by Month Without Project	Ak g. 32 22 32 32 32 32 32 32 32 32 32 32 32	Labor Costs by Month with Project	Aug	7 8 7 8 7 8	တ် ၁၃၈	127 227 227 127	
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lable	Man. 41. 41. 41. 41. 41. 41. 41. 41. 41. 41	Table	Mar	14 73	746 744	367 367 367	
	Feb. 16 16 16 16 18		Feb.	30 90	203 203	77 79.	
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	Year 1981 1983 1983 1985 1986 1986		Year	1981 1982	1983 1984	1985 1986 1987	

Decision of Escalation Factor

Escalation factor was be used by 8 percent decided in reference. to the following back datas.

leberharama war ak februarat a patu abka abiliki apti bagka yabay. Kajingtaji ji

- The price escalation factor which were used in the recent irrigation feasibility and appraisal report are around 8 percent (Data 1, 2 and 3).
- 2. Afterwards the oil crisis as of 1974 years, the inflation in the Philippines have been quiet down comparatively.

 (Data 4, 5, 6, 7, 8 and 9)

20 Parish Gara Day Day

3. The domestic inflation rate in recent years, especially, that in 1976 to 1979 years was lower than ADB Guidelines of 12 percent. (Data 10).

high recention the grown trace of the fighting better weight about playing a property

4. Guideline of World Bank indicate compare index of international inflation with GNP deflator (Data 11). Data 12 was made for the same purpose. The indicator on GDP and Consumer's price index in 1975 to 1976 indicate less difference. According to the Long-Term And Five Year (1978-82) Development Plans, NEDA, GNP was forecasted at an average annual rate of approximately 8 percent.

Escalation factor infuture would be used by 8 percent in reference to such forecasting.

and the form of the assemble for the part of the seek is day

Basic Data on Cost Escalation Factor

1. Cagayan Integrated Agricultural Development Project.
Feasibility Report, April 1976, JICA

8 percent per annum for both the foreign and local currency.

2. Jalaur Irrigation Project
Appraisal Report, October 1976, World Bank

용배 된 등이 그렇게 있었다.	Annua.	L. Inflati	on Kate	(3)
	197	77-79	1980-8	
Civil Works		12	10	ųť,
Equipment and servi	ces	8	7	

- 3. Laguna de Bay Development Project-1st Package
 Appraisal Report, November 1975 Asian Development Bank
 :- 8 percent per annum during the construction period
 1976-1980
- 4. Trend of Growth Rate of Consummer's Price in Metro Manila

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t of the first being the first the first the same of the first the same of the first the same of the s

Source: Central Bank of Philippines

5. Retail Price Index of Selected Commodities in Metro Manila Philippine Economic Indicators, August 1977, NEDA

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					Contract of the Contract of th		Pesos
- J.	$\frac{1}{2} + \frac{1}{2} \frac{f_{B,b}}{f_{B,b}}$. 1	A 180 L				
	À vent		7975 200	1	976		

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5) Lumber, Tangile, Rough (1.64, 1.6

1977 Jan. Feb. Mar. Apr. May Jun. 15.67 15.67 15.61 15.61 15.61 15.61 15.61

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1.69 1.69 1.79 1.79 1.79 (1.79 (1.79 (1.79))

a/ Data collection was discontinued.

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(42.5)5

6. Labor Wage Index⊥∕	Rates of Change from
	Previous Year (%) 1975 1976
Monetary Wage rate	
Skilled labor Unskilled labor	$\begin{array}{c} 4.0 \\ 9.7 \end{array}$
Real Wage rate	all Maria (M. 1916) (M. 1906)
Skilled labor Unskilled labor	-8.5 -1.6 -20.8 -1.3

Source: Central Bank of Philippines

Note: 1/ Industry labor wage:

7. The minimum standard of labor wage was decided as of May 1, 1976 based on No.978 of Presidential Degree.

1) Non-farm labor in Metro Manila	8 to	10 Peso
2) Non-farm labor in other districts	8 to	9 Peso
3) Plantation and organized labor	4.75	to 7 Peso
4) Farm labor	4.75	to 6 Peso

- 8. Hired farm labor wage in the Project area.
- Farm management Survey, 1977, LRED, NIA -

(Unit: Pesos)

	Palay İr	rigated	Palay Rainfed			
	Wet	Dry	Wet	Dry		
Land Preparation	8.5	8.3	9.0	7.5		
Repair of Dikes	6.0	6,0	7.1	7.0		
Transplanting	5.5	5.8	6.3	6,2		
Handweeding	7.2	7.3	6.6	6.7		
Fertilizer	7.5	7.8	7.0	6.8		
Hauling	6.0	6.0	6.8	7.5		
Drying		6.0	5.9	6.0		
Weighted ave	rage 6.6 Pe	so				

9. Retail: Price of rice in Bohol: Province to 1976, 960 need conservations

Unit: Pesos per kg

tional.

Jan. Feb. Mar. Apr. May Jun. Jul. Aug. Sep. Oct. Nov. Dec. Ave. 1.86 1.90 1.90 1.90 1.94 2.06 2.10 2.40 2.00 2.10 2.09 2.00 2.00 (100)

Sket their wer will crep

Source: Annual Report, NGA, Region VII, 1976

10. Guidelines of A.D.B.

telan X Japania Tagan

	1976	Annually 1977-79	Annually 1980-85
	8	8	8
Equipment	10	8	7

a/ World Bank recommendation, March 1975

11. Guidelines of World Bank

Inflation Indices, 1961 - 1985

	GNP Deflation (at market price (% per annum)	ces)	Index of Intern Inflationa/ (% per annum)				
1961-70	3.7		1.7				
1971-73	11.1		11.2				
1973	15.5		18.7	400			
-1974	10.2		22.4				
1975 provisional	11.9		14.5				
1976 projected	6.5		6.5				
1977-80 projected	7.7		7.7	. A.			
1981-85 projected	7.0		7.0				

a/ Index of c.i.f. prices of developed countries manufactured goods.

12. Comparison GDP, GNP with Consumer Price Index in Philippines

	1972	1973	1974	1975	1976	
G. D. P.	4.8	8.7	4.8	6,9	6.3	347
G.N.P.	4.2	9.9	5.8	na	na i i d	W.D
Consumer's Price	10.2	11.0	34.3	8.0	5.6	
Index	NV delab	S 37.27		ीतिस् रक्ष ाने,	1.75 (20)	í

Economic Cost

Component cost to be re-estimated for economic evaluation consist of unskilled labor, fuel and oil and land acquisition and compensation.

Financial unit wage of 15 Pesos used in cost estimation was adjusted based on opportunity costs of labor. Opportunity costs of labor were obtained from labor study and values from 2,2 pesos in 1979 to 6.1 pesos in 1985 years.

Financial diesel oil price per litter of 1.3 pesos was adjusted at economic price of 0.9 peso.

Cost to acquire the existing cultivated lands is excluded in economic evaluation to avoid the double country with benefit stream. But cost to acquire other purpose lands is counted. Methods of evaluation are the use of value capitalized from annual benefit of land or land value for tax assessment to fixed assets.

