

## 第 11 章 工 事 費



## 第11章 工事費

### (1) 工事費

1～2年後を想定した計画面積11.4haの工事費は約3,600万円となる。しかし、今回分の工事は最も緊急を要するところの現状の人員に対する実験圃場の確保と、現在の実験圃場からみて畑作物と果樹を組入れた圃場の7.8haを造成する。この工事費は次のとおりである。

圃場造成工事	900,000TK	( 9,004千円)
道路工事	39,000	( 390 )
用水施設工事	816,000	( 8,163 )
排水施設工事	225,000	( 2,251 )
諸経費	396,000	( 3,962 )
計(総工費)	2,376,000	(23,769 )
予備費・工事諸費	419,000	( 4,191 )
合計	2,795,000	(27,960 )

供与資材を含めた工事費の総括は表11-2に、工事費の詳細は表11-3に示す。また、11.4ha造成するための工事費は、添付資料-7に示す。

### (2) 単価

表11-4に示す単価は政府発注用資料の他、メーカーの資料を参考とした。また、歩掛りは日本の土地改良工事標準積算便覧を参考とし、現地で使用されている単価とのチェックを行って決めた。

### (3) 数量一覧表

表11-5に示す。

### (4) 供与資材

供与資材の費用と材料リストは表11-6、11-7で示すとおりである。供与する資材は次のとおりである。

i) 井戸用資材

ケーシング及びストレーナーは輸入禁止品目ではなく、また、ストレーナーは特に高品質な材料が要求されることから、今回使用されるφ250の資材は日本から供与する。

ii) 調整池囲り配管資材

この資材はほとんどがポンプに関連したバルブ等であり、日本からの供与とする。

iii) 管路資材

灌漑用管路資材として鋼管、ダクタイル鋳管及び塩化ビニル管があり、経済性の面から塩化ビニル管を使用する。塩化ビニル管はバングラデシュでは8"以下は輸入禁止品目となっており、現地調達とする。

iv) ポンプ

ポンプはバングラデシュでも製作されているが、実験圃場に利用するもので故障が少ないことが要求されるため、日本より資材を供与する。

v) 圃場施設(スプリンクラーセット)

スプリンクラーは現地では入手できないので、日本から資材で供与する。

(5) 物価上昇

過去5ヶ年の建設資機材の平均的な物価は表11-1に示すとおりで、1983年から84年にかけては2~7%の上昇率を示しており、平均10~13%程度である。

表11-1 過去5年間の単価の動き

(単位:TK)

資機材	単位	1978-80年	80-81	81-82	82-83	83-84
ブロック-10" (上)	1,000	834	1,057	1,323	1,091	1,274
セメント(日本)	袋	409	92	111	108	105
砂	100 cft	181	286	318	281	318
鉄筋	Cwt	567	595	628	607	657
人夫	日	20.6	25.0	24.9	26.8	27.4
大工		35.7	45.2	54.7	52.6	59.7

場所 : Dhaka

資料 : Statistical Yearbook of Bangladesh(1983~84)

表 1 1 - 2 工事費総括表

(TK)

工 種	数 量	供与資材	工事費	備 考
1.圃場造成工事			TK	
掘削押土	28,131㎡	-	844,000	
整地仕上	7.8ha	-	56,000	
小計			900,000	
2.道路工事				
幹線道路	1,054m	-	22,000	
支線道路	1,195m	-	17,000	
小計			39,000	
3.用水施設工事				
井戸	1カ所	168,000	310,000	
調整池	1カ所	99,000	264,000	
ポンプ場	1カ所	-	92,000	
管路埋設	1カ所	427,000	86,000	
ポンプ据付	1カ所	1,685,000	65,000	
圃場施設		396,000	-	
小計			816,000	
4.排水施設工事				
圃場排水路	1,720m		14,000	
横断暗渠	11カ所		211,000	
小計			225,000	
計			1,980,000	
諸 経 費			396,000	直接費×20%
総 工 事 費			2,376,000	
予 備 費			237,000	総工費×10%
計			2,613,000	
工 事 諸 費			182,000	(総工事+予備費)×7%
合計		2,775,000TK 27,760,000円	2,795,000TK 27,960,000円	

表 1 1 - 3 工事費明細書

一金 27,960,000円也

対 円 換 算

$$\text{現地通貨合計 } 2,795,000\text{TK} \times \frac{1\text{\$ } 257 \text{ 円}}{1\text{\$ } 25.69 \text{ 現地通貨}} = 27,960,000\text{円}$$

名 称	数量	単位	単 価	金 額	単価表	備 考
1.圃場造成工事						
掘削押土	28,131	m <sup>3</sup>	30	843,930	-	L=48m
整地仕上	7.8	ha	7,130	55,614	-	耕地含む
小計				899,544		
2.道路工事						
幹線道路	1,054	m	21	22,134	1	
支線道路	1,195	m	14	16,730	2	
小計				38,864		
3.用水施設工事						
井戸	1	カ所		310,000	3	
調整池	1	カ所		263,535	4	
ポンプ場	1	カ所		92,278	5	
管路埋設	1	式		85,658	6	
ポンプ据付	1	式		65,000	7	
小計				816,471		

名 称	数量	単位	単 価	金 額	単価表	備 考
4.排水施設工事						
圃場排水路(畑)	1,720	m	8	13,760	8	
横断暗渠工(P-I)	3	カ所	2,589	8,577	9	
横断暗渠工(P-II)	4	カ所	3,417	13,668	10	
横断暗渠工(P-III)	1	カ所	4,397	4,397	11	
横断暗渠工(B-I)	1	カ所	52,066	52,066	12	
横断暗渠工(B-II)	1	カ所	42,625	42,625	13	
横断暗渠工(B-III)	1	カ所	89,912	89,912	14	
小計				225,005		
計				1,979,884		
改め				1,980,000		
諸 経 費				396,000		直接費の20%
総 工 事 費				2,376,000		
予 備 費				237,000		総工費×10%
計				2,613,000		
工 事 諸 費				182,000		(総+予)×7%
合計				2,795,000		

表 11-4 単価表

幹線道路工 1.0m 当り単価表

一金 21TK

(10m 当り)

(単価番号 1号)

名 称	数量	単位	単 価	金 額	備 考
敷均し(11Tonブル)	70	m <sup>2</sup>	1	70TK	
" (人力)	70	"	100m <sup>2</sup> 11	8	
転圧(ロードローラー)	70	"	100m <sup>2</sup> 45	32	
法面仕上	20	"	10m <sup>2</sup> 14	28	
筋芝	20	"	10m <sup>2</sup> 38	76	
計				214	
1m 当り				21TK	

支線道路工 1.0m 当り単価表

一金 14TK

(10m 当り)

(単価番号 2号)

