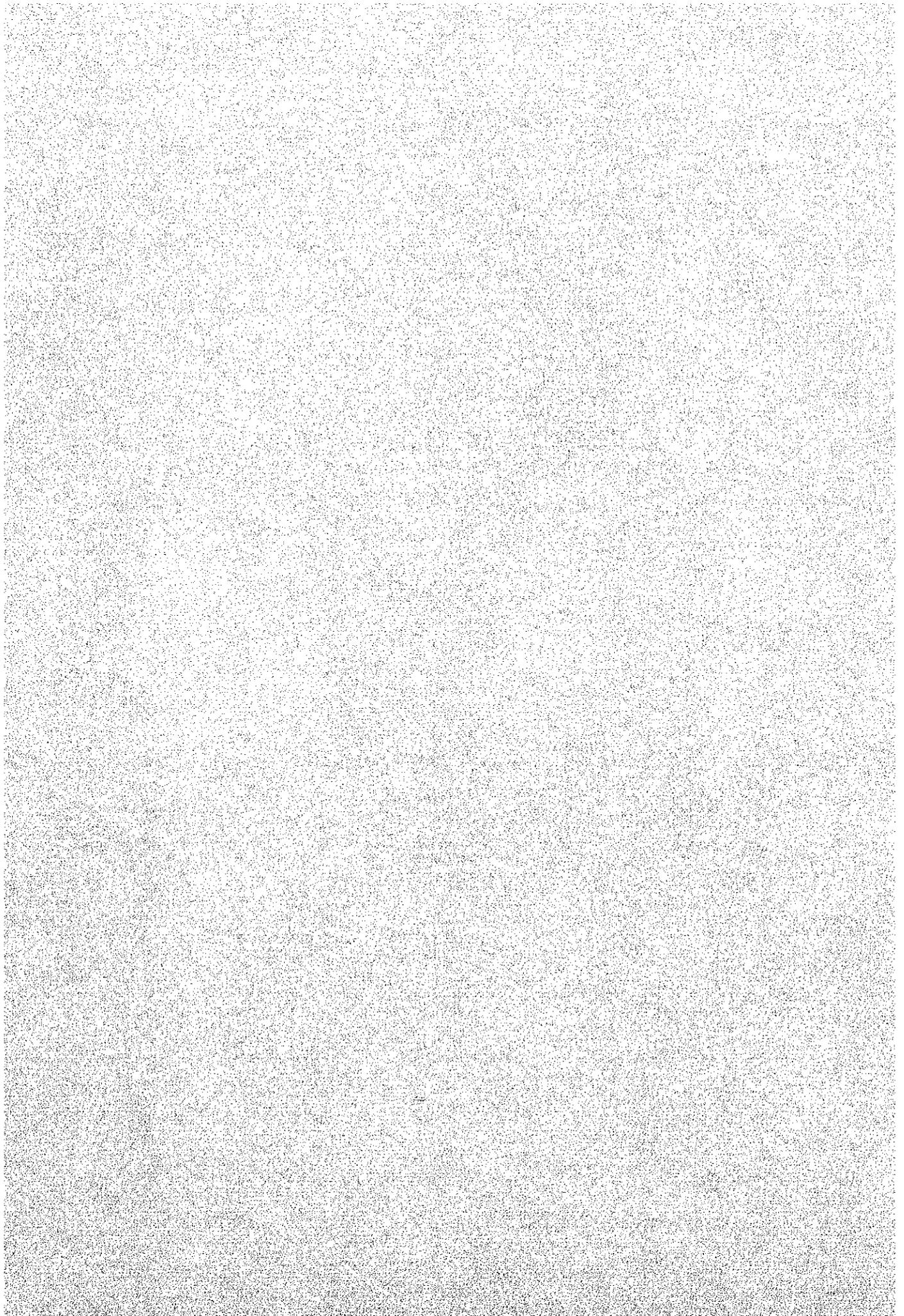


IX. SETTLEMENT



IX. SETTLEMENT

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A. Settlement

1. Selection of Settlers

FELDA has hitherto exercised control over farm land development and selection of settlers. The outline of FELDA's selection standard was as follows:

- i) a married man between 18 and 35 with a Malaysian nationality.
- ii) a man who either owns no land or possesses land below 2 acres.
- iii) other items cover health, education, degree of acquired skill, family environment, children, etc. as basic information for selection.

It should be within the purview of the Malaysian Government and her responsibility to select the settlers.

Therefore, it is inappropriate for any foreign government or non-Malaysian consultant to participate in the work of deciding concrete selection methods.

Therefore, we will, hereby, simply express our basic ideas as a reference to the Malaysian Government.

The economy of Malaysia is largely agricultural both domestically and internationally. Therefore, it is quite natural for the government to powerfully propel her efforts to develop agriculture centering on cash crops, mainly rubber and palm oil of high international marketability.

On the other hand, the nation domestically faces the serious problem of unemployment and under-employment. And to improve the situation, steps must urgently be taken to enlarge the scale of farm management of petty farmers to afford more employment opportunity to farm laborers and fishermen who stand below the poverty line. In Trengganu State alone, an estimated 20,000 people stricken with poverty are eagerly awaiting for the employment situation to improve.

When a nation's social life improves, the demand for higher-grade subsidiary food such as vegetable, fruit and meat normally increases at a faster rate than that for staple food. And as Malaysia has attained self-sufficiency in her staple food supply, she has entered a new stage of boosting production of higher-grade subsidiary food.

However, Malaysia today faces two contradicting problems in agriculture. While she must encourage seasoned farmers to boost production of higher grade food, she must also extend a helping hand to those unskilled poor people.

Furthermore, in order to convert swamps into rich farm lands, the nation must introduce advanced techniques for soil improvement, irrigation and drainage and upkeep these facilities in proper conditions besides maintaining high degree farm management.

Therefore, the following must inevitably be put into consideration for proper management of the Pilot Project area when selecting settlers:

- 1) Select both experienced, seasoned farmers and unskilled poverty-stricken people at an appropriate ratio. When only one of the either group is selected, it will not solve the problem mentioned above.
- ii) Divide the settlers into individual management households and joint management households.
- iii) Allocate either a paddy field + a small acreage of upland field or a fish-culture farm to experienced farmers for individual management.
- iv) Organize stock-raising, dry field farming and fruit-growing into corporate groups and allow work to unskilled people.
- v) The total pilot project management should be supervised by a governmental organ dispatching specialists to the work site to render technical guidance.

- vi) As many technical problems remain unsolved in swamp area farming, a technical service center to conduct basic studies should be established.
- vii) Over the years, the unskilled people will become seasoned farmers. Therefore, there should be a system of offering these people opportunities to become individual management households.

2. Settling Household

The number of households for settlement was planned as follow:

Paddy cultivation farm	835 acres	4.85 acres/family	172 families
Livestock estate farm (incl. long-term crops)	2,158 acres	15 acres/family	143 families
Upland crop estate farm	1,874 acres	6 acres/family	312 families
Demonstration farm	467 acres	6 acres/family	78 families
		Total	705 families

Housing Area

Paddy farmers house	172 families x 0.05 acres	9 acres
Paddy farmers pond or small farm	172 families x 0.10	17 acres
Other farmers house	533 families x 0.05	27 acres
Other joint ponds or farm	533 families x 0.28	150 acres
	Total	203 acres

3. Common Facilities

A total of 25 acres is allocated for common facilities as follow:

Clinic	10m x 10m	1 building
Assembly hall	15m x 20m	2 buildings
Kindergarten	15m x 20m	2 buildings
School	20m x 50m	2 buildings
Simple water-supply system		1 system

4. Demonstration Farm

As this project is the first case in Malaysia to utilize swamps for agricultural purposes on such a large and full scale, there are many unknown problems with regard to the management and operation of the Pilot Project, for example, ground water control, the use of fertilizers, methods of farming, selection of appropriate crops, etc. Also, tests for mechanization of farm work in preparation for the next stage are important. Facilities to temporarily store harvest crop, livestock quarantine quarters and others are necessary.

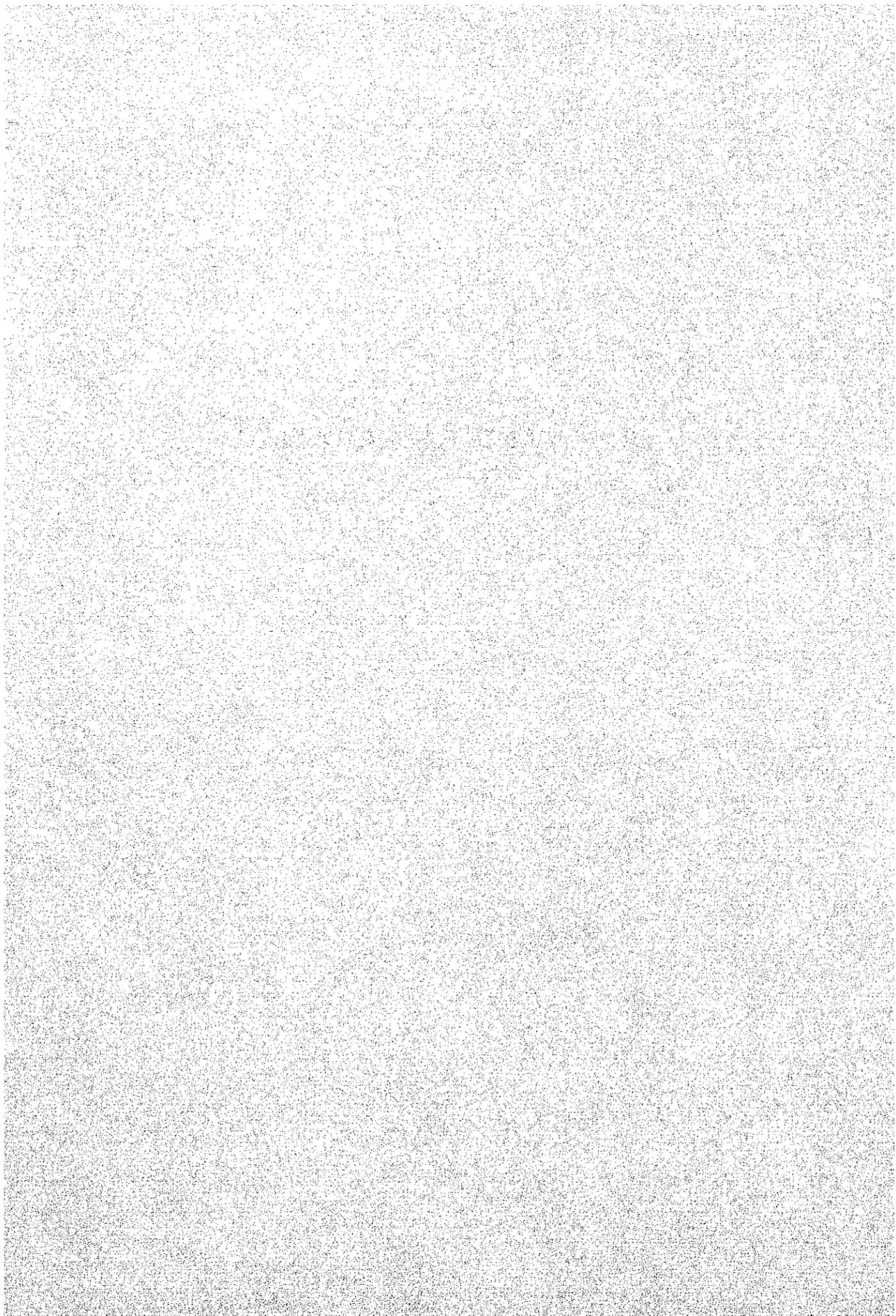
These testing farms and facilities should be grouped together and come under the management of a demonstration farm.