On the compensation cost, cultivated land's and other land's value was assessed using above methods. Farm house building's value was estimated on residual value of constructed cost newly.

Cost allocation of joint facilities is computed using the "Separable Costs Remaining Benefits Methods". The procedure of computation is shown the following Table.

	Total	9,486 7,440 7,440	28.350	2, 4, 28, 4, 388, 4, 080, 4, 14, 080, 4, 14, 14, 14, 14, 14, 14, 14, 14, 14,
	Unit: #*10	1,613 1,613 3,544	010 010 010	1,332
Economic Evaluation	#861	2,704 3,256 805 6,766	9 22 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	3.30 3.55 (1.00) (1.0
for Economi	1383	1,888 2,274 1,310	2,470 2,470	2,640 2,640 2,640
	[385]	2,163 2,628 1,140	000 000 000 000 000 000 000 000 000 00	2,720 500 500 500 500 500 500
to be re-e	1381	910 1,099 1,185	9. 200 9. 300	137 137 3,539 3,540
Component Cost to be re-estimated	1980	,	3 2 8 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	
	1979		# 09E	Wester Tall ground of the Section with
Table 6F-1		Financial Cost Unskilled Labor Fuel and Oil Land acquisition and Compensation	Total Total rounded	Economic Cost Unskilled Labor Fuel and Oil Land Acquisition and Compensation Total Total Total rounded

Francisco de Contraction

Cost Allocation

Cost of joint facilities to be allocated.

Pamacsalan Dam

48,380 P 103

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20年8年,60年的時候也可以表現一個一個大學的

Malinao Diversion Dam

21,370 P 10³

69,750 \$ 103

There are to make, the first of the first should be This study include the depreciation cost of equipment and not include the contingency and bear the transferred and

Alternative Construction Cost and Algert and Japan 1911

Language of the form of the first

1) Irrigation

a. Alternative dam

Total storage capacity

29,500 m³ x 10³

Construction Cost

45,400 ₽ x 10³

Consider the salt distance (1)

and by consthances at the tellings . b.

b. Alternative diversion dam

Total storage capacity 3,361 m3 x 103

Construction Cost 20,600 ₱ x 10³

119,810 $\mathbb{P} \times 10^3$ c. Specific costs for agriculture

d. Gross alternative Construction Cost Construction Cost

$$a + b + c$$

velevida 185,810 ₽ x 10 3

Electric Power

a. Alternative dam

Total storage capacity 22,920 m 3 x 10 3

Construction Cost 104 104 104 103,800 R x 103

前 计电 解高级 计

b. Specific costs for electric power 13,500 P x 103

c. Gross alternative Construction Cost

 $57,300 \ P \times 10^3$

3. Separable Cost

1) Irrigation
$$69,750 - 43,800 = 25,950 \text{ P} \times 10^3$$

Justifiable Expenditure Value

$$(i) = (ii)$$
 3,65

c. Annual net benefit

d. Justifiable expenditure value

ustifiable expenditure value

$$34,202 \div \frac{0.12 (1+0.12)^{50}}{(1+0.12)^{50}-1} = 284,070 \text{ P} \times 10^{3}$$

$$i = 12\%, \quad n = 50 \text{ years}$$

Electric Power

b. Justifiable expenditure value

$$1,746 \div \frac{0.083 (1 + 0.083)^{45}}{(1 + 0.083)^{45} - 1} (1 - \frac{0.1}{(1 + 0.083)^{45}})$$

्रिक्षा अस्ति विद्यालया । विद्यालया

$$= 20,510 P \times 10^3$$

$$n = 45 \text{ years}$$

(Unit: R x 10³)

		(Unit:	B × 103
ing the second s	Irrigation	Power	Total
	,185,810,	57,300	i sana kay istig Tana mening
b. Justifiable expenditure value	228,013	20,510	248,52
c. Smaller either of a and b	185,810	20,510	
d. Specific cost	119,810	14,425	134,23
e. (c - d)	66,000	6,085	
f. Separable cost	25,950	3,750	29,70
g. (estif) a plantage contact Caraca		2,335	42,38
h % of g	94.5	5.5	100,
i. Remining joint cost	37,850	2,200	40,05
j. Allocation cost	63,800	5,950	69,75
k. % to be allocated	91.5	8.5	100.
Note; <u>1</u> / 69,750 - 29,700 = 40,	050		

Internal Rate of Return

Internal rate of return is obtained by computation of present worth value. Present worth value of benefit and cost was computed at 50 years term as shown in the following Tables. Benefit streams are shown in Table 6-3 of main report. Cost streams consist of irrigation and power's construction economic cost, 0 % M cost and power's replacement cost.

And the first of the second of the second

Electric power and irrigation's present worth value isolated are shown in Table 6-6 and 6-7 of main report. Based on this Tables, internal rate of return of both project are obtained as the following Figures.

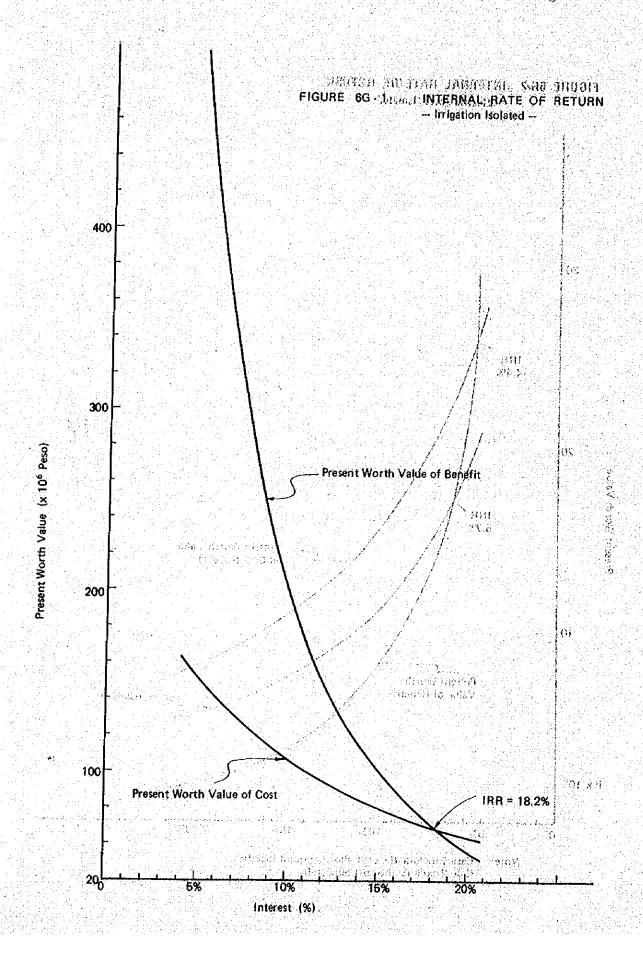
Present Worth Value of Economic Cost - Irrigation and Power Unit:

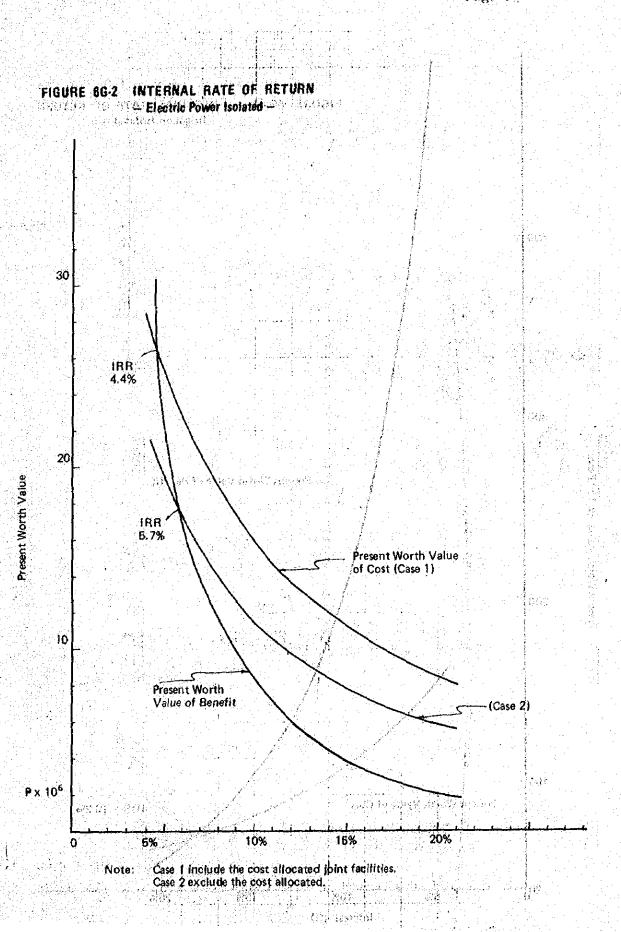
	208			4.32	3.42	16.54	11.93	14.35	11.65	4S.S	0.54	\$ 2.68	0.03	Σ 0.03	0.00	2 0.00	71.00
Peso x 106	Rate 15%	•		4.70	3.88	19.59	14.79	18.55	15.66	7.78	0.80	Σ 5.10	90.0	2 0.15	0.03	₹ 0.0 0.0	91.13
and Power Unit: P	Discount		1	\$1.2	77. T	23.43	18.45	24.22	21.43	11.13	1.19	2 10.49	0.25	2 0:76	0.29	2.0:27	121.49
Irrigation a	58	.		5.64 40.2	5.13	28.20	23.29	32.04	29.66	16.14	1.82	Σ 23.93	1.07	2 4:21	2.05	2.34	175.52
Cost - Imp	Total Annual Cost	1	l	6.22	5.91	78.48	29.75	42.95	41.77	23.88	2.82	2.83	5.15	2.83	16.02	2.82	318.76
t Worth Value of Economic Co	Power Re- Placement			•		- I							2.33	1	13.20		15.53
Value of	Power	1	: 1 : 1 : 1 : 1 : 1 : 1 : 1 : 1 : 1 : 1		11	1 .		1	1	1 .	0.43	0.43	0.#3	en • 0	о. тэ	€#.0	18.06
nt Worth	0 8 M Irrig:	4		1	ı	1		(1.47)	(1.47)	(0.74)	2.39	2.39	2.39	2.39	2.39	2.39	(104.06)
I Presen	Power	* 1 .				1.95	1.46	14.32	2.96	2.67			1	* j * j * j * j	-		23.36
Table 6G-1	Inrigation	1	ŧ	6-22	5.91	32.36	28.29	28.63	38.81	21.21			1		And the second s		161.43
	Project Year	0	7		en .	₹	م ا	9	L	α ο *	Ø	0.dg	32	88 H	#2	-50 -50	
	Year	1977	1978	1979	0861	1981	1982	1983	1984	1985	1986	1987	2009	2010 -2018	2019	2020	Total

Note: Eigures in the Parenthesis includes in the costs of Irrigation.

1 Power Unit: Peso c 10^6 Table 6G-2 Present Worth Value of Benefit - Irrigation and 1

							Appe Pa	ndix 6G- ge 3	<u>1</u>
0 T00	208		0.75	2.92 3.94	5.74 6.56	6.07	H. 55	Σ 22.88	58.73
er Unit: Peso	Rate 15%		0.93	3.78 5.30	8.06 9.65	9.33 8.50	7.56	2 20.67	103.76
on and Power	Discount R		1.17	4.93	11.52	13.90	12.92	2 126.71	207.32
- Irrigation and	1 1 28			6.52 10.03	16.72	23.10	22.59	283.80	508.69
Value of Benefit	Total		88	8.74 14.13	24.73	37.69	40.63 40.86		40.86 1,754.16
Present Worth Val	Power_				1.75	1.75	1.75		1.75
그를 하고 불편하는 그렇게 되어	Irrigation		1.88	हार.म् र म <i>्</i> .८	24.73	35.94	38.88		39.11
Table 6G-2	Project Year 0	7 m	ታ ທ	0	co <i>c</i>	0.00	12 12 13		· 06
	<u>Year</u> 1977 1978	1979	1981 1982	1983 1984	1985	00 8 5 1 00 00 00 00 00 00 00 00 00 00 00 00 00	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	4 12 1	2027 Total
					(4) (4) (4) (4) (4) (4) (4) (4) (4) (4)				