名 称	数量	単位	単 価	金 額	備 考
敷均し(11Tonブル)	40	m <sup>2</sup>	1	4TK	
" (人力)	40	"	100m <sup>2</sup> 11	4	
転圧(ロードローラー)	40	"	100m <sup>2</sup> 45	18	
法面仕上	21	"	10m <sup>2</sup> 14	29	
筋芝	21	"	10m <sup>2</sup> 38	80	
計				135	
1m 当り				14TK	

井戸工事 1カ所当り単価表

一金 310,000TK

(単価番号 3号)

名 称	数量	単位	単 価	金 額	備 考
準備工	1	式	TK	40,000TK	
テストボ-リングφ38	1	"		10,000	
掘削 φ550	110	m	1,500	165,000	
パイプ据付	1	式		20,000	
砂利	1	"		10,000	
揚水テスト	1	"		30,000	
ポンプ据付	1	"		35,000	BOX含む
計				310,000	



## 調整池 1カ所当り単価表

一金 263,535TK

(単価番号 4号)

名 称	数 量	単 位	単 価	金 額	備 考
表土掘削押土	600	m <sup>3</sup>	43TK	25800TK	ℓ=70m
築堤土運搬	3333	"	58	193314	ℓ=90m
築堤土転圧	3333	"	10m <sup>2</sup> :67	22331	
築堤土法面仕上	1556	m <sup>2</sup>	10m <sup>2</sup> :14	2178	
築堤用筋芝	920	"	10m <sup>2</sup> :38	3496	
掘削	56	m <sup>3</sup>	15	840	
埋戻し	50	"	8	400	
切土法面仕上	330	m <sup>2</sup>	16	5280	
レンガ積	135	m <sup>2</sup>	1172	1582	
鉄筋コンクリート	155	"	1868	2895	
無筋コンクリート	020	"	1448	290	
型枠	1767	m <sup>2</sup>	170	3004	
モルタル	008	m <sup>2</sup>	2079	166	
砂利	044	"	557	245	
コンクリート管	2	本	857	1714	φ600, L=1.8m
計				263535	

## ポンプ場 1カ所当り単価表

一金 92,278TK

(単価番号 5号)

名 称	数 量	単 位	単 価	金 額	備 考
レンガ積(壁)	321	m <sup>2</sup>	375TK	12038TK	
モルタル	190	"	95	181	
鉄筋コンクリート	1171	"	1868	21874	
石灰コンクリート	032	"	1868	598	
型枠	3375	"	170	5738	
支保工	394	空m <sup>3</sup>	30	1182	
断面型枠	22	m <sup>2</sup>	170	374	
窓 1500×900	1	ヶ	2500	2500	
通気口 500×500	2	ヶ	200	400	
ドア 2115×1.2m	1	ヶ	3000	3000	
鉄筋	066	Ton	18607	12281	
鉄筋コンクリート	674	m <sup>3</sup>	1868	12590	
型枠	2635	m <sup>2</sup>	170	4480	
鉄筋	058	Ton	18607	10792	
均しコン	149	m <sup>3</sup>	1448	2158	
砕石	247	m <sup>3</sup>	557	1376	
掘削	362	m <sup>3</sup>	15	543	
埋戻し	216	"	8	173	
計				92278	

管路埋設工 1式当り単価表

一金 85,658TK

(単価番号 6号)

名 称	数 量	単 位	単 価	金 額	備 考
管路埋設 φ 150	336	m	34TK	11424TK	
φ 75	1104	"	30	33120	
φ 50	95	"	28	2660	
制水弁据付 φ 150	1	カ所	663	663	
φ 75	8	"	663	5304	
給水栓据付	49	"	663	32487	
計				85658	

ポンプ据付 1式当り単価表

一金 65,000TK

(単価番号 7号)

名 称	数 量	単 位	単 価	金 額	備 考
加圧ポンプ据付配管	1	式		30000TK	
ケーブル埋設	1	"		10000	
ブレーカー直し	1	"		25000	ブレーカー-225Aブ-ス材料含む
計				65000	

圃場排水路(畑地) 1.0m当り単価表

一金 8 TK

(単価番号第 8号)

名 称	数 量	単 位	単 価	金 額	備 考
掘削	036	m <sup>3</sup>	15TK	5TK	
法面仕上	128	m <sup>2</sup>	10m <sup>2</sup> 16	2	
水路床仕上	05	"	10m <sup>2</sup> 16	1	
計				8	

圃場排水路(水田) 1.0m当り単価表

一金 29 TK

(単価番号 8-1号)

名 称	数 量	単 位	単 価	金 額	備 考
掘削	130	m <sup>3</sup>	15TK	20TK	
法面仕上 切土	283	m <sup>2</sup>	10m <sup>2</sup> 16	5	
" 盛土	170	"	" 14	2	
水路床仕上 切土	030	"	" 16	1	
水路天端仕上 盛土	080	"	" 14	1	
計				29	

横断暗渠(パイプ)タイプP-I 1ヶ所当り単価表

一金 2,859TK

(単価番号 9号)

名 称	数 量	単 位	単 価	金 額	備 考
コンクリート管φ300×1.8m	5	本	316TK	1580TK	
ブロック積	09	m <sup>3</sup>	1172	1055	
掘削	74	m <sup>3</sup>	15	111	
埋戻	63	m <sup>3</sup>	8	50	
特殊作業員	06	人	70	42	
普通作業員	06	人	35	21	
計				2859	

横断暗渠(パイプ)タイプP-II 1ヶ所当り単価表

一金 3,417TK

(単価番号 10号)

名 称	数 量	単 位	単 価	金 額	備 考
コンクリート管φ300×1.8m	6	本	316TK	1896TK	
ブロック積	09	m <sup>3</sup>	1172	1055	
掘削	180	m <sup>3</sup>	15	270	
埋戻	166	m <sup>3</sup>	8	133	
特殊作業員	06	人	70	42	
普通作業員	06	人	35	21	
計				3417	

横断暗渠(パイプ)タイプP-III 1ヶ所当り単価表

一金 4,397TK

(単価番号 11号)

名 称	数 量	単 位	単 価	金 額	備 考
PC管φ300×1.8m	7	本	316TK	2212TK	
ブロック積	09	m <sup>3</sup>	1172	1055	
掘削	467	"	15	701	
埋戻	458	"	8	366	
特殊作業員	06	人	70	42	
普通作業員	06	人	35	21	
計				4397	

横断暗渠(スラブ)タイプB-I 1ヶ所当り単価表

一金 52,066TK

(単価番号 12号)