The scale of this farm is as follows:

Testing Farm	Paddy field	59 acres
	Upland crops	74 acres
	Long-term crops	13 acres
	Grassland for cattles	247 acres
	Grassland for buffaloes	74 acres
Facilities for demonstration farm		97 acres
	Total area	564 acres (228.2 ha)

Institution	Office (and laboratory)	1
	Houses for staff	5
	Refrigerator	1
	Storehouses	2
	Machinery house	1
	Cattle pens	2

X. LAND RECLAMATION



X. LAND RECLAMATION

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A. Road Planning

1. Main Roads

Main roads connect villages and settlements to industrial areas, and to production and transport facilities. The main road for this area will run through the settlement planned for the east side of the area, and will connect up to Federal Highway No. 3 and the Dungun to Bukit Besi road. It is being planned essentially for the transport of agricultural products. The total length of main road extension will be 6.91 km. The road surface will be gravel, the effective width 6.0m, and the full width 8.0 m.

2. Branch Roads

Branch roads will connect farm roads to the main road. There will be a total of 19.83 km of branch road extension. Road surface will be gravel, the effective width 4.5 m, and the full width 6.5 m.

3. Farm Roads

Farm roads will connect to the near side of each farm zone. These roads will consist of vertical farm roads connecting farm zone to the branch and main roads, and lateral farm roads linking up with the vertical farm roads. Vertical farm roads will be arranged at intervals of 200m apart, and lateral farm roads 400m apart. Road surface will be dirt, and the total width 2.0 m.

Standard section of roads, and length and others of roads are as illustrated in Fig. X - 1 and 2.

Fig. X-1 Standard Section of Roads

STANDARD SECTION OF ROADS

(Unit: meter)

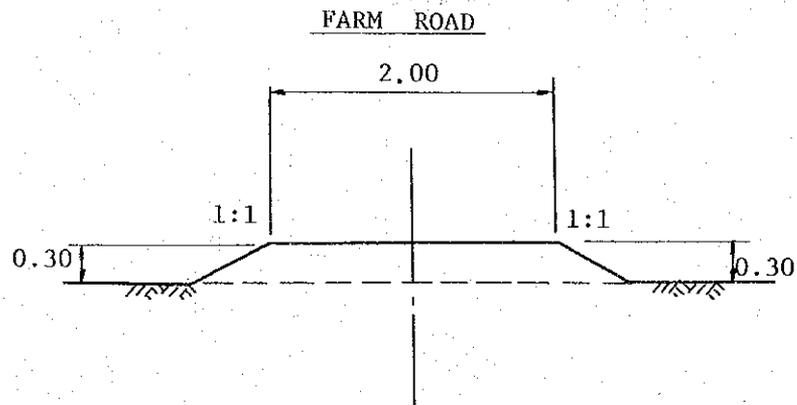
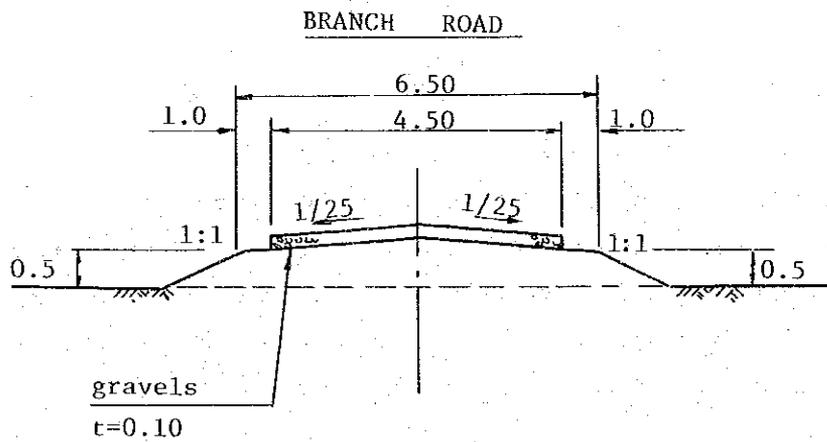
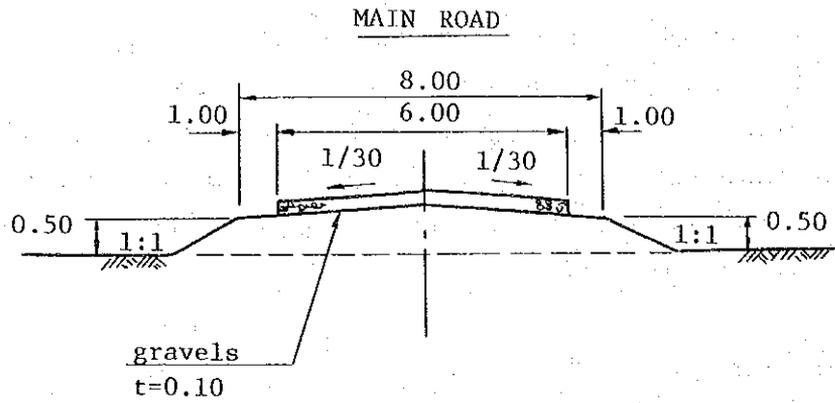
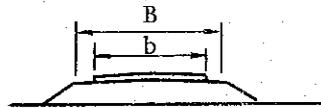
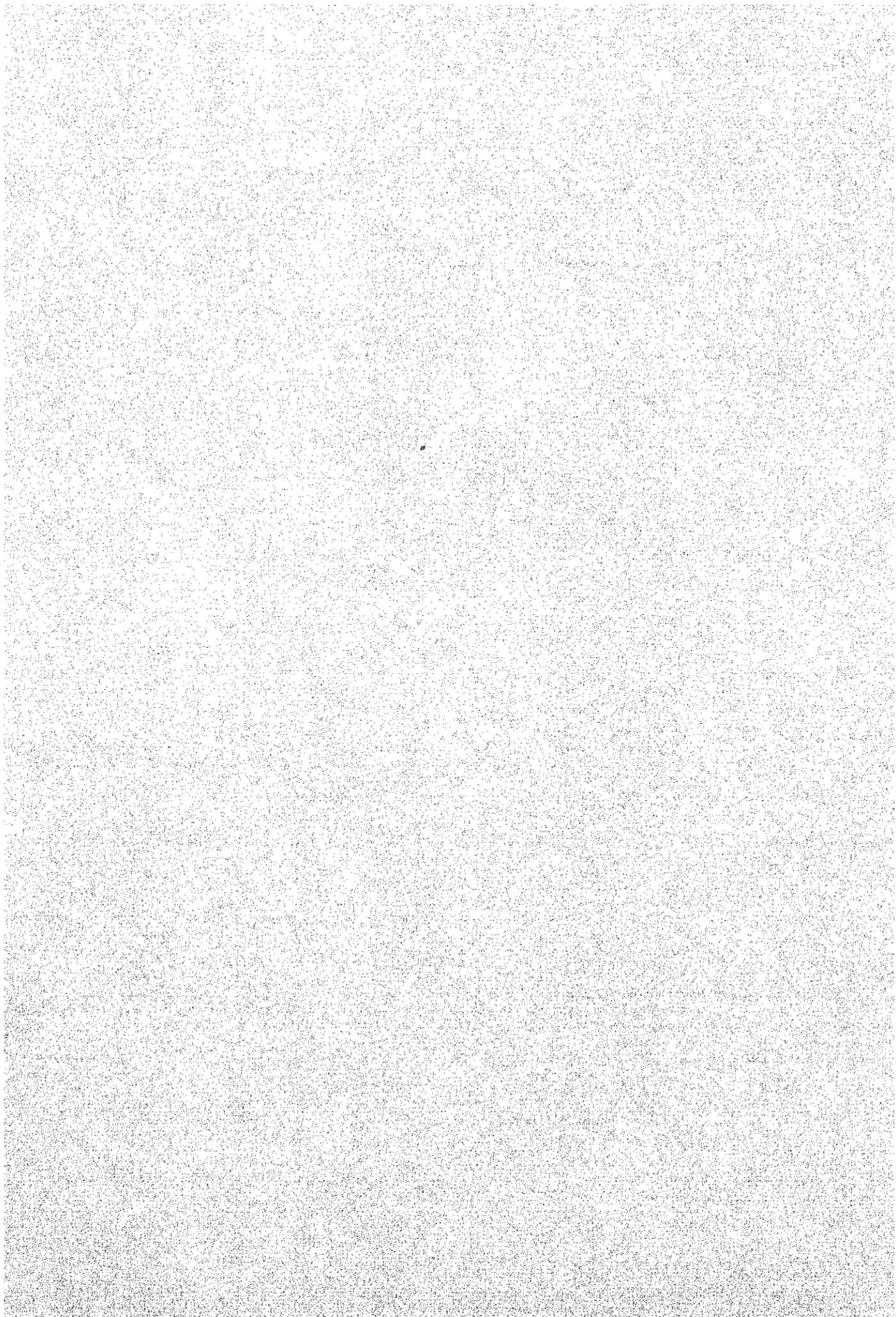


Fig. X-2 Length and Others of Roads

Road	Length	B.	(b)	Remarks
Main road	6,910 ^m	8.0 ^m	(6.0) ^m	
Secondary road No. 1	9,030	6.5	(4.5)	
" No. 2	4,920	"	"	
" No. 3	1,990	"	"	
" No. 4	3,890	"	"	
Sub-total	19,830			
Farm road	115,430	2.0	(2.0)	



XI. COST ESTIMATE



XI. COST ESTIMATE

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A. Cost Estimate

1. General

The project cost is estimated for the first phase and the second phase.