CHAPTER VII. STAGE DEVELOPMENT

Stage Development

A. Implementation Schedule

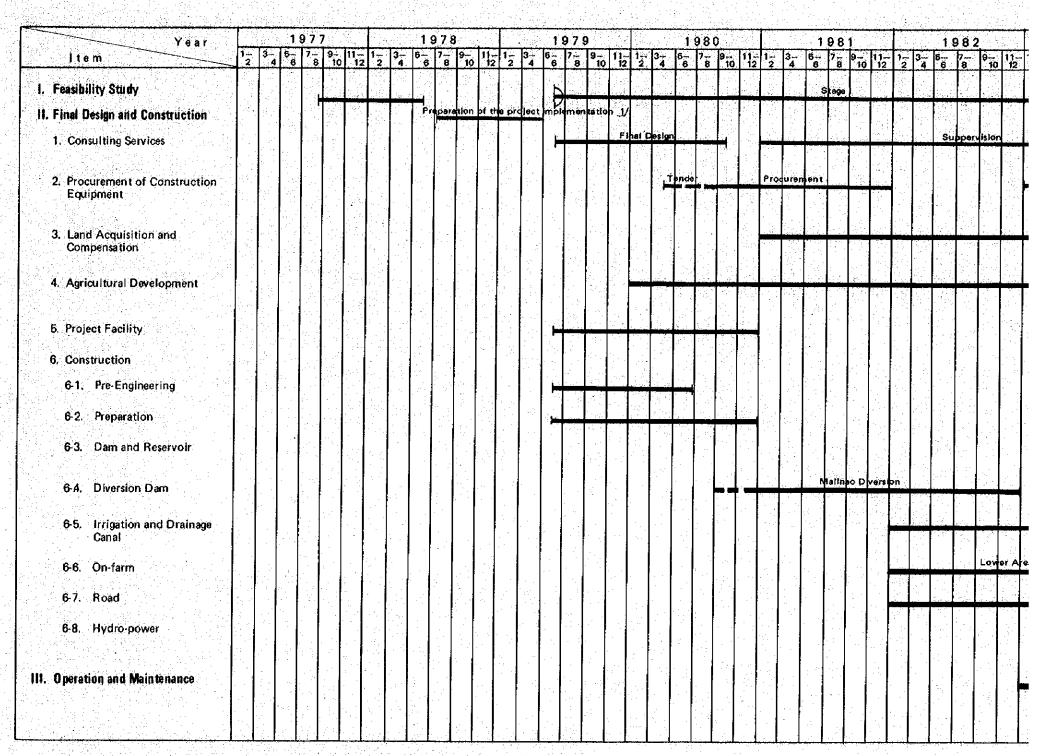
As one alternatives of the development schedule, stage development in phasing manner has been studied; the project is planned to be developed in two stages. The first stage (stage I) aims at developing the area of about 2,760 ha by using the available dependable discharge served by the proposed Malinao diversion dam only, and the second stage (Stage II) might be implemented, when the national economic conditions shall improve to be able to justify the high cost of developing the storage scheme. In the second stage, all of the areas of 5,320 ha will be served by means of the diversion dam and Pamacsalan dam.

The Stage I involves the construction of the Malinao diversion dam, irrigation and drainage systems to serve the area of about 2,760 ha, on-farm development, road and supporting services to meet the said areas. The Second Stage comprises of the construction of Pamacsalan dam, irrigation and drainage systems for the remaining areas of 2,560 ha including those of the upper area, remaining on-farm development, road and supporting services as well as hydro-power.

The construction periods of the Stage I is planned to be three years from FY 1981 to FY 1983 and Stage II is planned to start its construction from FY 1984 taking into account long construction periods of the Pamacsalan dam, and will be completed by mid-1987. Under this plan, the four and half years, from FY 1983 to mid-1987, have been considered to be enough to satisfy the above mentioned conditions.

Figure 7A-1 indicates the proposed implementation schedule for stage development. Table 7A-1 shows the yearly construction schedule of on-farm development.

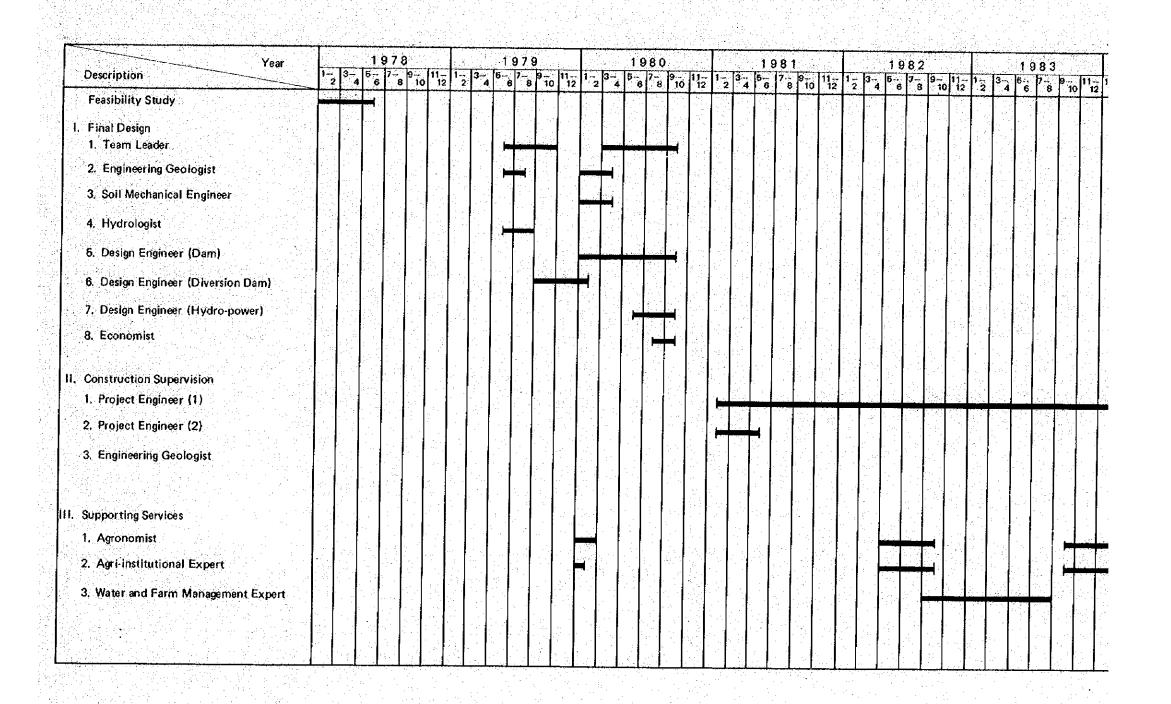
FIGURE 7A-1. IMPLEMENTATION SCHEDULE FOR THE PROJECT



Note: 1/ include the negotiation for external financial arrangement of the project establishment of project organization and recruitement of consulting firm.

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FIGURE 7A - 2 PROPOSEO SCHEDULE FOR CONSULTANT'S SERVICES



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Table 7A-1. Yearly Construction Schedule of On-farm Development

		Upper Area		. Nye.	Lower	ija Salas	
Year	Wahig	Pamacsalan	Sub-Total		Area		Total
1982					1,365		1,365
1983			_		1,392		1,392
1984	M. 14.3		- <u>-</u>		698		698
1985				. 3	690		690
1986	400	-	400		453		853
1987		120	120	10	202		322
Tótal	400	<u>120</u>	<u>520</u>		4,800		5,320

B. Project Cost and Disbursement Schedule

The Project cost in case of stage development is estimated by applying the same procedures as those of the Project Plan, except the cost of consulting services, which is evaluated based upon the expanded implementation schedule.

As the results, the total investment cost in each stage, including the cost for price escalation during the construction period, is estimated at about US\$20.9 million (F157.1 million) in Stage I and US\$26.4 million (F197.7 million) in Stage II, totaling US\$47.3 million (F369.2 million) as a whole. Table 7B-1 shows the breakdown of the investment by major items.

The project cost per hectare is estimated at about US\$4,800 for overall plan in stage development plan, of which US\$4,010 per hectare is in stage I and US\$2,890 per hectare in Stage II respectively as shown below;

Description	Stage I Stage II	Overall Plan
Project cost (US\$'000)	11,070 15,380	26,450
Cost per hectare (\$/ha)	4,010 2,890	4,970
		$(4,410)^2$

Note; 1/: cost estimated by the depreciation basis for construction equipment and no inclusive at construction equipment cost and price escalation.

2: exclusive of allocated hydro-power cost.