名 称	数 量	単 位	単 価	金 額	備 考
鉄筋コンクリート	68	m <sup>3</sup>	1868TK	12702TK	
捨て "	20	"	1448	2896	
ブロック積	206	"	1172	24143	
鉄筋 φ16	4121	kg	19	7830	
" φ12	1359	"	19	2582	
掘削 入門	85	m <sup>3</sup>	15	1275	
埋戻し "	43	"	8	344	
残土処理 " 0=20m	42	"	7	294	(人力盛土単価)
計				52066	

横断暗渠(スラブ)タイプB-II 1ヶ所当り単価表

一金 42,625TK

(単価番号 13号)

名 称	数 量	単 位	単 価	金 額	備 考
鉄筋コンクリート	53	m <sup>3</sup>	1868TK	9900TK	
捨て "	16	"	1448	2317	
ブロック積	170	"	1172	19924	
鉄筋 φ16	3205	kg	19	6090	
" φ12	1057	"	19	2008	
掘削	1050	m <sup>3</sup>	15	1575	
埋戻し	730	"	8	584	
残土処理	324	"	7	227	
計				42625	

横断暗渠(スラブ)タイプB-III 1ヶ所当り単価表

一金 89,912TK

(単価番号 14号)

名 称	数 量	単 位	単 価	金 額	備 考
鉄筋コンクリート	125	m <sup>3</sup>	1868TK	23350TK	
捨て "	37	"	1448	5358	
ブロック積	343	"	1172	40200	
鉄筋 φ16	7601	kg	19	14442	
" φ12	2506	"	19	4761	
掘削	794	m <sup>3</sup>	15	1191	
埋戻し	542	"	8	434	
残土処理	252	"	7	176	
計				89912	

表11-5 数量一覧表

名 称	規 格	単 位	数 量	備 考
1. 圃場造成工事				
掘削押土	ブロック O-1	m <sup>3</sup>	4,605	L=53m A=1.0ha
	"	"	2,000	表土扱 L=25m (a=1.0ha d=0.1m)
	O-2	"	3,898	L=47 A=1.0"
	U-1	"	1,462	L=45 A=1.0"
	"	"	1,000	表土扱 L=25m (a=0.5ha d=0.1m)
	U-2	"	3,991	L=55" A=1.0"
	U-3	"	2,669	L=55" A=1.0"
	U-4	"	3,992	L=45" A=1.0"
	U-5	"	-	土工は0-1に含む A=0.3"
	U-6	"	-	土工は0-2に含む A=0.4"
	U-7	"	-	土工は0-4に含む A=0.3"
	U-8	"	3,604	L=44m A=0.8"
	幹線道路取付部	"	440	L=60 -
	8号支線 "	"	470	L=100 -
	計		28,131	L=48 A=7.8ha
整地仕上・耕起		ha	7.8	
2. 道路工事				
幹線道路	B=7.0m	m	1,054	土工事は圃場造成工に含む
支線道路	B=4.0m	"	1,195	
3. 用水施設工事				
井戸	L=110m φ550	カ所	1	
調整池	V=1500m <sup>3</sup>	"	1	堤体の盛土はU-1ブロックより運搬
ポンプ場	3.75×4.75m	"	1	レンガ造り
管路埋設		式	1	φ150-336m φ75-1104m φ50-95m
4. 排水施設工事				
圃場排水路(畑)		m	1,720	
横断 渠工	タイプP-I	カ所	3	コンクリート管 φ300
"	P-II	"	4	" "
"	P-III	"	1	" "
"	B-I	"	1	ボックスカルバート
"	B-II	"	1	"
"	B-III	"	1	"

表1.1-6 供与資材費

27,755,000 円

名 称	数 量	単 位	単 価	金 額	摘 要
1. 井戸用資材	1	式		1677000円	
2. 調整池回り配管	1	"		889000	
3. 管路資材	1	"		4277000	
4. ポンプ	1	"		16855000	
5. 圃場施設	1	"		3957000	スプリンクラ-セット
計				27755000	

井戸用パイプ 資材費明細書

1,677,000 円

名 称	数 量	単 位	単 価	金 額	摘 要
ケ-ミングパイプ $\phi=5.5m$ /本	17	本	45000円	765000円	
スクリーン $\phi=5.5m$ /本	4	"	150000	600000	
計			∴	1365000	
輸送費			∴	312000	
計			∴	1677000	

## 調整池廻り配管 資材費明書

989,000 円

名 称	数量	単位	単 価	金 額	摘 要
スクリーン#5m/m 1.4m×1.4m	10	式	50000円	50000円	
" #5m/m φ 800m/m	10	"	30000	30000	
ラップ管 φ 200, SGP	1	ヶ	1760	1760	
制水弁 φ 200 鋳鉄	1	"	52500	52500	
φ 150 "	1	"	32100	32100	
SGP 直管 φ 200	245	m	4100	100450	
" " φ 100	365	"	1890	68885	
" 1 F 短管 φ 200	3	ヶ	5320	15960	
曲管 90° φ 200 フランジ	1	"	4580	4580	
φ 200 溶接	1	"	3360	3360	
φ 100 ネジ	1	"	705	705	
22 1/2° " "	2	"	530	1060	
11 1/4° " "	2	"	460	920	
エルボ " "	1	"	705	705	
塩ビ管 (VP) φ 200 TS	574	m	2512	144180	
" φ 150 "	200	"	1692	33840	
Tee φ 200 "	2	ヶ	13000	26000	
フランジ短管 SGR φ 200	3	"	13300	39900	
φ 150	1	"	5700	5700	
M F joint φ 200	1	"	17700	17700	
φ 150	1	"	12300	12300	
TS ソケット φ 200-φ 150	1	"	8100	8100	
曲管 22 1/2° VP φ 200	2	"	8320	16640	
" 1/4° VP φ 200	2	"	6700	13400	
計				680853	
輸送費				308000	
合 計				988853	
改め				989000	

管路資材費明細書

(現地調達分)

2,883,000 円

名 称	数 量	単 位	単 価	金 額	摘 要
PUC C-Glass Pipe 6" -C	336	m	381 TK	128016 TK	
3" -C	104	"	106	117024	
PUC 2" -C	96	"	57	5472	
PUC Sochet 6"	92	ヶ	155	14260	
3"	304	"	38	11552	
2"	27	"	21	567	
PVC Bend 6" × 90°	1	"	358	358	
3" × 90°	1	"	87	87	
3" × 45°	2	"	79	158	
3" × 22° 1/1	1	"	67	67	
3" × 11° 1/4	1	"	59	59	
PVC Tee 6" × 3" × 6"	8	"	352	2816	
3"	1	"	134	134	
3" × 2" × 3"	17	"	110	1870	
PVC・Reducen 3" × 2"	9	"	38	342	
エルボ 2"	26	"	25	650	
GAS Pipe 2"	40	m	121	4840	
計				288272 TK	
				288300 円	



管路資材費明細書

(日本から資材供与分)