In the first phase of the construction, embankments for flood protection are not constructed along the Paka river, and such crops as allow submergence of 2-3 days like paddy are to be cultivated in the area where the water level of the Paka river increases to cause flooding. In the first phase, reformation into well-drained paddy fields is not considered, so introduction of large farm machinery is to be start from the second phase.

In the second phase, embankments for flood protection along the Paka river and pumps for drainage of the flooded area are to be planned for reformation into dry fields for paddy.

The project cost is estimated using figures provided by KETENGAH, DID and governmental departments on unit prices and costs as of 1977.

Since construction machinery is available in Malaysia without problems, the construction works are to be carried out on the contract basis. Items to be imported are limited to large diameter pump and large gates. Cost of the imported plant, equipment and services to be procured by international competitive bidding is estimated based on international price level. The local cost such as materials and labor is estimated taking into account the experience of similar on-going project in Trengganu State.

Imported items such as pumps, gates, construction machinery and major construction materials, will incur duties and taxes. There are 35% - 100% for pumps, gates, etc., and 100% for other imported goods. Handling charge including domestic transportation are calculated at 5% of c.i.f. cost at Port Kelang.

Physical contingency of the cost estimate is 10% of direct cost and 4% for the procurement cost of the machinery. Price contingency is calculated for each year of the construction period.

Price contingency is 5.0%. The price contingencies is, therefore, calculated assuming this rate for the initial year and the incremental rates for the ensuing years as follows:

	1st year	2nd year	3rd year	4th year	5th year
Inflation Rate (%)	5.0	10.3	15.8	21.6	27.7

2. Project cost

The project cost consists of (i) cost for the civil works including land reclamation, (ii) cost for storage facilities including project office and its related facilities, and (iii) initial farm investment.

2.1 First phase development cost

The total cost for the first phase development is M\$27.937 million. Tables XI- and 2 show the breakdown of the cost. The cost for unit area is M\$4.311 per acre, or M\$10.654 per ha.

The annual civil work schedule is shown in Table XI-3, and the annual cost in Table XI-4.

2.2 Second phase development cost

The second phase development is the supplement to the first phase construction. The additional development cost is M\$12.411 million.

Tables XI-5 and 6 show the breakdown of the cost. The total of the first phase development cost and the additional cost is M\$40.348 million.

The cost for unit area is M\$6.226 per acre, or M\$15.387 per ha.

Table XI-I Bukit Bauk Pilot Project

Cost Estimate (First Phase) (Unit: M\$10³)

	<u>Item</u>	<u>Foreign currency</u>	<u>Local currency</u>	<u>Total</u>
I.	Civil works	9,167	6,481	15,648
	1. Preparatory works	-	7	7
	2. Irrigation	1,179	689	7
	3. Drainage	713	403	1,868
	4. Road	1,934	1,075	3,009
	5. Land reclamation	5,341	4,307	9,648
II.	Settlement and Demonstration farm	2,935	2,157	5,092
	Sub-total	12,102	8,638	20,740
III.	Engineering services	605	431	1,036
IV.	Physical contingency (I) x 10%	916	648	1,564
V.	Prices contingency	2,682	1,915	4,597
	Total	16,305	11,632	27,937

Table XI-2 Cost Estimate (First Phase)

(Unit : M\$)

Works	Unit	Quantity	Financial Cost				Total
			Foreign Currency		Local Currency		
			Unit Price	Amount	Unit Price	Amount	
I. Civil Works							
1. Preparatory works							
1.1 Land aquisition	m ²	13,600	-	-	0.5	6,800	6,800
1.2 Miscellaneous	L.S					200	200
Total						7,000	7,000
2. Irrigation							
2.1 Main and secondary canals							
Concrete pipe D=800mm	m	2,600	62.35	162,110	62.35	162,110	324,220
Concrete pipe D=600mm	m	3,200	36.10	115,520	36.10	115,520	231,040
Concrete pipe D=400mm	m	600	26.25	15,750	26.25	15,750	31,500
Concrete pipe D=250mm	m	1,680	22.95	38,556	22.95	38,556	77,112
Concrete pipe D=200mm	m	2,200	19.70	43,340	19.70	43,340	86,680
Concrete pipe D-150mm	m	600	16.40	9,840	16.40	9,840	19,680
Deformed pipe specials	L.S			115,534		115,534	231,068
Excavation	m ³	42,880	0.99	42,451	0.69	29,587	72,038
Banking	m ³	1,008	3.35	3,376	2.33	2,348	5,724
Sand bed	m ³	6,567	4.63	30,405	3.21	21,080	51,485
Miscellaneous	L.S			29,118		28,335	57,453
(Sub-total)				(606,000)		(582,000)	(1,188,000)
2.2 Related structure							
2.2.1 Turnout							
Concrete-A	m ³	5	172.56	862	115.04	575	1,437
Concrete-B	m ³	1	117.66	117	78.44	78	195
Gravel	m ³	2	11.56	23	8.04	16	39
Reinforcement bar	ton	0.32	600.00	192	400.00	128	320
Gate φ 400mm	Set	8	546.00	4,368	154.00	1,232	5,600
2.2.2 Miscellaneous	L.S			438		971	1,409
(Sub-total)				(6,000)		(3,000)	(9,000)

(Unit : M\$)

Works	Unit	Quantity	Financial Cost				Total
			Foreign Currency		Local Currency		
			Unit Price	Amount	Unit Price	Amount	
2.3 Pump station							
2.3.1 Pump station	m ²	85	734.80	62,458	935.20	79,492	141,950
2.3.2 Head race							
Concrete-A	m ³	118	172.56	20,362	115.04	13,574	33,936
Concrete-B	m ³	17	117.66	2,000	78.44	1,333	3,333
Gravel	m ³	32	11.56	369	8.04	257	626
Rainforcement bar	ton	7.10	600.00	4,260	400.00	2,840	7,100
Screen	m ²	9	109.76	987	114.24	1,028	2,015
2.3.3 Miscellaneous	L.S			4,564		5,476	10,040
(Sub-total)				(95,000)		(104,000)	(199,000)
2.4 Irrigation pumps	Set	1		472,000		-	472,000
(Sub-total)				(472,000)			(472,000)
Total				1,179,000		689,000	1,868,000
3. Drainage							
3.1 Main and secondary canals							
Excavation	m ³	288,320	0.99	285,436	0.69	198,940	484,376
Banking	m ³	17,438	3.35	58,417	2.33	40,630	99,047
Sodding	m ²	51,989	1.06	55,108	0.73	37,951	93,059
Miscellaneous	L.S			20,039		14,479	34,518
(Sub-total)				(419,000)		(292,000)	(711,000)
3.2 Drainage sluices							
Concrete-A	m ³	299	172.56	51,595	115.04	34,396	85,991
Concrete-B	m ³	33	117.66	3,882	78.44	2,588	6,470
Gravel	m ³	59	11.56	682	8.04	474	1,156
Rainforcement bar	ton	18.20	600.00	10,920	400.00	7,280	18,200
Gate	m ²	59	3607.50	212,842	1017.50	60,032	272,874
Miscellaneous	L.S			14,079		6,230	20,309
(Sub-total)				(294,000)		(111,000)	(405,000)
Total				713,000		403,000	1,116,000

(Unit : M\$)

Works	Unit	Quantity	Financial Cost				Total
			Foreign Currency		Local Currency		
			Unit Price	Amount	Unit Price	Amount	
4. Road							
4.1 Main road							
Stripping	m ²	13,600	0.50	6,800	0.50	6,800	13,600
Banking	m ³	29,367	3.35	98,379	2.33	68,425	166,804
Gravel	m ³	4,146	11.56	47,927	8.04	33,333	81,260
Miscellaneous	L.S			7,894		5,442	13,336
(Sub-total)				(161,000)		(114,000)	(275,000)
4.2 Branch road							
Banking	m ³	69,405	3.35	232,506	2.33	161,713	394,219
Gravel	m ³	8,924	11.56	103,161	8.04	71,748	174,909
Miscellaneous	L.S			17,333		12,539	29,872
(Sub-total)				(353,000)		(246,000)	(599,000)
4.3 District road							
Banking	m ³	66,054	3.35	221,280	2.33	153,905	375,185
Sodding	m ³	34,846	1.06	36,936	0.73	25,437	62,373
Gravel	m ³	2,939	11.56	33,974	8.04	23,629	57,603
Miscellaneous	L.S			14,810		11,029	25,839
(Sub-total)				(307,000)		(214,000)	(521,000)
4.4 Related structures							
4.4.1 Bridges							
Concrete-A	m ³	1,320	172.56	227,779	115.04	151,852	379,631
Concrete-B	m ³	63	117.66	7,412	78.44	4,941	12,353
Rainforcement bar	ton	79.23	600.00	47,538	400.00	31,692	79,230
Excavation	m ³	5,890	0.99	5,831	0.69	4,064	9,895
Banking	m ³	4,570	3.35	15,309	2.33	10,648	25,957
Gravel	m ³	127	11.56	1,468	8.04	1,021	2,489
Concrete pile	Set	244	886.08	216,203	249.92	60,980	277,183
Superstructure	m ²	844	453.96	383,142	128.04	108,065	491,207

(Unit : M\$)							
Works	Unit	Quantity	Financial Cost				Total
			Foreign Currency		Local Currency		
			Unit Price	Amount	Unit Price	Amount	
4.4.2 Culvert							
Concrete-A	m ³	745	172.56	128,557	115,04	85,704	214,261
Concrete-B	m ³	78	117.66	9,177	78,44	6,118	15,295
Rainforcement bar	ton	26.22	600.00	15,732	400,00	10,488	26,220
Gravel	m ³	156	11.56	1,803	8,04	1,254	3,057
4.4.3 Miscellaneous	L.S			53,049		24,173	77,222
(Sub-total)				(1,113,000)		(501,000)	(1,614,000)
Total				1,934,000		1,075,000	3,009,000
5. Land reclamation							
5.1 Land reclamation							
Cutting	ha	2,387.2	247	589,638	187	446,406	1,036,044
Uprooting	ha	2,387.2	551	1,315,347	415	990,688	2,306,035
Land grading	ha	2,387.2	855	2,041,056	645	1,539,744	3,580,800
Miscellaneous	L.S			260,959		196,162	457,121
(Sub-total)				(4,207,000)		(3,173,000)	(7,380,000)
5.3 Farm roads and farm drains							
Fram roads and farm drains	ha	2,158.5	500	1,079,250	500	1,079,250	2,158,500
Miscellaneous	L.S			54,750		54,750	109,500
(Sub-total)				(1,134,000)		(1,134,000)	(2,268,000)
Total				5,341,000		4,307,000	9,648,000