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Table 7B-1.	
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											OxIO3		601.70	F	age		7B-1	
	Total	104,740	6,470	31,760 1,520	3,200	5,740	13,870	10,410	197,710	29,660	227,370 US\$30,320x10 ³	094°64T	354,820					
(thit: *'000)	Sub-total	68,350	700	13,480 480	2,490		0,840	3,190	95,530	14,330	109,860 514,650×103	109,860	<u>197720</u>	US\$26,360×±0~		tion tion		
ing)	L.C.	34,520	700	13,480	2,490		3,070	7 ⁴ 60	41,850	6,280	48,130 USS	48,130	0£0,68	SO		of construc		
of the Project	U.	33,830		13,250	Ì	i i i pish	3,770	2,730	53,680	8,050		46,960	108,690		ırrency	basis		
Cost of the	Sub-total	068,38	5,770	. 38, 38, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,	710	5,740	7,030	7,220	102,180	15,330	117,510 \$15,670×10 ³		157,100	US\$20,950×10°	: Local currency	depreciation		iğle Se
	Stage I	21,450	5,770	380	710	4,750	2,730	040.1	37,870	5,680	in and a	15,870	59,420		ပ် i		ole 7B-2.	
7.78-1.1		046,41		37,900	ista National Saat	066	008,4	6,180	64,310	9,650		23,730	97,690		currency	nvestment	equipment is given in Table	
Table 78-1.			mpensation) (e e e e e e e e e e e e e e e e e e e	ase T	erif tag	forest			F.C.: Foreign currency	required i	pment is g	
			ion and Co	Equipment	Developmen	it.	nstration	ervices	-H		r d	tion	otal	in in the second	т. Б.С.		٠.	
	Description	Civil Works	Land Acquisition and Compensation	Construction Equipment	Agricultural Development	eration an	oject Admil	8. Consulting Services	Sub-tot	mtingency	Sub-total	rice Escala	Cymud I		Ž			
		ဉ်	2. Lai		т. А	ტ. გ.	7. Pr	် မ		္မ	in adili Litari In alia	10.	ina Marti Artik		\$4. \(\frac{1}{2}\) \$4. \(\frac{1}{2}\) \$5. \(\frac{1}{2}\)			

of the Project (Depreciation Base) ø Table

																	AP	oendix 7B Page 3	-1
			Tota1	104,740	6,470	28,380	1,520	3,200	5,740	12,000	10,410	172,460	25,870	198,330 US\$26,450	127,570	325,900 US\$43,450			
	t: ¥1000)	- 1	Sub-total	68,350	700	17,880	08⊅	2,490		7,190	3,190	100,280	15,040	115,320 USS15,380	96,880	212,200 US\$28,290			
on Base)	(Unit:	Stage I	o i	34,520	700	1.	480	2,490		3,050	09#	41,700	6,250	7,950	008,04				
epreciatic			E.C.	33,830	1	17,880	•	1		4.340	2,730	58,580	8,790	68,370	56,080	123,450			
Investment Cost of the Project (Depreciation Base)		C	Sub-total	36,390	5,770	10,500	1,040	710	5,740	4,810	7,220	72,180	10,830	83,010 US\$11,070	30,690	113,700 US\$15,160			
Ost of the		Stage 0	ပြ	21,450	5,770	. •	1,040	710	4,750	2,700	040°τ	37,460	5,620	080,64	15,740	58,820 U			
nvestment (ы С	14,940	. •	10,500		Ţ	066	2,110	6,180	34,720	5,210	39,930	14,950	24,880	urrency	rency	
Table 7B-2. In			Description	Civil Works	Land Acquisition and Compensation	Construction Equipment	Agricultural Development	Operation and Maintenance	Project Facility	Project Administration	Consulting Services	Sub-total	Contingency	Sub-total	Price Escalation	Grand Total	Note: F.C.: Foreign currency	L.C.: Local currency	
				i.	~	m	#	Ŋ	φ	7	œ		တ		10.				

Foreign currency Local currency F.C.: Foreign coll.C.: Local cur

Table 78-3. Disbursement Schedule for Stage I Development

				Table 7	/B-3.	pisburs	sement :	cnedul	e ror t	stage 1	neverobu	ent				(unit;	#LOOO)		
			Toța	ıl	(Jan	lst yea		(Jan	2nd ye ; † 80- De			ord year .'81-Dec	, '81)		4th yea .'82-Dec	r ,'82)	(Ja	5th ye n.'83+De	c. (83)
	Description	F.C	L.C	Total	$\overline{\mathbf{F.C}}$	L.C	Total	F.C	L.C	Tota)	F.C	L.C	Total	<u>F.C</u>	L.C	Total	<u>r.c</u>	L.C	<u>Total</u>
1.	Civil Works	14,940	21,450	36,390		1,010	1,010	~	250	250	10,140	5,570	15,710	3,120	8,610	11,730	1,680	6,010	7,690
	1-1. Preparation	80	140	220	-	_	-			*	80	140	220		police d oca				-
	1-2. Dam				_	•••	<u> </u>	7	-	- 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1	_			<u>-</u>		e Here			strain e la ge
	1-3. Diversion Dam	11,500	8,030	19,530	_	-	-	-		-	10,060	5,430	15,490	1,440	2,600	4,040			
1	1-4. Irrigation and Drainage Canals	2,220	8,440	10,660	,	-	. ~		andri Harita Harita	. -	_		<u>.</u>	1,110	4,220	5,330	1,110	4,220	5,330
	1-5. On-farm	820	2,160	2,980	_		-		-					410	1,080	1,490	410	1,080	1,490
	1-6. Roads	320	1,420	1,740		-		. - .	- · · · · · · · · · · · · · · · · · · ·				••• ••••	160	710	870	160	710	870
	1-7. Hydro-power	elv∯ 			_	-	_	-	— . 	-						7		5 %	
	1-8. Pre-Engineering	idis tekkeri. S	1,260	1,260	-	1,010	1,010		250	250	-	-		-	-1	-			-
2.	Land Acquisition and Compensation	-	5,770	5,770	<u>-</u>	-	-	<u>.</u>	-			3,640	3,640		990	990		1,140	1,140
3.	Construction Equipment	37,900	380	38,280	र चे इंटिंस्ट	. 11. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	<u>-</u>			≟	37,900	380	38,280						
Ή,	Agricultural Development	- 1	1,040	1,040	.연 : 2 원왕(). 2 호	<u> -</u>	_	· · · · -	260	260	் <u>ச</u> நக்கி	260	260	a -	260	260	2.5	260	260
5	Operation and Maintenance Cost		710	710				-		erin Tillig	<u>-</u>		3 / T		-	714		710	710
έ.	Project Facility	990	4,750	5,740	990	2,370	3,360	<u>-</u>	2,380	2,380	_		_	_	∴	- -	-		
7.	Project Administration	4,300	2,730	7,030	80	270	350	-	230	230	3,840	790	4,630	250	790	1,040	130	650	780
8	Consulting Services	6,180	1,040	7,220	770	130	900	1,750	290	2,040	820	140	960	1,420	240	1,660	1,420	240	1,660
	Sub-total (1 to 8)	64,310	37,870	102,180	1,840	3,780	5,620	1,750	3,410	$\frac{5,160}{}$	52,700	10,780	63,480	4,790	10,890	15,680	3,230	9,010	12,240
9.	Contingency	9,650	5,680	15,330	280	570	850	260	510	770	7,900	1,620	9,520	720	1,630	2,350	490	1,350	1,840
	Sub-total (1 to 9)	73,960	43,550	117,510	2,120	4,350	6,470	2,010	3,920	5,930	60,600	12,400	73,000	5,510	12,520	18,030	3,720	10,360	14,080
10.	Price Escalation	23,730	15,870	39,600	260	540	800	430	830	1,260	18,790	3,840	22,630	2,290	5,190	7,480	1,960	5,470	7,430
	Grand-tótal (1 to 10)	97,690	59,420	157,110	2,380	4,890	7,270	2,440	4,750	7,190	79,390	16,240	95,630	7,800	17,710	25,510	5,680	15,830	21,510