1,394,000 円

名 称	数量	単位	単 価	金 額	摘 要
ドレッサー継手 φ75×50	23	ヶ	4452円	102396円	
LAソケット φ50	26	"	191	4966	
給水パイプ φ50	49	"	12500	612500	
ゲートバルブ φ150	1	"	32100	32100	
" φ75	8	"	12100	96800	
ソケットフランジ φ150	2	"	10100	20200	
" φ75	16	"	6800	108800	
ドレッサー継手					
接着機	20	kg	2000	40000	
計				1017162	
				1169000	資材増 15%
輸送費				225000	
計				1394000	

ポンプ資材費明細書

16,885,000 円

名 称	数 量	単 位	単 価	金 額	摘 要
深井戸水中ポンプ			円	円	
水中ポンプ100φ×5×18.5KW 1.2m/m×60m-1台	1	式		4565000	
手元開閉器屋外スタンド型	1	函		215000	
制御盤 220V×3φ4W	1	面		955000	
梱包費	1	式		250000	
小 計				5985000	
加圧ポンプ					
ウズ巻ポンプ100φ×180×15KW 1.2m <sup>3</sup> /m×39m	1	式		2500000	
制御盤	1	"		1385000	
梱包費	1	"		125000	
小 計				4010000	
電力ケーブル					
鋼体外装直埋ケーブル150m <sup>2</sup> /m4w220	600	m	9000	5400000	
" 95 " "	60	"	6000	360000	
制御ケーブル	1	式		100000	
梱包費	1	"		700000	
小 計				6560000	
計				16555000	
輸送費	1	式		330000	
合 計				16885000	

圃場施設資材費明細書  
(スプリンクラーセット)

3,957,000 円

名 称	数 量	単 位	単 価	金 額	摘 要
移動式アルミ管2ライン1セット当り			円	円	
取水キャップφ50	1	個	22400	22400	
取水ホース " φ=1.0m	1	本		6000	
アルミニウム管φ50接続接手付 φ=4.5m	4	"	10200	40800	
" φ50 φ=6.0m	6	"	11600	69600	
" φ50立上り接手付 φ=6.0m	8	"	12500	100000	
アルミニウム φ20 三脚付 立上り管 φ=1.0m	8	"	5200	41600	
スプリンクラー	8	個	4800	38400	
チーズカップラーφ50	1	"	12800	12800	
バンドカップラーφ50	2	"	6900	13800	
エンドプラグ φ50	3	"	2500	7500	
圧力計	1	"	5700	5700	
パッキングの予備					
立上り用	8	個	240	1920	
カップラー用	23	"	550	12650	
接手U-パッキング	1	"	150	150	
分水用	1	"	400	400	
計				373720	
10セット	1	式		3737200	予備1セット含む
輸送費	1	式		220000	
合 計				3957200	
改 め				3957000	

表 11-7 供与資材数量一覧表

名 称	規 格	単 位	数 量	備 考
1, 深井戸				
ケーシングパイプ	φ 250	m	90	
ストレーナー	φ 250	m	20	
	φ 50 x 4.0m	m	96	
2, 調整池廻り配管材				
スクリーン	# 5mm 1.4 x1.4	式	1	
"	# 5mm φ 800	"	1	
ラツハ管	φ 200 SGP	ヶ	1	
制水弁	φ 200 鑄鉄	"	1	
	φ 150	"	1	
SGP 管	φ 200	m	24.5	
	φ 100 ネジ付	"	36.5	
IF短管	φ 200	ヶ	3	
曲管 90°	φ200 フランジ付	"	1	
	φ200	"	1	
	φ100 ネジ付	"	1	
22° 1/2	φ100	"	2	
11° 1/4	φ100	"	2	
エルボ	φ100	"	1	
塩ビ管 (VP)	φ200	m	57.4	
(#)	φ150	m	20.0	
(Tee)	φ200	ヶ	2	
フランジ短管	SGP φ200	"	3	
	SGP φ150	"	1	
MF ジョイント	SGP φ200	"	1	
	SGP φ150	"	1	
TS ソケット	φ200 x φ150	"	1	
曲管 22° 1/2	VP φ200	"	2	
11° 1/4	VP φ200	"	2	

名 称	規 格	単 位	数 量	備 考
3. 管路資材				
硬質塩ビ管	φ150 x 4.0m	m	336	
(直管)	φ 75 x 4.0m	m	1104	
	φ 50 x 4.0m	m	96	
TSソケット	φ150	ヶ	92	10%増
	φ 75	・	304	
	φ 50	・	27	
曲管	φ150 x 90°	ヶ	1	
	φ 75 x 90°	・	1	
	φ 75 x 45°	・	2	
	φ 75x22°1/2	・	1	
	φ 75x11°1/4	・	1	
ドレツサーチーズ	φ 75 x 50	ヶ	23	
T字管	φ150 x 75	・	8	
	φ 75 x 75	・	1	
	φ 75 x 50	・	17	
片落管	φ 75 x 50	・	9	
LAソケット	φ 50	・	26	鋼管-塩ビ管
エルボ	φ 50	・	26	
鋼管	φ 50	m	40	
給水バルブ	φ 50	ヶ	49	
スルースバルブ	φ150	・	1	
	φ 75	・	8	
ソケットフランジ	φ150	・	2	
	φ 75	・	16	
4. ポンプ				
深井戸水中ポンプ		セット	1	
加圧ポンプ		・	1	
5. ホ場施設				
スプリンクラーセット		セット	10	1セット当り資材は明細書参照



採集地





~~参 考 资 料~~

資料-1. REQUEST FOR JAPANESE TECHNICAL AND FINANCIAL ASSISTANCE

1. Project Title: Strengthening of Institute of Postgraduate Studies in Agriculture (formerly Bangladesh College of Agricultural Sciences, BCAS), Salna.
2. (i) Sponsoring Organization: Agriculture & Forests Division
- (ii) Administrative Ministry: Ministry of Agriculture
- (iii) Executing Agency: Institute of Postgraduate Studies in Agriculture (IPSA), Bangladesh Agricultural Research Institute (BARI).

A. TECHNICAL ASSISTANCE

3. Estimated Cost (in lakh Taka/lakh US dollars) with Annual Phasing\*: (Details of annual phasing are shown in Annexure)

	1st Yr.	2nd Yr.	3rd Yr.	4th Yr.	5th Yr.	Total
(i) Total (Lakh, Tk)	1,206.25	705.25	352.75	185.50	148.00	2,597.75
(Lakh, US\$)	(48.25)	(28.21)	(14.11)	(7.42)	(5.92)	(103.91)
(ii) Foreign exchange	981.00	592.75	315.25	185.50	148.00	2,222.75
	(39.25)	(23.71)	(12.61)	(7.42)	(5.92)	(88.91)
(iii) Project aid	981.00	592.75	315.25	185.50	148.00	2,222.75
	(39.25)	(23.71)	(12.61)	(7.42)	(5.92)	(88.91)
(iv) RPA	-	-	-	-	-	-
	(-)	(-)	(-)	(-)	(-)	(-)
(v) CDST**	225.00	112.50	37.50	-	-	375.00
	(9.00)	(4.50)	(1.50)	(-)	(-)	(15.00)

\* Figures in the parenthesis indicate estimated cost in US dollars.