(Unit : M\$)							
Works	Unit	Quantity	Financial Cost				Total
			Foreign Currency		Local Currency		
			Unit Price	Amount	Unit Price	Amount	
II. Settlement and Demonstration farm							
Houses for settlement	Set	705	1,980	1,395,900	2,520	1,776,600	3,172,500
Kindergarten	Set	2	19,800	39,600	25,200	50,400	90,000
Primary school	Set	2	29,700	59,400	37,800	75,600	135,000
Clinic	Set	1	12,320	12,320	15,680	15,680	28,000
Public hall	Set	2	19,800	39,600	25,200	50,400	90,000
Simple water supply system	Set	1	188,500	188,500	188,500	188,500	377,000
Demonstration farm	Set	1	1,200,000	1,200,000	-	-	1,200,000
Total				2,935,320		2,157,180	5,092,500
say				2,935,000		2,157,000	5,092,000

Table XI-3 Annual Civil Work Schedule (1)

Item	Quantity	1st year	2nd year	3rd year	4th year	5th year
[Drainage]						
Driving channel	ℓ=230m	ℓ=230m				
Main drainage canal	ℓ=5,655m	ℓ=5,655m				
Secondary canal	ℓ=23,250m (15 lines)		ℓ=10,000m	ℓ=8,250m	ℓ=5,000m	
[Irrigation]						
Pipe line Main	ℓ=5,800m			ℓ=3,000m	ℓ=2,800m	
Secondary	ℓ=5,080m (7 lines)				ℓ=3,000m	ℓ=2,080m
Open canal Secondary	ℓ=5,600m (8 lines)				ℓ=3,000m	ℓ=2,600m
Irrigation pump	φ600mm 1set		Building	Machinery		

Annual Civil Work Schedule (2)

Item	Quantity	1st year	2nd year	3rd year	4th year	5th year
[Road]						
Main road	ℓ=6,910m		ℓ=2,000m	ℓ=2,000m		ℓ=2,910m
Secondary road	ℓ=19,830m		ℓ=5,000m	ℓ=10,000m	ℓ=4,830m	
District road	ℓ=4,898m	ℓ=2,000m	ℓ=1,898m	ℓ=1,000m		
Bridges, culverts	n=78		n=20	n=40	n=18	
[Demonstration farm]						
Site arrangement	A=228.4 ha				A=128.4 ha	A=100.0 ha
Buildings and instruments	13 houses				5 houses	8 houses
[Settlement]						
Site arrangement	A=92.1 ha				A=40.0 ha	A=52.1 ha
Housing	n=705 houses				300 houses	405 houses
Public buildings	n=6				3 houses	3 houses
[Land reclamation]						
Cutting	A=2,066.7 ha		A=466.7 ha (Paddy 337.8ha)	A=800 ha	A=800 ha	

Annual Civil Work Schedule (3)

Item	Quantity	1st year	2nd year	3rd year	4th year	5th year
Transportation	A=2,066.7 ha		A=466.7 ha (Paddy 337.8ha)	A=800 ha	A=800 ha	
Uprooting	A=2,066.7 ha		A=466.7 ha (Paddy 337.8 ha)	A=800 ha	A=800 ha	A=800 ha
Land clearing	A=2,066.7 ha		A=466.7 ha (Paddy 337.8 ha)	A=800 ha	A=800 ha	A=800 ha
Land Grading	A=337.8 ha		A=337.8 ha			
Farm road	A=2,158.5 ha		A=1,000 ha	A=800 ha	A=800 ha	A=358.5 ha
Farm drainage canal	A=2,158.5 ha		A=1,000 ha	A=800 ha	A=800 ha	A=358.5 ha

Table XI-4 Annual Cost of Bukit Bauk Pilot Project (I) (Unit: M\$10³)

Item	Total	1st year	2nd year	3rd year	4th year	5th year
[Drainage]						
Driving channel	8	8				
Main drainage canal	217	217				
Secondary canal	891		383	316	192	
(sub-total)	(1,116)	(225)	(383)	(316)	(192)	
[Irrigation]						
Pipeline Main	421			218	203	
Secondary	369				218	151
Open canal Secondary	407				218	189
Irrigation pump	671		199	472		
(Sub-total)	(1,868)		(199)	(690)	(639)	(340)

Annual Cost of Bukit Bauk Pilot Project (2) (Unit: M\$10³)

Item	Total	1st year	2nd year	3rd year	4th year	5th year
[Road]						
Main road	228		66	66		96
Secondary road	653		165	329	159	
District Road	521	213	202	106		
Bridges, culverts	(1,614)		414	828	372	
(Sub-total)	(3,016)	(213)	(847)	(1,329)	(531)	(96)
[Demonstration farm]						
Site arrangement	706				397	309
Buildings and instruments	1,200				462	738
(Sub-total)	(1,906)				(859)	(1,047)
[Settlement]						
Site arrangement	285				124	161
Housing	3,173				1,350	1,823
Public buildings	720				360	360
(Sub-total)	(4,178)				(1,834)	(2,344)

Annual Cost of Bukit-Bauk Pilot Project (3) (Unit: MS10³)

Item	Total	1st year	2nd year	3rd year	4th year	5th year
[Land reclamation]						
Cutting	1,384		312	536	536	
Transportation	692		156	268	268	
Uprooting	2,076			468	804	804
Land clearing	1,731			391	670	670
Land grading	505			505		
Farm road	1,134			525	420	189
Farm drainage canal	1,134			525	420	189
(Sub-total)	(8,656)		(468)	(3,218)	(3,118)	(1,852)
[Engineering services]	1,036	828	208			
[Physical contingency]	1,564	33	143	418	541	429
[Prices contingency]	4,597	65	231	943	1,666	1,692
(Sub-total)	(7,197)	(926)	(582)	(1,361)	(2,207)	(2,121)
Total	27,937	1,364	2,479	6,914	9,380	7,800

Table XI-5 Cost Estimate (Second Phase)

(Unit: M\$10³)

Work Item	First Phase			Second Phase			Total Work		
	F.C.	L.C	Total	F.C	L.C	Total	F.C	L.C	Total
I. Civil works									
1. Preparation work	-	7	7	-	-	-	-	7	7
2. Embankment	307	214	521	490	340	830	797	554	1,351
3. Irrigation	1,179	689	1,868	-	-	-	1,179	689	1,868
4. Drainage	713	403	1,116	1,390	345	1,735	2,103	748	2,851
5. Roads	1,627	861	2,488	-	-	-	1,627	861	2,488
6. Land reclamation	5,341	4,307	9,648	792	602	1,394	6,133	4,909	11,042
Sub-total	9,167	6,481	15,648	2,672	1,287	3,959	11,839	7,768	19,607
II. Settlement and demonstration farm	2,935	2,157	5,092	1,454	320	1,774	4,389	2,477	6,866
III. Engineering services	605	431	1,036	206	81	287	811	512	1,323
IV. Physical contingency	915	648	1,564	267	128	395	1,183	776	1,959
V. Prices contingency	2,682	1,915	4,597	3,714	2,282	5,996	6,396	4,197	10,593
Total	16,305	11,632	27,937	(8,313)	(4,098)	(12,411)	(24,618)	(15,730)	(40,348)
Unit cost per hectare (2,622.0 ha)			M\$10,654 (US\$5,327)			(M\$4,733)			(M\$15,387) (US\$7,693)
Unit cost per acre (6,480 acres)			M\$ 4,311			(M\$1,915)			(M\$ 6,226)

Table XI-6 Cost Estimate (Second Phase)

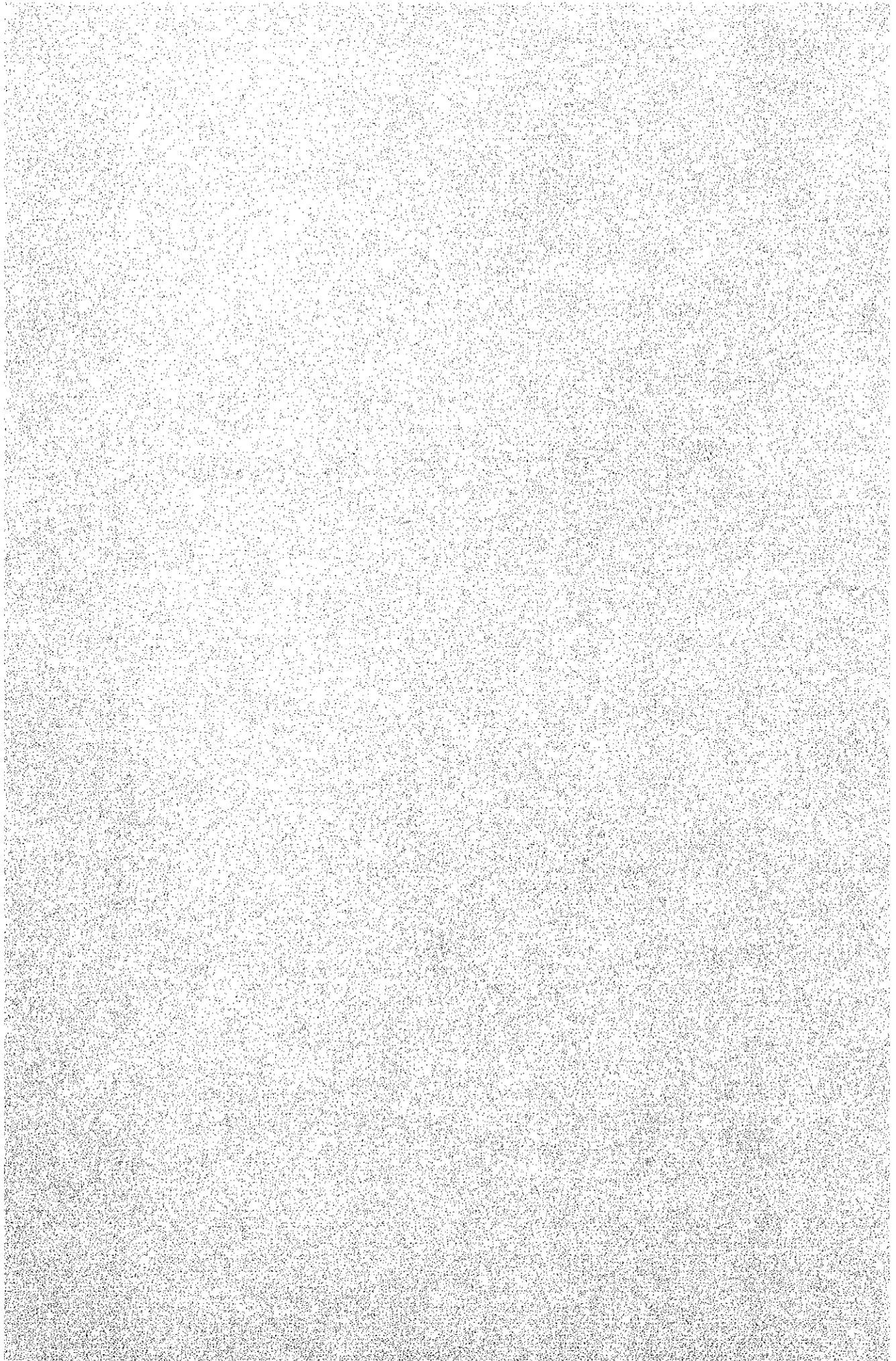
(Unit : M\$)