	그 속보안된 변호하고 있다. 네무		4.1.1.4.1.1	Table 7	B-4. C	isbursen	ment Sche	dule for St	tage [1]	l Develo	pment	Maria Mari							
			m o to s			5th year 183 - De		6tl (Jan.'8)	h year			: P'000) 7th year !85 - De			8th year		Ctae	9th year	
	<u>Description</u>	<u>F,c</u>	Tota L.C	Total	F.C	L.C	Total		L.C	Total	$\frac{\text{Coans}}{\text{F.C}}$	L.C	Total	$\frac{\text{(odi)}}{\text{F.C}}$	L.C	Total	$\frac{Coain}{F.C}$	L.C	
1.	Civil Works	33,830	34,520	68,350				3,530	7,770	11,300	15,510	8,240	23,750	10,740	11,740	22,480	4,050	6,770	10,820
	1-1. Preparation	100	280	380	-	-		70	200	270	. <u>4</u> 4	4.		30	80	110		•	7
	1-2. Dam	19,270	19,800	39,070	-	-		2,480	3,980	6,460	4,260	3,870	8,130	9,380	7,480	16,860	3,150	4,470	7,620
	1-3. Diversion Dam	310	860	1,170	· 12 · - :	<u>-</u>	- 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1	+		i apad				310	860	1,170	er en er er er er er er er er er er er er er		
*	1-4. Irrigation and Drainage Canals	2,040	7,800	9,840	=	·		580 2	2,200	2,780	580	2,200	2,780	580	2,200	2,780	330	1,200	1,500
	1-5. On-farm	760	2,000	2,760	-	<u> </u>	-	210	570	780	210	570	780	210	870	780,	1,130	290	420
	1-6. Roads	310	1,320	1,630	<u>-</u>	-		190	820	1,010	120	500	620	· · · · · · · · · · · · · · · · · · ·	W. W.		nu.		adina Tabu
	1-7. Hydro-power	11,040	2,460	13,500	-	-	100 - 1 4 , 0	-	-	-	10,340	1,100	11,440	230	550	780	470	810	1,280
	1-8. Pre-Engineering	· · · · · · · · · · · · · · · · · · ·	0,30 <u>⊅</u>	1.02	1 1 4 4 5	_ \$ ((e <u> </u>	graden <mark>-</mark> T		<u> 2</u> 190	_	- · · · · · · · · · · · · · · · · · · ·		_			*	-		
2.	Land Acquisition and Compensation		700	700	<u> </u>	·		- -	700	700		r i Jes			10.		English A	3.37.6	
3.	Construction Equipment	13,350	130	13,480	13,350	130	13,480	-	. - :	T _a - No	- 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1		1. <u>E</u> 12.	-			÷ .		
4.	Agricultural Development	· · ·	480	480		<u>-</u>	-	en es plan is	260	260	그 사는 결사로	220	220	- -		-	, And the		
5.	Operation and Maintenance Cost	÷	2,490	2,490		· · · · · · · ·	-	•	710	710		710	710		710	710		360	360
6.	Project Facility	υ(Δ)	4	i jang	1994 -			•	, , ;	· · · · · · · · · · · · · · · · · · ·	. j j. <u>-</u> 1	-		-	- 1		- 1 - - 1		
7.	Project Administration	3,770	3,070	6,480	1,070	10	1,080	280	760	1,040	1,240	730	1,970	860	1,000	1,860	320	570	890
8.	Consulting Services	2,730	460	3,190	1112	19 2 <u>-</u>	$V_{\mathcal{L}}(\xi_{i}) = \frac{1}{2} (1) .$	870	150	1,020	670	110	780	1,080	180	1,260	110	20	130
	Sub-total	53,680	41,850	95,520	14,420	140	14,560	4,680 10	0,350	15,030	17,420	10,010	27,430	12,680	13,630	26,310	4,480	7,720	12,200
^		0.050	6 220	111 920	2,160	20	0.100	700]	1,550	2,250	2,620	1,500	4,120	1,900	2,050	3,950	670	1,160	1,830
9.	Contingency State	8,050	6,280	14,330	2,100	20	2,180	7 00	1,550	2,230	2,020 1,020	1,500 /	4,120						
	Sub-total (1 to 9)	61,730	48,130	109,860	16,580	160	16,740	5,380 11	1,900	17,280	20,040	$\frac{11,510}{}$	31,550	14,580	15,680	30,260	5,150	8,880	14,030
iO.	Price Escalation	46,960	40,900	87,860	8,750	90	8,840	3,500 7	7,730	11,230	15,670	9,000	24,670	13,490	14,500	27,990	5,550	9,580	15,130
eri eri	Grand-total (1 to 10)	108,690	89,030	197,720	25,330	<u>250</u>	25,580	8,880 19	9,630	28,510	35,710	20,510	56,220	28,070	30,180	58,250	10,700	18,460	29,160

TABLE 78-5. Disbursement Schedule for Stage I Development (Depreciation Base)