\*\* IPSA being an academic institution it is expected that most of the equipment will be exempt from taxes and duties as per UNESCO agreement.

4. Implementation Period:

(i) Commencement: July 1985

(ii) Completion: June 1990

5. Project Objectives & Justification: Enclosed herewith.

6. Provision in

(i) Five year Plan:

(ii) ADP:

7. Financing Arrangement:

a. Local cost	<u>Amount</u>	<u>Source</u>
	375.00	GOB
	(15.00)	
b. Foreign Exchange	2,222.75	Govt. of Japan
	(88.91)	

8. Project Components:

Components of the sub-project/program indicating estimated cost thereof:

	<u>Estimate Cost</u> <u>(in lakh US dollars)</u>		
	<u>F.E.</u>	<u>Taka</u>	<u>Total</u>
a. Consultant service (list enclosed)	9.36	-	9.36
b. Training (list enclosed)	22.60	-	22.60
c. Equipment, farm implements, glass- wares, teaching aid materials, vehicles, chemicals, etc. (list enclosed)	21.00	-	21.00
d. Others (i + ii)	49.55	-	49.55
i. Physical facilities and in- frastructure development:			
a. Land development and installation of irrigation systems for IPSA experimental farm	16.00	-	16.00
b. Peripheral drainage and internal road communication	2.00	-	2.00
c. Experimental facility develop- ment including field laboratories, central pivot irrigation system, threshing floors, farm house, greenhouse, glasshouse, growth chambers etc.	9.5	-	9.5

d. Conversion of groundfloor of class room building into five laboratories through necessary modifications	0.65	-	0.65
e. Provision of emergency standby electricity for laboratories, greenhouse, sensitive equipment (200 KVA capacity)	2.40	-	2.40
f. Provision of books, journals, and equipment (e.g. microfilm and microfiche readers, etc.) for IPSA library	3.00	-	3.00
g. Provision for equipment and machinery for maintenance workshop	0.50	-	0.50
h. Office equipment & general supplies	0.50	-	0.50
ii. COST	-	15.00	15.00

Note: Conversion rate 1 US dollar = Tk.25.00.

Annexure. Statement showing phasewise estimated cost involved in Technical Assistance components. (in lakh TK/US dollars)

	<u>Yr. 1</u>	<u>Yr. 2</u>	<u>Yr. 3</u>	<u>Yr. 4</u>	<u>Yr. 5</u>	<u>Total</u>
a. Consultant service	28.00 (1.12)	56.25 (2.25)	56.25 (2.25)	65.50 (2.62)	28.00 (1.12)	234.00 (9.36)
b. Training						
Foreign training	113.00 (4.52)	113.00 (4.52)	113.00 (4.52)	113.00 (4.52)	113.00 (4.52)	565.00 (22.60)
Incountry training	7.00 (0.28)	7.00 (0.28)	7.00 (0.28)	7.00 (0.28)	7.00 (0.28)	35.00 (1.40)
c. Equipment, farm implements, etc.	315.00 (12.60)	157.50 (6.30)	52.50 (2.10)	- (-)	- (-)	525.00 (21.00)
d. Others						
i. Physical facilities	518.25 (20.73)	259.00 (10.36)	86.50 (3.46)	- (-)	- (-)	863.75 (34.55)
ii. CDST	225.00 (9.00)	112.50 (4.50)	37.50 (1.50)	- (-)	- (-)	375.00 (15.00)

## 9. Project Objectives and Justification

### Project objectives:

To impart training to postgraduate students leading to MS and PhD degrees through fundamental and applied research in the various disciplines of Agriculture, organize short courses for research scientists and extension personnel and conduct basic research to the extent required for backstopping applied research of various crop research institutes.

### Justification:

Higher education in agriculture was initiated in Bangladesh with the establishment of the then Bengal Agricultural Institute (BAI) at Dhaka in 1938. Till 1961, BAI was the sole educational institution offering BS degree in Agriculture in Bangladesh. In view of increased demand for agricultural education, Bangladesh Agricultural University was established in Mymensingh in 1961. Major thrust of BAI and BAU has been undergraduate studies although provision for higher education leading to MS degrees had been created to cater to such needs. BAI started postgraduate studies in agriculture leading to M.Sc. Ag. in the arly fifties while BAU started the postgraduate program with its own graduates in 1966. However, for various reasons, the program never gained confidence enough to attract students for degrees beyond M. Sc. Ag. Higher education leading to MS or PhD in the various fields of agriculture, therefore, stagnated.

There is a shortage of MS and PhD level trained manpower to implement the various agricultural research and educational programs of the country. Bangladesh is depending mostly on foreign donors for postgraduate studies/training in agriculture requiring substantial financial involvement. Moreover, committments towards such support are also uncertain.

The institute, if provided with adequate facilities and support will be able to offer such higher training at much lesser cost. A large number of highly qualified scientists from BARI and BRRRI are available on part time basis to teach and supervise thesis research of MS and PhD students.

The IPSA will remain under the administrative control of BARI while it follows the academic programs of BAU at least for the first few initial years. As per original project proposal approved by the Planning Commission, it is envisaged that the IPSA (former BCAC) will eventually turn to be a fullfledged institution of higher agricultural education with its own curriculum.

The IPSA now offers graduate courses in seven departments viz. Agronomy, Horticulture, Genetics and Plant Breeding, Soil Science, Entomology, Plant Pathology, and Crop Botany. Similar programs are being planned for Agricultural Extension. A batch of 40 M.Sc. Ag. students in various fields of agriculture, originally enrolled in BAI but later on transferred to IPSA, have just completed their final examinations. Regular classes of the second batch of 84 students for 1982 - 83 academic session started on September 17, 1984.

In addition to trained MS and PhD level students, IPSA will conduct fundamental research aiming at strengthening the applied research activities of BARI, BRRRI and other similar organizations as feed-back mechanism. It will also conduct specialized training programs for research and extension personnel.

The Institute owns about 80 hectares of land for establishing experimental farm and residential, dormitory and other ancilliary facilities. The land has been cleared from forest and it will take time and effort to build it into an experimental farm. However, till it is ready for experimentation, the facilities in BARI and BRRRI can be utilized for the purpose of graduate students and faculty. The laboratory space is highly inadequate for changed situation. For running the graduate program effectively laboratory facilities need to be extended and well equipped. Likewise, greenhouse and glasshouse facilities for controlled environment studies will have to be created.