Works	Unit	Quantity	Financial Cost				
			Foreign Currency		Local Currency		Total
			Unit Price	Amount	Unit Price	Amount	
I. Civil Works							
1. Embankment							
1.1 Banking	m ³	128,878	3.35	431,741	2.33	300,285	732,026
2.2 Sodding	m ²	32,583	1.06	34,537	0.73	23,785	58,322
2.3 Miscellaneous	L.S			23,722		15,930	39,652
Total				490,000		340,000	830,000
2. Drainage							
2.1 Control reservoir							
Excavation	m ³	20,000	0.99	19,800	0.67	13,800	33,600
Miscellaneous	L.S			1,200		1,200	2,400
(Sub-total)				(21,000)		(15,000)	(36,000)
2.2 Pump station							
2.2.1 Pump station	m ²	170	734.80	124,916	935.20	158,984	283,900
2.2.2 Head race							
Concrete-A	m ³	237	172.56	40,896	115.04	27,264	68,160
Concrete-B	m ³	30	117.66	3,529	78.44	2,353	5,882
Gravel	m ³	63	11.56	728	8.04	506	1,234
Reinforcement bar	ton	14.20	600.00	8,520	400.00	5,680	14,200
Screen	m ²	18	109.76	1,975	114.24	2,056	4,031
2.2.3 Outlet tank							
Concrete-A	m ³	225	172.56	38,826	115.04	25,884	64,710
Concrete-B	m ³	16	117.66	1,882	78.44	1,255	3,137
Gravel	m ³	32	11.56	369	8.04	257	626
Reinforcement bar	ton	13.50	600.00	8,100	400.00	5,400	13,500
Gate	m ²	8	3607.50	28,860	1017.50	8,140	37,000
2.2.4 Miscellaneous	L.S			13,399		12,221	25,620
(Sub-total)				(272,000)		(250,000)	(522,000)

(Unit : MS)

Works	Unit	Quantity	Financial Cost				Total
			Foreign Currency		Local Currency		
			Unit Price	Amount	Unit Price	Amount	
2.3 Flood gate							
Concrete-A	m ³	380	172.56	65,572	115.04	43,715	109,287
Concrete-B	m ³	25	117.66	2,941	78.44	1,961	4,902
Gravel	m ³	50	11.56	578	8.04	402	980
Rainforcement bar	ton	22.69	600.00	13,614	400.00	9,076	22,690
Gate	m ²	20	3,607.50	72,150	1,017.50	20,350	92,500
Miscellaneous	L.S			8,145		4,496	12,641
(Sub-total)				(163,000)		(80,000)	(243,000)
2.4 Drainage pump	Set	2	467,000	934,000	-	-	934,000
(Sub-total)				(934,000)			(934,000)
Total				1,390,000		345,000	1,735,000
3. Land reclamation							
3.1 Land reclamation							
Cutting	ha	2,387.2	106	253,043	80	190,976	444,019
Uprooting	ha	2,387.2	220	525,184	170	405,824	931,008
Miscellaneous	L.S			13,773		5,200	18,973
Total				792,000		602,000	1,394,000
II. Settlement and demonstration farm							
Electric supply system	Set	1		320,000		320,000	640,000
Generator 700kW	Set	1		1,133,300		-	1,133,300
Total				1,453,300		320,000	1,773,300
Say				1,454,000		320,000	1,774,000

XII. PROJECT IMPLEMENTATION



A. Trengganu Tengah Development Authority, - KETENGAH -
(The Lembaga Kemajuan Trengganu Tengah - LKTT -)

KETENGAH was created in 1973 under the Malaysian Act 104 as a result of the Federal State Joint Task Force Report on Trengganu Tengah in 1972. The objectives of the Lembaga are defined as follows:

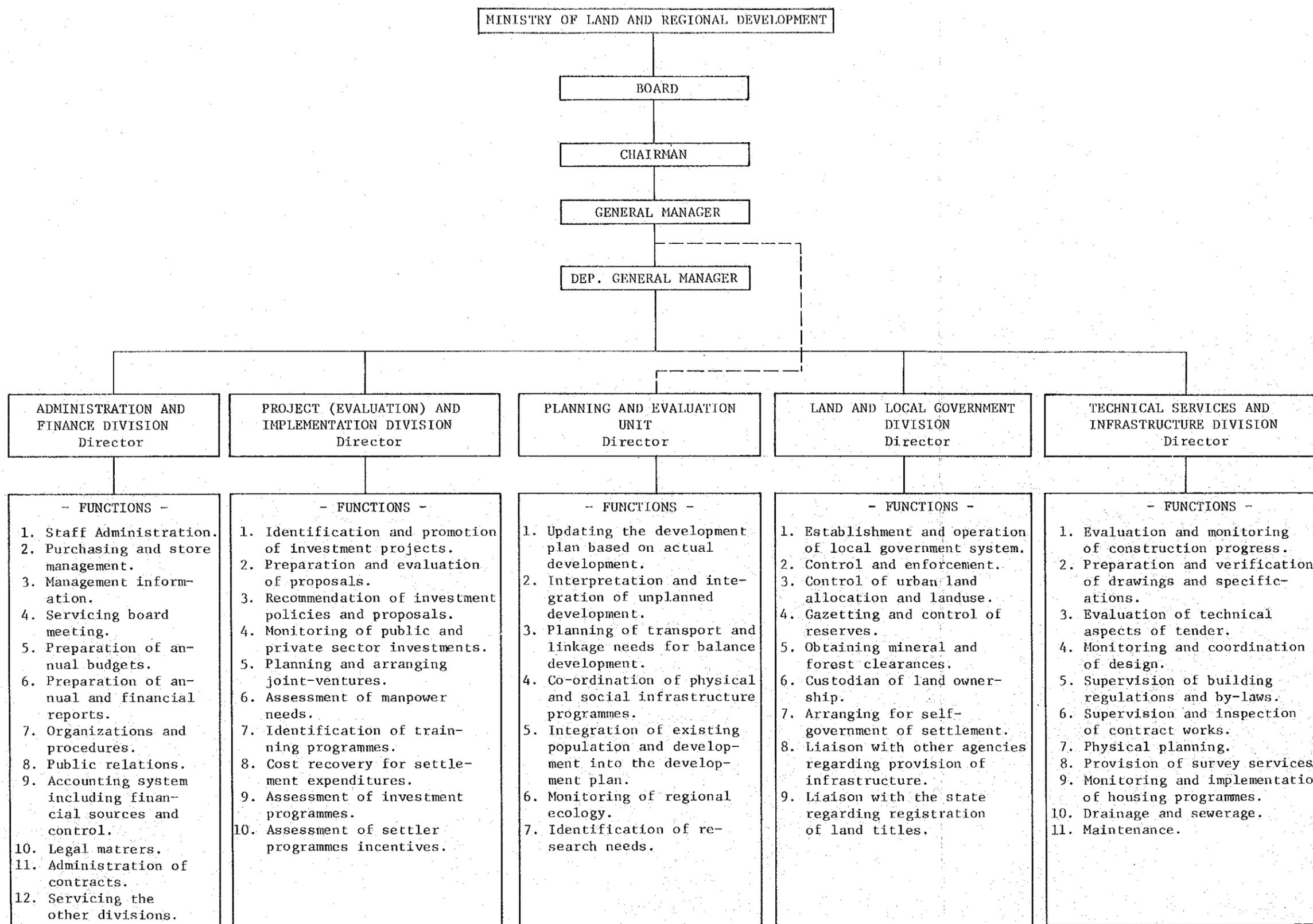
"To carry out economic and social development within the Trengganu Tengah Region in accordance with the New Economic Policy as contained in the Second Malaysia Plan."