			Total		(Jan	lst ye	ar Dec.!79)	(Jan.	2nd yea . 180 - 1	, and the second second	(Jan.	3rd yea '81 - De	 6. 5 	Glan.	4th yea 182 - De		, <u>;</u>	5th ye	
	Description	F.C	L.C	Total	F.C	<u>L.C</u>	Total	$\frac{\overline{\mathbf{r}} \cdot \mathbf{c}}{\mathbf{r}}$	L.C	Total	F.C	<u>L.C</u>	Total	F.C	ь.с	Total	F.C	L.C	Dec. '83) Total
1.	Civil Works	14,940	21,450	36,390	in Service	1,010	1,010	***	250	250	10,140	5,570	15,710	3,120	8,610	11,730	1,680	6,010	7,690
	1-1. Preparation	80	140	220	–	-	-	· 1	· · · · · · · · · · · · · · · · · · ·	•• · · · · · · · · · · · · · · · · · ·	80	140	220		-	.a. j. -	,	•	
	1-2. Dam	•	-		ar Er		.			j 744	, † , t	-		a same	4 1 7 1	Ár y tak			
	1-3. Diversion Dam	11,500	8,030	19,530		grade 🕶 d	-: Tuer T		-	+-	10,060	5,430	15,490	1,440	2,600,	4,040	_	-	-
ż	1-4. Irrigation and Drainage Canals	2,220	8,440	10,660	g - +	1			4. 7 5	- ',	. · · · · ·	-	a 47 :	1,110	4,220	5,330	1,110	4,220	5,330
•	1-5. On-farm	820	2,160	2,980			-		-	₋		_		410	1,080	1,490	410	1,080	1,490
٠.	1-6. Roads	320	1,420	1,740		 .	<u> </u>						. :	160	710	870	160	710	870
	1-7. Hydro-power	· · · · · · · · · · · · · · · · · · ·	••	1, m	-	nang i	7	.	_	••			en en en en en en en en en en en en en e				$\frac{1}{2} \left(\frac{1}{2} + \frac{1}{2} \right)$	1 1 ± 13 14	
	1-8. Pre-Engineering		1,260	1,260	~	1,010	1,010	·	250	250	-	_	_		<u> </u>	-	_	_	•
2.	Land Acquisition and Compensation		5,770	5,770	· -	- -	·	_	-	 7		3,640	3,640	-	990	990	→	1,140	1,140
3.	Construction Equipment	10,500	-	10,500		· · · · · · · · · · · · · · · · · · ·	n garating	, 7 2.	-	=	1,500	_ =	1,500	4,690		4,690	4,310		4,310
ц,	Agricultural Development	e de la composition della composition della composition della composition della composition della composition della composition della composition della composition della composition della composition della composition della composition della composition della composition della composition della composition della composition della composition della composition della comp	1,040	1,040	-	-	inida Sela∰i ka	- '-	260	260		260	260	_	260	260	.	260	260
5.	Operation and Maintenance Cost		710	710	,		No Respire	, , .) 	- ; ,	_		-	-	- · · · - · · · · · · · · · · · · · · ·			710	710
6	Project Facility	990	4,750	5,740	990	2,370	3,360		2,380	2,380	<u>.</u> 43	· - ·	-	- · -	y <u></u>	<u>-</u>	-		
7	Project Administration	2,110	2,700	4,810	80	270	350	·	230	230	930	760	1,690	620	790	1,410	480	650	1,130
8	Consulting Services	6,180	1,040	7,220	770	130	900	1,750	290	2,040	820	140	960	1,420	240	1,660	1,420	240	1,660
	Sub-tots1 (1 to 8)	34,720	37,460	72,180	1,840	3,780	5,620	1,750	3,410	5,160	13,390	10,370	23,760	9,850	10,890	20,740	7,890	9,010	16,900
9.	Contingency	5,210	5,620	10,830	280	570	850	260	510	770	2,010	1,560	3,570	1,480	1,630	3,110	1,180	1,350	2,530
	Sub-total (1 to 9)	39,930	43,080	83,010	2,120	4,350	6,470	2,010	3,920	5,930	15,400	11,930	27,330	11,330	12,520	23,850	9,070	10,360	19,430
10.	Price Escalation	14,950	15,740	30,690	260	540	800	430	830	1,260	4,770	3,700	8,470	4,700	5,200	9,900	4,790	5,470	10,260
1	Grand-total (1 to 10)	54,880	58,820	113,700	2,380	4,890	7,270	2,440	4,750	7,190	20,170	15,630	35,800	16,030	17,720	33,750	13,860	15,830	29,690

Table 7B-6. Disbursement Cost for Stage II Development (Depreciation Base)

		Т	able 7B-6	6. Disbu	ursement	Cost for	r Stage	II Develo	opment (Deprecia	tion Base	9)				
						6th year			7th year		(x =)	8th year		,_	9th yea	
	Description	F.C	Total L.C	Total	Jan F.C	L.C	Total	F.C	.'85-Dec L.C	Total	F.C	,'86-Dec L.C	Total	f.c	n.'87-Dec L.C	c.'87) Total
			<u></u>	60.050	2 520	7,770	11,300	15,510	8,240	23,750	10,740	11,740	22,480			
1.	Civil Works	33,830	34,520	68,350	3,530	•	200	13,310	0,240	23,730				4,050	6,770	10,820
	1-1. Preparation	100	280	380	70	200	270	-	-	· -	30	80	110	ing in the second secon		-
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1-2. Dam	19,270	19,800	39,070	2,480	3,980	6,460	4,260	3,870	8,130	9,380	7,480	16,860	3,150	4,470	7,620
	1-3. Diversion Dam	310	860	1,170			-	, - .	<u> </u>		310	860	1,170		***	_
	1-4. Irrigation and Drainage Canals	2.040	7,800	9,840	580	2,200	2,780	580	2,200	2,780	580	2,200	2,780	300	1,200	1,500
	1-5. On-farm	760	2,000	2,760	210	570	780	210	570	780	210	570	780	130	290	420
	1-6. Roads	310	1,320	1,630	190	820	1,010	120	500	620		-			1 4 /1	
	1-7. Hydro-power	11,040	2,460	13,500	-	-	· <u> </u>	10,340	1,100	11,440	230	550	780	470	810	1,280
	1-8. Pre-Engineering		- .	• 🖚	-	i -	- .	· -	-	.	-	-	- A 7	**	<u> </u>	
2.	Land Acquisition and Compensation	· · · - ·	700	700	-	700	700	•				~ - 트.		-	· -	<u>-</u>
з.	Construction Equipment	17,880		17,880	6,040	-	6,040	5,590		5,590	4,290	E WE	4,290	1,960	_	1,960
4.	Agricultural Development	-	480	480	~ .	260	260	₹.,	220	220	-			-		
5.	Operation and Maintenance Cost	· -	2,490	2,480	,	710	710	-	710	710	- .	710	710	-	360	360
6.	Project Facility	-		· · · · · ·		· · · <u>-</u>	-	÷ -	-	<u>-</u>	-	. -		. -	+ x =	_
7,	Project Administration	4,410	3,050	7,190	770	750	1,520	1,690	730	2.420	1,200	1,000	2,200	480	570	1,050
8.	Consulting Services	2,730	460	3,190	870	150	1,020	670	110	780	1,080	180	1,260	110	20	130
	Sub-total (1 to 8)	58,580	41,700	100,280	11,210	10,340	21,550	23,460	10,010	33,470	17,310	13,630	30,940	6,600	7,720	14,320
9.	Contingency	8,790	6,250	15,040	1,680	1,550	3,230	3,520	1,500	5,020	2,600	2,040	4,640	990	1,160	2,150
	Sub-total (1 to 9)	67,370	47,950	115,320	12,890	11,890	24,780	26,980	11,510	38,490	19,910	15,670	35,580	7,590	8,880	16,470
1.0.	Price Escalation	56,080	40,800	96,880	8,380	7,730	16,110	21,100	9,000	30,100	18,420	14,490	32,910	8,180	9,580	17,760
	Grand-total (1 to 10)	123,450	88,750	212,200	21,270	19,620	40,890	48,080	20,510	68,590	38,330	30,160	68,490	15,770	18,460	34,230

The annual disbursement schedule for the investment cost is shown in Table 7B-3 to 7B-6.