Agricultural production principles and problems are location specific. Higher training, particularly at postgraduate level in developed countries with dissimilar climate, crops, and management factors frequently turn out to be less than effective and without any direct bearing on Bangladesh problems. In-country MS and PhD programs, therefore, can benefit us on both these counts. Complexities in agricultural production processes and rapid expansion of national agricultural research capabilities in Bangladesh during the past few years accentuated the need for such highly trained technical manpower.

The Bangladesh College of Agricultural Sciences (BCAS) was initially established to produce BS level graduates with emphasis on postgraduate programs. Before it became functional, another agricultural college at Dumki, Patuakhali got started with the first batch of students admitted in 1979. With BAU, BAI and Dumki Agricultural College, all offering undergraduate programs and having the capacity to meet the annual demand for agricultural graduates within the country, the BCAS lost its thrust in the undergraduate program.

In the backdrop of a stagnated higher agricultural educational program unable to cater to the needs of the country, a meeting of the representatives of BARI, BAU and the Ministry of Agriculture was held on October 3, 1983 which recommended the transformation of BCAS into a graduate school named the "Institute of Postgraduate Studies in Agriculture" (IPSA) to offer MS and PhD programs in the various disciplines of Agriculture thereby deleting the undergraduate program. It is to be noted here that the Martial Law Committee on Reorganization of various institutes/organizations examined the new set up and formally approved it. This has also received the final approval from the CMLA and the President of the country.

IPSA therefore aims at offering formal graduate programs on various aspects of agricultural sciences designed on the basis of agroecological and socioeconomic factors prevailing in Bangladesh.

A technical assistance program was being considered by the Japan Government based on undergraduate requirements mainly. In view of the change in the emphasis and objectives of the project, it is now desirable that the entire project be reviewed and the requirements be modified and or extended as needed. The original project plan contains serious gaps and omissions especially in view of new developments. It is therefore essential that necessary facilities in the form of expert services, physical facilities and manpower development are provided to enable the IPSA to serve its purpose fully.

It may be mentioned here that the Japanese Government has shown keen interest in providing IPSA with all necessary technical aid. Several high powered Japanese Missions visited IPSA recently and through of process of elaborate discussions with various officials of the Ministry, with all such facilities. A copy of their letter of intention to this effect which has been communicated to the Bangladesh Govt., is also attached herewith.

#### 10. Provision for Counterpart Personnel

The expatriate consultants will work in cooperation with the scientists of the IPSA in respective disciplines. The head of the department in which the expatriate consultant will work will be responsible for acting as local counterpart.

#### 11. Outcome of the Project

The project envisages to produce highly qualified technical manpower. There will be about 100 M.Sc. (Ag.) and Ph.D. graduates passing out from IPSA every year who will in turn be absorbed in the various crop research institutes. This will eventually reduce the dependence on foreign countries for manpower development and also enable Bangladesh to produce required technical manpower at a much reduced cost.

- (a) What other preliminary work on T.A. programs in the same subject area had been implemented in the past:

The Institute of Postgraduate Studies in Agriculture (IPSA) has been established converting the former Bangladesh College of

Agricultural Sciences (BCAS) at Salna. The BCAS project was approved by the Planning Commission for 5 years and incorporated in the SFYP as a core project. Meanwhile, the Martial Law Committee on Reorganization has reviewed the project and the modification and transformation of BCAS to IPSA has been approved. The physical facilities of BCAS (now IPSA) had been provided by Japanese Govt. and further technical assistance in the light of the modification and transformation of BCAS is being considered by the Japanese government.

(b) If T.A. preliminary work on program already implemented in the past, give justification for the present project.

The BCAS was established mainly to impart teaching undergraduate with emphasis on postgraduate studies. Physical facilities including laboratories can cater to the needs of undergraduate teaching only. The project has been reviewed and BCAS has been converted to IPSA and the objectives modified. The major thrust of the IPSA is to impart graduate training and conduct fundamental research related to applied research being carried out at the crop research institutes. The physical facilities already developed at IPSA are not adequate to run the academic programs leading to M.Sc. (Ag.) and Ph.D. degrees. Additional infrastructures like greenhouse, glasshouse, irrigation systems, etc. need to be installed. Staff housing, an essential feature of any residential campus, is practically non-existent. Equipment so far received for the BCAS are highly inadequate and in most cases not suitable for running the projected activities of the IPSA.

It is against this backdrop that a revised proposal has been prepared and the Government of Japan has indicated its willingness to fund the project in the form of Technical Cooperation and Grant Assistance to make the institute fully functional.



Foreign Training Requirements for the Institute of Postgraduate Studies (IPSA)  
 Scientists showing the area of specialization

Department/Section	Academic Degree Program Ph.D	Postdoctoral Fellowship/Visiting Professorship with Area of Specialization (max. 1 year)
Agricultural Extension Education	1- Extension education	
Agronomy	1- Agricultural climatology 1- Weed science	1- Irrigation agronomy 1- Crop production including cropping systems 1- Crop ecology 1- Minimum tillage
Crop Botany	1- Plant taxonomy 1- Crop physiology	
Entomology	1- Entomology (taxonomy)	1- Integrated management 1- Biological control of insect pests
Genetics & Plant Breeding	1- Biometrical genetics 1- Vegetable breeding	1- Drought resistance 1- Plant breeding 1- Tissue culture 1- Gene bank operation
Horticulture	1- Pomology 1- Vegetable production (olericulture)	1- Micropropagation 1- Fruit preservation 1- Hybrid technology
Plant Pathology	1- Seed pathology 1- Virology	1- Plant disease control 1- Quarantine technology
Soil Science	1- Soil management 1- Geology	1- Soil microbiology 1- Organic matter depletion in deficient soil

(c) How the outcome (report, design, etc.) of the project is to be translated into future action plan program?

Basically, this is an educational project aiming to produce quality manpower for equipping the expanding agricultural research organizations. In the long run, the project will help strengthen the agricultural research system of the country. This will also assist in solving the fundamental problems hindering agricultural production.

Expatriate Consultants Requirement

	No. of Experts	Priority	Man/ Months	Project Year	From
Agricultural Extension Education	1	1	36		USAID
Agricultural Climatology	1	2	24	III, IV, V	Japan
Soil-plant-water-relationship (Agronomy) (Plant physiology, Agronomy, Soil physique, Agri. Engineering etc. )	1	1	36	I, II, III	Japan
Plant Taxonomy	1	3	36	III, IV V	Japan
Insect Rearing & Maintenance	1	4	24	IV, V	Japan
Tissue Culture (Breeding, Horticulture)	1	5	12	I, II	Japan
Farm Machinery (Operation and Maintenance at technician level.)	1	3	12	I, II	Japan
Greenhouse & Glasshouse (Construction expert)	1	1	12	IV	Japan
Plant Pathology	1	2	36	II, III, IV	Japan
Horticulture (Fruits)	1	2	36	II, III, IV	Japan
Soil Management	1	2	30	II, III, IV	Japan
Farm Construction (Supervising construction)	1	1	12	I ( during construction)	Japan

Internal Training for Researchers, Extension agents, Farmers etc.