To achieve these objectives the major development efforts are concentrated on the following:

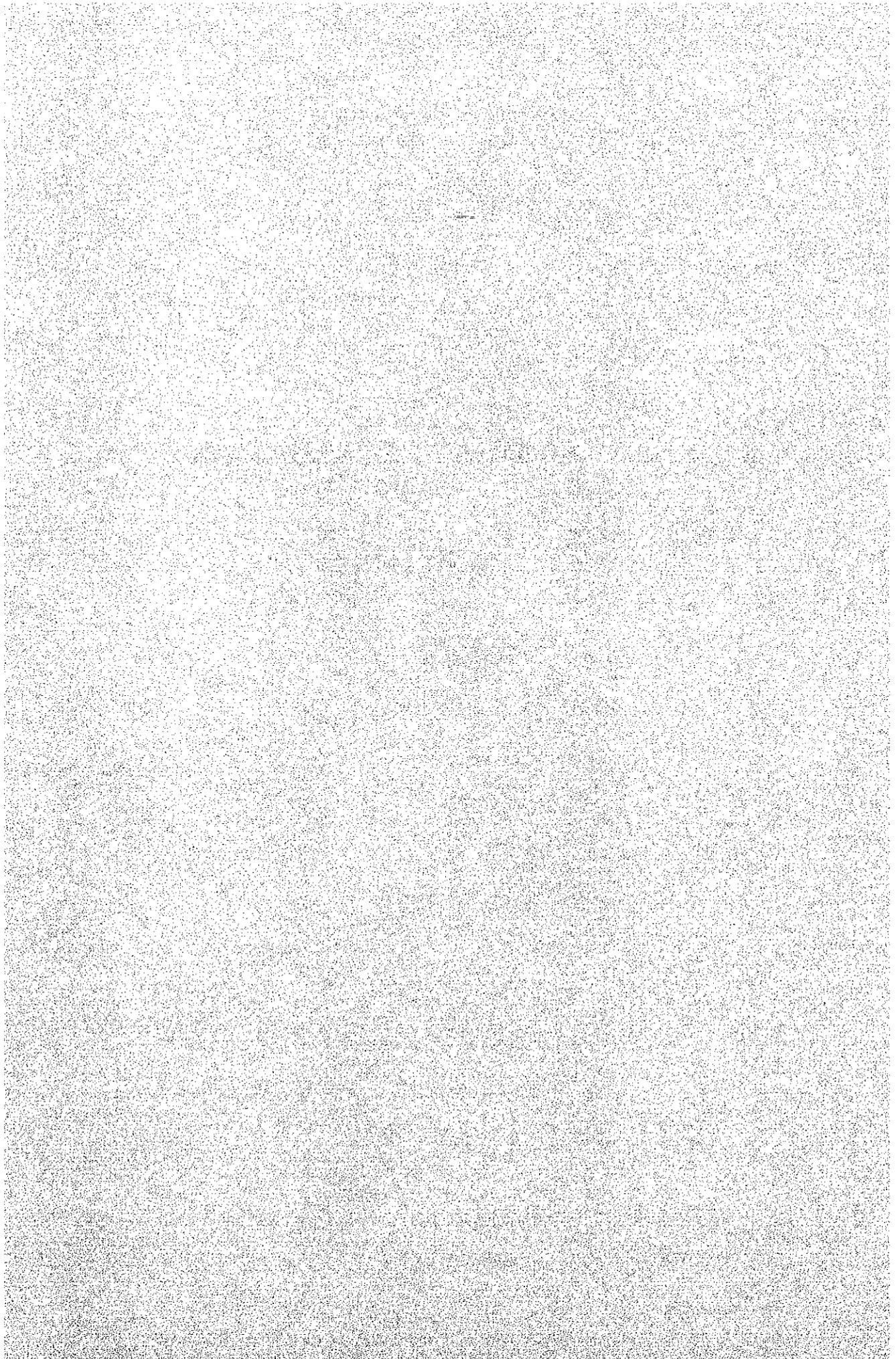
- i. The opening up of land for agriculture through existing agencies such as FELDA, FELCRA, RISDA, the private sector and by private sector and by itself;
- ii. The promotion of agricultural diversification;
- iii. The development of urban centers;
- iv. The provision of infrastructure and social facilities in these centers.

As the central authority in the development of Trengganu Tengah, the Authority has a wide range of responsibilities to undertake. An organization of the Authority is illustrated Fig. XII-2.

Fig. XII-1 ORGANIZATION CHART KETENGAH 1977



XIII. ECONOMIC EVALUATION



XIII. ECONOMIC EVALUATION

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A. Basic Assumptions for the Economic
Internal Rate of Return (EIRR)

1. Price of Farm Products/Inputs

- 1.1 Major farm products of the Pilot Project are rice, soybeans, pepper, various vegetables and fruits. Of these products, rice is considered international trading goods and the price is based on projected 1980 international price of IBRD. International price of US\$359 per m.t. for rice was used. The prices of other farm products have been based on domestic prices. The price of fertilizers have also been based on projected international prices. Wages are based on local market rates and family labour is included in the calculation of labour cost.

2. Intensity of Land Use

- 2.1 At full development, with adequate water control, good drainage, soil improvement and farm mechanization, it is estimated that the cropping intensity in the low land will be 172% while that of upland will be 100%.

3. Crop Yields

With the Pilot Project, the yield of rice is estimated to be 1.44 m.t./acre in case of monsoon season improved rice, and 1.52 m.t./acre in case of off-season improved rice. These yields were projected on the basis of available data from the existing irrigated areas and the local experiment station of MARDI.

4. Agricultural Development Period

After the completion of project works, it is expected that full agricultural development will take further seven years. During this period a comprehensive programme on extension, farm mechanization, water management, and marketing will be implemented and the yield and crop intensity will gradually increase year by year up to the full

development in the twelfth year after the project construction is started.

5. Economic Life of the Pilot Project

The economic life of the Pilot Project is assumed at 50 years after completion of the Pilot Project taking into consideration services and physical life of major engineering structures of the Pilot Project and the previous standard for similar projects.

6. Economic Cost

- i) Total investment cost of the agricultural development, both foreign and local, excluding interest during construction and price escalation.
- ii) Operation and maintenance costs as well as replacement costs have been included. Residual value of equipment has been deducted from the costs.

7. Economic Benefits

The direct tangible economic benefits of the Pilot Project are estimated as the difference between the net value of crop and livestock production "with" and "without" the Pilot Project.

The annual net benefits from the 4th year to the 11 year are assumed at M\$2,400,000, M\$2,635,000, M\$2,836,000, M\$3,141,000, M\$3,650,000, M\$4,025,000, M\$4,175,000, M\$4,419,000 and M\$4,608,000 which will accrue from the Pilot Project at the 12th year are assumed to remain constant thereafter for the life of the Pilot Project.

Indirect and non-quantifiable benefits are not included in the economic analysis.

8. Economic Internal Rate of Return

Based on the above assumptions, the EIRR has been calculated at 16.5% for the first phase of the Pilot Project.

B. Price of Paddy Rice for Economic Analysis (1980)

(Unit: M\$/m.t.)

1. Projected price of Thai 5% broken rice in 1980 (f.o.b. Bangkok)	US\$ 359 M\$ 898
2. Corresponding price Malaysian 20-25% broken rice	M\$ 717
3. Ocean freight and insurance (i & f Kuantan)	M\$ 45
4. Port handling and transport to project site and unloading	M\$ 26
5. Rice price in project site	M\$ 843
6. Paddy equivalent at 63.5% recovery	M\$ 535
7. Milling cost less value of by-product	M\$ 4
8. Handling and transport cost from farm to mill	M\$ 3
9. Farm gate price of paddy	M\$ 528

Remarks:

1): IBRD projected price for Thai 5% broken f.o.b.

1976 300 (US\$/ton)

1977 313

1978 336

1979 348

1980 359

2): Port handling and transport costs from

Kelang to Kuala Dungun M\$ 45

Port handling and transport coast from

Kuantan to Kuala Dungun M\$ 26

3): US\$ 1 = M\$ 2.5

C. Price of Agricultural Products

For the economic justification and financial analysis of the Pilot Project, the following prices were utilized respectively.

<u>Description</u>	<u>Economic</u>	<u>Financial</u>
	(M\$/ton)	(N\$/ton)
Paddy		
Improved	528	480
Local	470	450
Pineapple	550	500
Chillies	1,000	850
Tomato	800	700
Onion	800	700
Beef		
Oxen	7,200	5,800
Buffalo	7,000	5,620

D. Estimation of Anticipated Unit Crop Yield

1. In evaluating an irrigation development project, the unit crop yield is estimated on the basis of the present situation, the result on research and study of crop production, the conditions of climate, soil, water, etc. and others. Also in the study of the Bukit Bauk Pilot Project, the anticipated unit crop yield was estimated taking into account the peat soil as well as the above-said conditions.
2. The unit yield of paddy is expected to increase gradually in parallel with the increase of land productivity and attain the maximum yield on the seventh year after completion of the Pilot Project. The anticipated unit paddy yield during the build-up period is presented in the below table.

Anticipated Unit Yield of Paddy

(Unit: ton/acre)

Item	Build-up Period											
	1st ^{1/}	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th
<u>Improved Paddy</u>												
Monsoon season				0.72	0.76	0.94	1.02	1.21	1.15	1.30	1.37	1.44
Off-season					0.81	0.99	1.08	1.28	1.32	1.37	1.44	1.52
<u>Local Paddy</u>												
Monsoon season				0.69	0.72	0.75	0.78	0.81	0.85	0.89	0.96	1.00

3. According to the latest data ^{2/}, the yield position of paddy before and after project is illustrated in Fig. A. The upper half of the figure exhibits that: 1) yield level of rainy season paddy before project is 2.2 tons per ha on an average fluctuating from a little over 1.5 tons/ha to about 3.2 tons/ha, 2) this yield level will be raised to as high as 4.3 tons/ha after project, and 3) a yield level

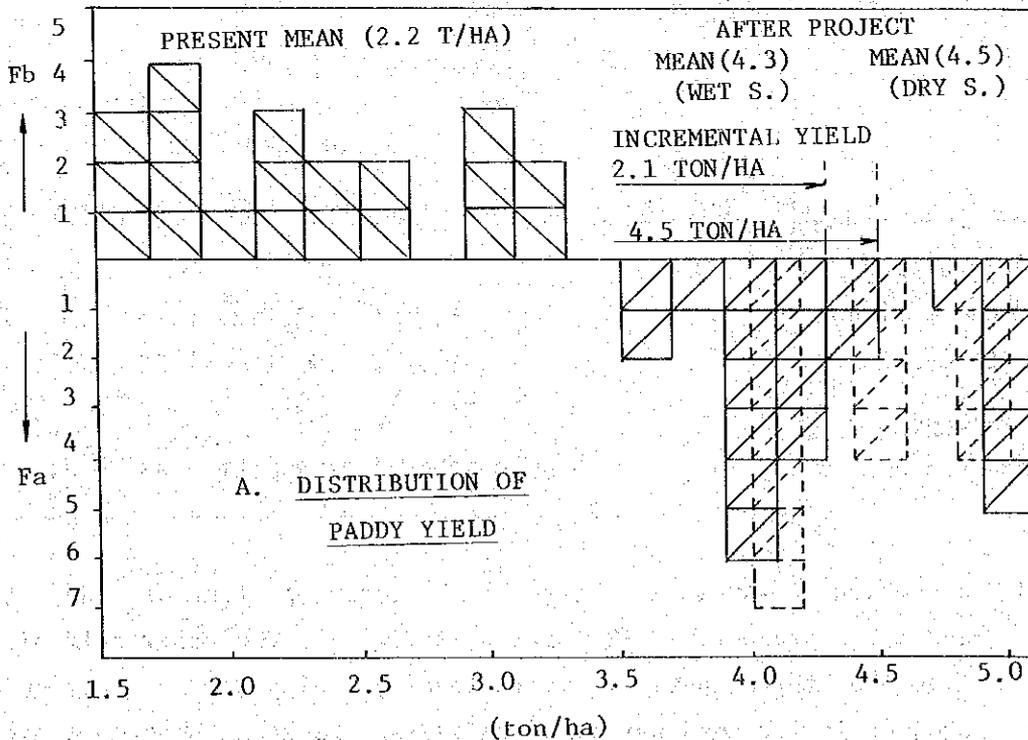
^{1/}: Means 1981/82 when the construction is assumed to be commenced.