C. Economic Justification

1. Benefited Area

The beneficial area of the lower area in the Project Plan which would be served by the Malinao diversion dam was decided at 2,757 ha on the assumption that the construction of Pamacsalan dam will be completed within two and half years after completion of the Malinao diversion dam, that is the area of 2,757 ha corresponds to meet the probable discharge of about return period two years. However, in case of stage development plan, such area should be decided based on the more severe probable discharge considering the long periods of the completion of dam construction, thus reducing the beneficial area.

According to the operation study of the diversion dam for last 10 years from 1966/1967 to 1976/1976, an average irrigable area during the 10 years is computed at 2,375 ha as shown below. Therefore, the harvested area in the stage I is decided at 2,375 ha though the area of 2,757 ha will be planted.

Result of Operation Study

<u>Year</u>	Irrigable Area (ha)
1966 - 1967	2,040
1967 - 1968	1,780
1968 - 1969	1,610
1969 - 1970	2,757 (3,800)
1970 - 1971	2,757 (3,270)
1971 - 1972	2,757 (4,800)
1972 - 1973	1,810
1973 - 1974	2,757 (4,800)
1974 - 1975	2,757 (3,105)
1975 - 1985	2,730
Average	2,375

Note: figures in the parenthesis show potential irrigable area by discharge

4,800 ha Project area in lower area of the Project Plan

2,757 ha Project area of Stage I Project.

Table 7C-1 shows the annual increase of beneficial area up to

Based upon the implementation schedule in the stage development, on-farm development will be undertaken in two stages, Stage I in two years (1982 - 1983) and Stage II in four years (1984 - 1987). The present land category in each stage is as follows:

Present Land Category in Each Stage

	Stage I		Stage	e II	0veral1		
Land use under existing situation	Before		Before	After Const.	Before Const.	After Const.	
Paddy irrigated Rainfed	59 559	57 532	409 501	382 479	1,060	439 1,011	
Upland 1/ Palay 1/ Others Crop 1/ Grasslands 1/	39 55 2,456	34 47 2,087	248 168 1,583	210 143 1,349	287 223 4,039	244 190 3,436	
Total	3,168	$\frac{2,757}{}$	2,909	2,563	6,077	5,320	

Note: 1/ Land to be reclaimed for paddy field in the project.

2. Economic Cost

The economic cost was revised from the financial cost, which is estimated on the basis of financial base, under the economic consideration of the items of unskilled labor, fuel and oil, land acquisition and compensation. The depreciation cost of construction equipment is amounted to be US\$1,40 million (P10.5 million) in the Stage I and US\$2.39 million (P17.9 million) in the Stage II.

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Table 7C-1. Annual Beneficial Area

								ha)	
	1982	1983	198#	1985	1986	1987	1988	1989	1990
Overall Project									
Wet Season		0		() ()	1	(. (ţ	
Area Flanted Area Harvested	1 - I -	1,365	2,375	2,375	2,375	2,757	5,175	5,176	5,176
Dry Season	น์ ((0.000	787	7.87	, 1,31,	o C	n 6	2 6 6 14	(C) (C) (B) (B) (B) (B) (B) (B) (B) (B) (B) (B
Area Harvested	1,365	2,375	2,375	2,375	2,375	5,320	02°, 02°, 03°,	5,320	5,320
Total								91-	
Area Flanted	1,365	4,122	5,514	5,514	5,514	8,077	10,496	10,496	10,496
Area Harvested	1,365	3,740	4,750	4,750	4,750	7,695	10,496	10,496	10,49€
Stage I. Project			-						
Total				-					
Area Planted	1,365	4,122	5,514	5,514	5,514	5,514	5,514	5,514	5,514
Area Harvested	1,365	3,740	4,750	4,750	4,750	4,750	4,750	4,750	4,750
				· · · · · · · · · · · · · · · · · · ·					

3. Incremental Benefit

Target yield, production cost and unit price of products are assumed to be same as those of the Project Plan. Input materials in the Stage I are to be supplied to meet the planted area and output are estimated on the basis of harvested area.

Table 7C-2 indicates an annual stream of economic cost and incremental NPV in the Stage I and Overall Plan.

4. Internal Rate of Return

Internal Rate of Return (IRR) is computed at 17.2 percent in the Stage I and 16.4 percent in the Overall Plan as shown in Figure 7C-1 and 7C-2.

Table 70-2. Economic Cost and Incremental Benefit

	1992			888	,)				,711	1,750	1917
	ΉI	• .		1	ì	4			8	Н	외
	1991	4 (4)		17,686,17,686) (; i				38,485	1,750	10,235
(osad	1990						•		11,017 13,463 14,826 24,952 34,115 35,546 37,341 38,485 38,711	1,750 1,750 1,750 1,750 1,750	7,212 11,017 13,463 14,826 26,702 35,865 37,296 39,091 40,235 40,461
H	r-4 }			- 1	i .				n ^		κή (c)
(unit: 10 peso)	1989		ı	7.00)) (1	i	35,546	1,750	37,296
3 3	1988			7 905 71 931 14 901 15 749 17 635 17 685 17 685	2		1		4,135	1,750	5,865
		•		ď	† >		.0		დ დ	0	୍ଦା ଆ
	1987		1	7 - 7	} * -		17,60	1	24,95	1,75	26,70
	1986		ì	A 749	5		19,250 16,820 17,780 34,000 33,040 17,600	(.4,826	1	4,826
			,	-	₹ . •		0		დ. ო		(S)
	1985		1	ر م	S F F		34,00		ຕ. ສຸ		13,46
	1984		. •	ר רוס	 		7,780		1,017	1	1,017
1.			. 0	יר	l :		~ O		ζί ⊢!		(A)
	1983		15,30				16,82		7,212	. 1 	
	1982		19,020 15,300	ر 12) , ,		9,250	•	1,881	i .	1,881
		ha				t g					
	1981	2,757	31,54			5,320	31,77				
٠.	1979 1980 1981	[Stage I] - Benefited Area 2,757 h	Economic Cost 6,170 5,860 31,540			[Overall] - Benefited Area 5,320	Economic Cost 6,170 5,860 31,770		1	•	i
	20	ted	70	,		ted	70	n'	ī	r _{js} .	
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	Item	₽.	mic	men	1))	all	onic	men	gati	tric	Total
	레	stag.	Conc	Incremental NPV	1	Over	conc	incremental NPV	Irrigation	Electric Power	Ĕ
		೭	й	4 4	ř	ŭ	щ	ДÜ	Ηİ	ini :	ten h

FIGURE 7C-1 INTERNAL RATE OF RETURN (STAGE I). (RRIGATION ONLY (2,757 ha)