Title	No. of Participants	No. of Trainings per Year
1. Training on research methodology & orientation for researchers (1 - 2 weeks)	50	1
2. Training of extension agents (1 week)	50	4
3. Training of farmers on improved technology (1 week)	50	4
4. In-country training leading to MS & PhD	10	MS=7 Ph.D-3

## 12. Justification for Equipment/Facilities for Various Departments

Thrust of the institute of Postgraduate Studies in Agriculture (IPSA) is primarily directed towards producing quality manpower who will eventually be absorbed in the agricultural research systems in Bangladesh. Keeping that in view, besides formal class room teaching, major emphasis is given on thesis reserach being carried out by the graduate students. Producing thesis based on original research is a prerequisite for the candidates of M.S. and Ph.D. degrees. Fundamental research in agriculture involves a good number of major and minor disciplines.

For carrying out meaningful research very often multidisciplinary approach is necessary. Hence building up of laboratory facilities is prerequisite to developing an effective academic program for an institution like IPSA.

Requirement of equipment for graduate studies (leading to M.S. and Ph.D.) is obviously different from that of undergraduate program. Undergraduate courses require basic equipment mostly for demonostrat- tion and trial only. But the graduate program demands sophisticated and precision equipment. Quality and standard of most of the equipment so far received for the erstwhile BCAS under Japanese assistance program is not commensurate with the requirements of graduate studies being pursued in IPSA.

The university (BAU) sets some general outlines of the theoretical courses for various disciplines in its syllabi; but such frameworks for thesis research are not or cannot be provided. Usually the student in consultation with the supervisory committee takes up researchable problem that interests him and at the same time has academic value. In most cases the thesis research contribution towards understanding fundamental aspects of applied research. Doing research for more academic interest is also not uncommon.

(a) Agronomy

Agronomy department covers a number of minor disciplines like crop management, crop productivity, irrigation agronomy, cropping systems, plant nutrition and fertilizer management, soil-plant-water relationship, seed physiology and technology, crop physiology etc. Student strength in agronomy department remains highest every year. It is desirable that while developing graduate research program in agronomy, provision should be made so that students should have enough access to work in any of the areas mentioned above. Moreover, agronomy laboratory needs to be equipped to such an extent that it can cater to needs of basic research as per mandate of the institute. The department has already taken up research programs covering soil-plant-water relationships and inter and intraspecific plant competition in community levels. Over time, the program will gradually expand and more areas will be covered.

In addition to the already existing equipment (highly inadequate), to meet the minimum requirement of the department some additional equipment have been listed under serial number 1 through 150. The items have been carefully selected in order to avoid duplication. Two items of same or similar purpose or capacities are not included. Some of the equipment can be used by multidisciplinary scientists. For example, items under serial numbers 14, 15, 16, 17, 27, 38, 39, 47, 42, 53, 54, 93, 94, 95, 98, 88, etc. can be used jointly by the students of agronomy and crop botany (crop physiology). Similarly, varieties of equipment referred to in the list under agronomy department can be used by soil science group or horticulture group. Those equipment have not been shown again under soil science or crop botany departments. In fact, separate list for crop botany dept has not been included as both the departments will use the similar equipment. Similar relationships do exist among other disciplines and while listing the equipment, this particular aspect has not been overlooked.

In addition to the common facilities listed under Agronomy, some specific equipment & facilities are needed for individual disciplines departments, lists of which have been included in the project proposal.

(b) Genetics & Plant Breeding

Although the M.Sc. (Ag.) syllabus for the Department of Plant Breeding and Genetics does not contain any practical paper but each and every students must have to conduct research work for their thesis. The teachers of this department have, and will have to conduct, some basic and fundamental research for the academic as well as national interest. To start and continue Plant Breeding and Genetics oriented research i.e. for cytogenetics, cytology and embryological study the department of Plant Breeding and Genetics of IPSA needs the following equipment (also listed in the equipment list).

1. Research Photomicroscope with phase-contrast, Fluorescent interference accessories, drawing visual attachments etc.
2. Fluorescent Microscope
3. Compound Microscope
4. Simple Microscope (Toshiba Illuminator with filters)

For emasculation and pollination the following items are essential:

1. Forceps (Very fine)
2. Scissors (Very fine)
3. Needle
4. Pollen duster
5. Air suction pump (High speed)
6. Magnifier (High and low power & goggles type magnifier)
7. Razor for dissection (Self-explanatory)

This department handles germplasm of different crops, of which seeds hold to be conserved in polyethylene bag or aluminium foil which need to be sealed. For this purpose one aluminium polyethylene sealer is essential.

For quality test of breeding materials without damaging the seed, one NMR (Nuclear Magnetic Resonance) is very much essential in this department.

35 mm camera with macro attachments (close up photography), attachment for microphotography (Nikon/Canon) will be very much helpful in taking pictures of small & large specimen/experimental materials. This department deals with germplasm from indigenous and exotic sources. Some of the plant materials need to grow in the growth chamber under a particular environment. Sometimes some plants need more than one environments to grow successfully for which growth chamber as well as phytotrons are essential.

Since this department runs and hope to run with many students and teachers, most of the equipment should be multiple in number as listed in the equipment list.

#### (c) Horticulture

Besides regular courses, each student for postgraduate programme has to submit a thesis/dissertation in the partial fulfilment of the degree. A systematically designed research programme needs to be carried out by the student himself under the guidance of supervisor. The horticultural discipline includes the widest range of crops grouped under vegetables, fruits and ornamentals. The main research thrust of horticulture program is to standardize propagation methods, develop cultural practices, and evolve/screen varieties that eventually lead to higher production. Besides, some basic research for backstopping applied research of different horticultural crop needs to be done. In addition of supervising students, faculty member of the department needs to conduct different research programme including both fundamental and applied research. The equipment



listed under 'Horticulture' title are not the exhaustive one but some basic needs for a horticulture laboratory. These will aid in doing different activities in relation to experimental purpose and demonstration. Further, many equipment listed under other department if procured will be of much help in doing different research activities. In order to develop micropropagation technique for different horticultural crop, establishment of a tissue culture laboratory with modest facilities is needed.