^{2/}: Obtained from Mr. Nakahara, Ex-ADB officer.

of 4.5 tons/ha has been planned for dry season paddy on an average. These figures indicate that the increase of yield is about 4.5 tons/ha in paddy for dry season crop as there has been practically no cultivation practiced before, whilst it is only 2.1 tons/ha rainy season.

4. Difficulty of paddy cultivation in peat soil area is mentioned in the report. However, paddy cultivation in peat soil area is considered possible as far as the reclamation is conducted smoothly and adequately. Assuming that paddy cultivation is possible, agricultural development plan on the Bukit Bauk Pilot Project was established as seen in the report. Practically, the paddy cultivation is to be tested in the proposed demonstration farm.

Fig. A Paddy Yields and Production Cost



E. Labor Requirements

1. Average number of family labor forces was estimated to be 2.6 persons (husband, wife and son) per household. The reason is as below.
 - a. Settlement will be conducted during 1982/83 to 1983/84 at latest. In accordance with the selection criteria, the proposed settlers are limited to married men of 25 in average ages.
 - b. In 1991/92 the agricultural production will reach the maximum level on the basis of which the farm budget is calculated.
 - c. In 1991/92 average ages of settlers' children will be 17 to 20 years old. Such a youth should be one of the family labor forces.
 - d. It is realistic to assume that non-farm employment will at least grow at the similar rate as the population increase even in the Pilot Project. In this study, however, it was assumed that at least one child within farm family remains as the farm successor.
2. Monthly labor requirements by crops for paddy cultivation farms were estimated on the basis of family labor forces as shown in Table A. As seen in the table, in May shortage of labor forces takes place. Such shortages will be solved by supplying hired seasonal laborers or in collaboration with other farmers.
3. Monthly labor requirements for upland crop estate farms were estimated excluding common estate farm activities, in other words, limited to labor requirement for crop production. Table B shows monthly labor requirements by crops.
4. In the proposed estate farms, the farming practices will still require considerable manpower even though some kinds of farm machineries are introduced different from paddy cultivation farms. The labor requirements per year for the operation of the estate farms are estimated at about 115,000 man-days including 113,465 man-days for crop production in case of upland crop estate farm and about 55,000 man-days including about 4,000 man-days for fruit production in case of livestock estate farm. These requirements will be provided by about 300 permanent family for the upland crop estate farm and about 160 permanent family for livestock estate farm.

Table A
Monthly Labor Requirement by Crops
Paddy Cultivation Farmer
 (Unit: man-day)

Crops	Acreege (acre)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Total
<u>Paddy</u>														
<u>Improved</u>														
Main season	1	2	9							12	17	2		42
-do-	1	2	2	9							12	17		42
Off-season	1			12	17	3	3	9						44
-do-	1			12	17	3	3	9						44
-do-	1			12	17	3	3	9						44
<u>Local</u>														
Main season	1	14	1	1	5	6							8	35
<u>Upland Crops</u>														
Chillies	1			10	15	25	15	30	30	30				185
Fruits	0.35	2	2	2	2	2	2	2	2	2	2	2	2	24
Other vegetables														
Cucumber	0.5			5	6	13	5	10	4					43
Long beans	0.5	7	6	5						5	6	10		39
Total(A)	8.35	27	20	32	52	92	45	51	57	41	49	37	39	542
Workable days^{1/}		24	22	24	23	24	23	24	24	23	24	23	24	282
Family labor force^{2/}		62.4	57.2	62.4	59.8	62.4	59.8	62.4	62.4	59.8	62.4	59.8	62.4	733.2
Difference(B-A)		35.4	37.2	30.4	7.8	-29.6 ^{3/}	14.8	11.4	5.4	18.8	13.4	22.8	23.4	191.2

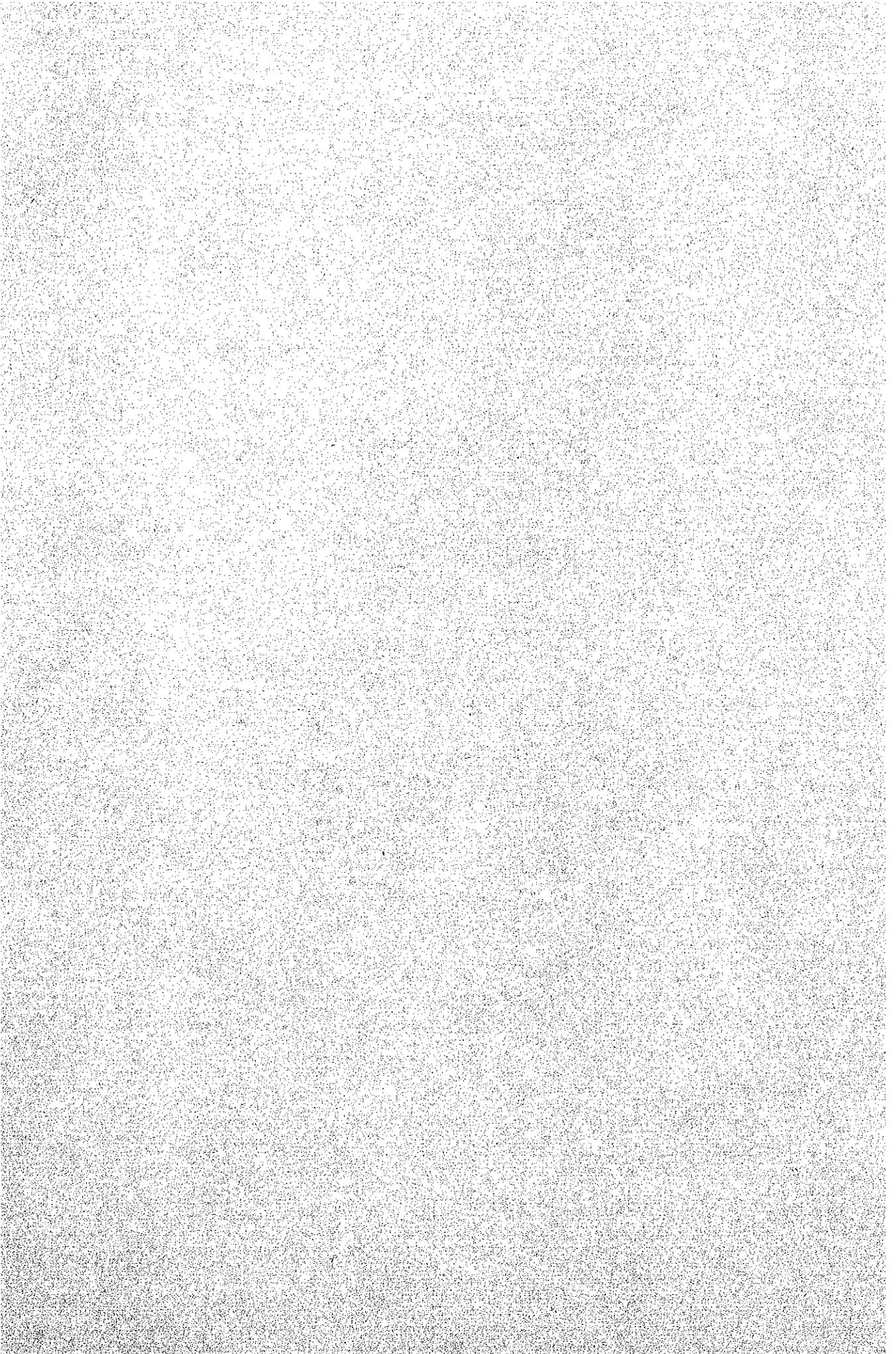
1/: Excluding national holidays, sundays, rainy days, etc.
 2/: Calculated assuming that average number of available family labor forces is 2.6 persons per household.
 3/: Shortage of labor forces will be solved by supplying hired seasonal labor forces or in collaboration with other farmers.

Table B
Monthly Labor Requirement by Crops
 Upland Crop Estate Farm
 (Unit: man-day)

Crops	Acreage (acre)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Total
<u>Vegetables</u>														
Tomato	0.5	4	6	12	6	8	8	8	8					52
Chillies	0.5		5	7	13	7	15	15	15	15	15	10		102
Watermelon	0.5			4	6	12	10	8	8	8				48
Onion	0.5					4	5	11	10	10	10	10		60
<u>Fruits</u>														
Pineapple	4	12	8	4	9	9	8	7	6	8	7	4	6	88
Total (A)	6	12	12	15	32	34	39	45	48	41	32	24	16	350
Workable days ^{1/}		24	22	24	23	24	23	24	24	23	24	23	24	282
Family labor force ^{2/} (B)		62.4	57.2	62.4	59.8	62.4	59.8	62.4	62.4	59.8	62.4	59.8	62.4	733.2
Difference (B-A)		50.4	45.2	47.4	27.8	28.4	20.8	17.4	14.4	18.8	30.4	35.8	43.4	383.2

1/: Excluding national holidays, sundays, rainy days.
 2/: Calculated assuming that average number of available family labor forces is 2.6 persons per household.
 3/: Limited to labor requirements for crop production. The remaining labor forces will be supplied for the common estate farm activities, i.e., collection of harvested products, transport to cannery, works in cannery, sending works of crop products to market, etc.

XIV. OTHERS



XIV. OTHERS

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A. Socio-Economic Background in Trengganu

Size

Trengganu is one of the 11 states of Peninsular Malaysia. Total area of the State of Trengganu is 3.2 million acres (5,050 sq. miles). Its length is 136 miles and its broadest part is 77 miles. About 70% of the total area is covered under forest and total area under crop cultivation is 464,000 acres.

Population

Total population of Trengganu is estimated to be 495,000 at the end of 1977. Population growth rate for 1957 - 70 is 2.9% p.a. compared to 2.7% p.a. for Peninsular Malaysia.

There are four urban centres and their respective population and population growth rates are as follows:

	<u>Population growth rate</u>	<u>Population 1977</u>
Kuala Trengganu	4.7%	65,000
Jerteh/Besut/Kg.Raja	3.4%	12,000
Dungun	2.7%	20,000
Cukai	1.2%	15,000

Economy

The GDP of Trengganu in 1975 is estimated to be \$369.7 million and GDP per capita is \$765 or 60% of the Malaysia average. Compared with Selangor, the most developed state, Trengganu GDP per capita is only 40% of Selangor,

The breakdown of GDP by sector of origin in 1975 is as follows:

Agriculture, forestry, fishing	\$164.1m	44.4%
Mining and quarrying	5.0	1.4
Manufacturing	40.6	11.0
Construction	11.7	3.2
Utilities	3.3	0.9
Transport, storage & Communication	17.6	4.8
Wholesale and retail trade	31.5	8.5
Ownership of dwellings, banking, insurance and real estate	34.9	9.4
Public administration and defence	31.9	8.6
Other services	29.1	7.8
Total	369.7	100.0

B. Major Sectors

Agriculture

The main crops are rubber, rice and oil palm, in order of importance (in terms of acreage). Rubber and rice are small holder's crop whereas oil palm is mainly an estate crop. Income from rubber and rice are relatively low due to low productivity while income from oil palm is also relatively low compared with other areas in Peninsular Malaysia but compared with rubber and rice, oil palm yields a higher income. To increase the income of the rural sectors various crops have been introduced in the state in recent years with variable success including groundnuts, tobacco, green peas and soya bean. Another programme of increasing the rural income is through land development and agencies involved are Federal Land Development Authority, State Economic Development Corporation and Federal Land Consolidation and Rehabilitation Authority and private sector.

It is estimated that 60% of the population depends on agriculture for their livelihood and about 53% of the labour force depends on agriculture.

Forestry

Royalty from forestry has been the main source of the State Government's revenue at \$15 million per annum currently. However, it is expected to be superseded by royalty from petroleum which is expected to amount to \$29 million in 1978. It is estimated that 2,000 people are involved in logging. Logging is mainly done on small scale basis.

Fishing

The total number of fishermen in the state is estimated to be 12,000 people or 9% of the labour force. Fishing is a traditional sector mainly involving small boats and working within the coastal fishing area. These and other factors cause for the low income of the sector. Total annual production is estimated at 55,000 tons valued at \$45 million.

Mining

The importance of this sector has declined since the closing of the only major iron ore mining in the state in 1970. There are, however, several tin mines being worked and a number of granite quarries are in operation to meet local road construction demand. The discovery of petroleum and gas off-shore of Trengganu in recent years is expected to create a tremendous impact on the state. Several wells commence production this year estimated at 30,000 barrels/day and expected to reach a maximum of 120,000 barrels/day beginning 1980.

Industry

The main industries are saw milling, construction, oil palm and rubber processing. Other industries in existence include food processing, boat building and basic engineering works. Total employment of this sector is estimated to be 14,000 people.

Industrial sector is basically undeveloped and large industries generally are not attracted to come to Trengganu. Lack of infrastructure, (transportation system, electricity supply, water supply, poor communication system) lack of skilled manpower, and distance from major market and port are some of the factors that have been propounded for this.

Retailing

Retailing is an important sector and a large number of retail shops are in existence. Total number of labour force employed by this sector is 12,000 people.

Education

The total number of schools in the state in 1977 is 280 comprising 149 primary schools and 31 secondary schools. The ratio of schools per 10,000 population is 5.03 for primary school and 0.63 for secondary schools. The ratio of students per teacher is 31.5 for primary schools and 27.3 for secondary schools.

Health

There are altogether five hospitals in the state comprising one General Hospital, three district hospitals and one rural hospital. The total number of beds is 726 in 1977. The number of population per doctor is 58,000 compared with only 4,600 for the whole of Malaysia. Like doctors the number of persons per nurse in Trengganu is 1,400 compared with 1,200 for Malaysia indicating shortage of medical personnel in the state. On the general health index Trengganu rank lowest in comprison with the other states of Peninsular Malaysia.

C. Development Objectives and Strategies

Objectives The overriding objective of development in Trengganu is towards the achievement of national objective, i.e. attaining national unity through the elimination of poverty and restructure the present stratification of economic functions by race.

Strategies The strategies for attaining those objectives are summarized as follows:

- (i) increasing income through improved productivity.
- (ii) creation of employment opportunities.
- (iii) creation of opportunities for Malay participation in modern and high income sector.
- (iv) improving the availability of modern physical infrastructures and social services.

Third Malaysia Plan

The total allocation to be spent for the public sector in Trengganu under the Third Malaysia Plan (1976-80) is \$892.027 million. Of the total 80.9% are programmes in the economic sector, and 16.9% social sector programmes. General administration and security are allocated 2.7% and 1.7% each respectively.

Agriculture Sector

Of the total of \$721.869 million allocated for the economic sector, agriculture and rural development takes up 54.4%. Much will be spent on development of new lands for export crop (oil palm) involving various agencies i.e. Federal Land Development Authority, Federal Land Rehabilitation and Consolidation Authority and Central Trengganu Development Authority.

Food (rice) production programmes are also undertaken by providing irrigation and drainage facilities, as well as making available input subsidies and better extension service to farmers. Development of other crops such as tobacco, soya bean, and groundnut will be expanded during the plan period.

Infrastructure Infrastructure development (roads, telecommunications, electricity and water) totals \$241.192 million or 33.4% of allocation for economic sector. Part of it is for the construction of a hundred mile new road in order to open up 1 million acres of new area, and the remainder is for improving the existing road system, and expanding the present airport. Telecommunication system in the state would be improved and the number of lines increased in order to meet growing demand. The supply of tap-water and electricity would also be made available to greater area i.e. in towns and rural areas where no such supply is available at the moment.

Industry This sector is allocated \$86.179 million altogether and the main objective is to increase the Malay participation in commerce and industry involving various agencies such as Urban Development Authority, and Indigenous Trust Council. Programmes include the provision of business premises, loans, consultancy services, training and technical advice to help Malays start business and make them better businessmen. Part of the allocation would also be spent on development of industrial sites, where all basic amenities are provided in order to attract major industries into the state.

Social Services

Social sector is given \$131.226 million allocation for construction of new schools and replacement of existing ones, and also to improve medical services in the state. Low cost housing will also undertaken in view of the poor housing condition, in particular for the low income group.

General administration and security

The total allocation for these sectors is \$38.732 million and most of it will be spent for the construction of office buildings and the remainder for the construction of officers accomodation.

Source; State Planning Unit, Trengganu

D. Influence of Pilot Project on DID Scheme

1. Influencing Factors

The Bukit Bank Area is an undeveloped jungle swamp area at present. It is necessary to examine possible influence on the DID scheme along the lower reaches of the river because of the change in run-off factors before and after the tree cutting and agricultural land reclamation.

Main factors affected by the development are the coefficient of run-off, evapo-transpiration, and water capacity of soil.

In a hilly area, the coefficient of run-off is generally smaller in a forest than in a dry or grass land. So the run off is considered to be small. In a swamp, however, the soil is constantly saturated with water because of poor drainage and the surface is partially waterlogged. The initial loss for a rainfall is small, and the coefficient of run-off is estimated to be large. The coefficient of run-off may be larger in a paddy field than in a forest. The evapo-transpiration may be about the same in a forest and in an agricultural land because of the coverage with vegetation.

The water capacity of an agricultural land with good drainage facility will be far larger than that of a swamp forest because the soil in the former is generally dried before a rainfall. The water capacity is especially large in a peat area.

Summing up, the coefficient of run-off becomes smaller and the water capacity increases as the result of development of the jungle swamp in Bukit Bauk. Thus, the flood will be smaller as compared with the same before development.

2. Actual Measurement Examples in Other Countries

"Cutting of a forest increases the damage from flood" has been a matter of dispute in many countries. Actual results show that there is no fixed tendency. Damages from floods showed slight increases in some cases, but showed no particular change in other cases. Several examples are given below.

(1) The average annual coefficient of run-off surveyed in an area of

about 200 acres in Wagon wheel Gap in the USA increased by 6% as a result of forest cutting.

- (2) As a result of the survey conducted for 12 square mile basin of the Shacklarn Brook River, New York, the annual average of the coefficient of run-off only changed from 64.0% to 65.4% before and after the forest cutting.
- (3) In a 87-ha basin in Horz Mountain in Germany, the annual average of the coefficient of run-off changed from 54% to 57% as a result of development from a forest to grassland.
- (4) In a 60-ha wood and pasture land developed from a wood land in the basin of the Emmentel River in Switzerland, the annual average of the coefficient of run-off changed from 47.8% to 59.4%. This large increase was perhaps the result of soil surface hardening in the pasture land. This may be considered to be a special case.
- (5) In a 1715-acre basin the white Hollow Tennessee in the USA, the coefficient of run-off was kept at 40% before and after development of a woodland into a grassland.

3. Influence on DID Scheme

As described above, development from a woodland into an agricultural land involves no big change. Especially in Bukit Bauk, the peat land having larger water capacity is far more influential to floods than the change of surface vegetation. Floods are considered to become smaller because drainage facilities are provided.

E. Fertilizer and Agro-chemicals Requirements 3/

Item	(kg/acre/crop/year)			
	Improved Paddy	Local Paddy	Vegetables	Pineapple <u>2/</u>
Urea (46% N)	51	26	74	73
TSP (46% P ₂ O ₅)	35	17	74	
MP (60% K)	14	8	35	
Chap Bintang <u>1/</u>				188
Lime				13
Copper sulphate				4
Potash				20
Diazinon	0.28	0.18	0.34	0.5
Sumithion	0.28	0.18	0.34	0.5

1/: Urea : Potash : Ammonium sulphate = 1 : 1 : 1

2/: After planting, 9 times of fertilization are conducted during the period of the first 4 years. These figures are an annual average.

3/: Estimated for the economic justification and financial analysis.