(d) Soil Science

Biological nitrogen covers a major part of soil microbiology. A Gas Chromatography equipment is most essential for this purpose. To measure the total nitrogen amount in soil, plant, etc. the Kjeldshl method is universal. A vapour distillation apparatus and a digestion apparatus is highly needed. Fume hoods is essential for the installation of digestion chamber. The direct method for the measurement of nitrogen fixation is the  $^{15}\text{N}$  technique. For the separation of  $^{15}\text{N}$  and  $^{14}\text{N}$  gas from a sample, an Emission spectrometer must be used. As soil microbiology deals with different microorganisms the sterile works with specific microbes has to be done under air flow chamber. Syringes, Dispensette, adjustable pipettes, shaking unit, incubator, bacterial counts chamber ultracentrifuge, pipettors, etc. will be urgently needed for different microbiological works. A combititrator (for automatic titration) is essential for the assessment of the exact amount of titration. Burettes are not sufficient. A high pressure liquid chromatography is used in various complex analytical methods. Different substances can be detected and the quantity can be measured, i.g., analysis of different amino acids. A fermenter should be used for the production of bacterial culture in large quantities as inoculum, which will be needed in different experiments.

Other mentioned items will also be of invaluable use for different microbiological works, which will be essential for the students as well as for the teachers and certainly for our national interest and its development.

(e) Entomology

Department of Entomology, Institute of Postgraduate Studies in Agriculture (IPSA), immediately needs the enclosed laboratory equipments to run different research work and practical classes as outlined in the curriculum layout for degree of M.Sc. (Ag.) in Entomology.

Metler H-80 analytical balance, compressed air hand sprayer, Knapsack sprayer, hand midget duster, manual sprayer, hand grip sprayer sartomius 1264 PM electric balance, etc. will be needed for biological assay studies, other insecticidal and microbial pesticides studies.

Mass rearing of any economically important pest is the prerequisite for host-plant resistance studies, development of a sound rearing technique, bio-assay studies, life history studies, etc. This kind of work is most essential to impart practical training to the postgraduate students to handle the field oriented problems. As such the department needs a mill grinder, refrigerator, waring blender, magnetic stirrer, climate control cabinet, hand push spreader, insect rearing incubator, rearing containers, rearing canisters, rearing tubes, insect rearing boxes, insect breeding equipments, museum collecting boxes and a freeze dryer.

A set of battery operated black light and lighting moth collectors are needed for pest surveillance, forecasting and monitoring system.

Grain moisture tester, corn sheller, etc. will be used for the studies of stored grain pests.

Disecting equipment sets will be necessary to run practical classes on preparation of slides of insect muscle, nerve blood and tracheae, identification of disease specimen, etc.

(f) Crop Botany

Course contents of Crop Botany mostly cover crop physiology and Plant taxonomy. Student pressure in this department seems to be relatively low; but even with minimal student strength, department needs well equipped laboratory facilities.

(g) Plant Pathology

The equipment listed under this department is needed for carrying out research works in mycology, mematology, bacteriology, virology, etc. The SEM will also be used by other departments as well.

(h) Common Service Facilities related to Research and Experimentation

Peripheral drainage:

IPSA farm land was cleared from an undulating forest land intersperse with low flat lands serving as drainage avenue for the entire hinterland from west. There is a gradient is slope from west to east with a difference of about 2.8 meters from highest to the lowest point. During monsoon (6 - 7 months per year) rain water from the western highlands flows through the farm and fresh flood is a common feature almost every year.

For establishing IPSA farm, run off water from the neighbouring fields needs to be effectively controlled. The internal irrigation and drainage systems planned for the farm cannot cater to such exigencies. The peripheral canal can serve as the drainage of this huge runoff thereby allowing a planned land development of IPSA farm. Additionally, for growing crops in the dry season. This canal can also serve as a emergency irrigation supply source for the farm, should there be a failure in the internal irrigation system.

#### Growth Chamber:

This facility is needed to conduct precision scientific experiments requiring critical control of environmental parameters.

#### Generator 200 KVA:

Electricity failure is a common phenomenon in Bangladesh and this seriously hampers any sophisticated research in the laboratory or even in the field. A standby electricity generator is essential to provide continued electricity to prevent huge wastages in terms of manpower, effort, time and money. The rated capacity of the generator has been fixed considering the future needs of the campus.

#### Field Laboratories:

Experimental plant and soil samples taken from the fields need processing before analysing in the laboratory. Quantum of the samples, however, depends on the nature and number of experiments. When the IPISA starts at full swing, it is expected that several thousand plant and soil samples will have to be handled every year. Initial processing of the samples, recording of data, drying of soil and plant samples will be done in the field laboratory. The field laboratory will be located centrally. The field laboratory will be equipped with large dryers, balances, threshers, winnowers, storage bins & trays, etc. This will serve as the clearing house for all graduate research and faculty research programs of IPISA.

#### Farm house:

Experimental farm will be an integral part of the IPISA. When the land development is complete, there will be about 150 acres of land in the areas. Responsibility of managing land preparation and cultural management of experimental crops will be entrusted to the farm management unit headed by a farm superintendent with about 80 manpower. The office of the farm superintendent, garrage, farm machinery workshop, etc. will all be located in the same premises.

#### Greenhouse/Glasshouse:

These facilities are needed to conduct controlled environment experimentation in relatively large scale where the control requirements are not so precise as in a growth chamber study. There are many offseason experiments already planned which require such facilities and these are being seriously hampered without these facilities.

#### Covered and Open Threshing Floors:

Bangladesh has a monsoon climate with cloudy (rainy weather) persisting through a major part of the year. All threshing/drying activities remain suspended without a covered threshing floor during rainy season. The open floor provides facility for drying whenever there is sunshine available.

#### Land Development including Installation of Irrigation Systems:

The IPSA experimental farm is composed of undulating terrain with low spots serving as drainage for the entire hinterland. The land needs to be developed in a systematic manner with appropriate cross grading and block sizes convenient to research/experimentation. Furthermore, assured & controlled irrigation is a necessity for any successful experimentation. Development of irrigation system concurrently with land development is therefore very essential.

B. Grant Assistance

3. Estimated cost (in Taka/lakh US dollars) with Annual Phasing:\*

	<u>1st Yr.</u>	<u>2nd Yr.</u>	<u>3rd Yr.</u>	<u>4th Yr.</u>	<u>5th Yr.</u>	<u>Total</u>
(i) Total	514.25 (20.57)	364.75 (14.54)	226.00 (9.04)	88.50 (3.54)	-- (--)	1,103.50 (47.74)
(ii) Foreign exchange	512.25 (20.49)	360.75 (14.43)	226.00 (9.04)	88.50 (3.54)	-- (--)	1,187.50 (47.50)
(iii) Project aid	-- (--)	-- ( )	-- (--)	-- (--)	-- (--)	-- (--)
(iv) RPA	512.25 (20.49)	360.75 (14.45)	226.00 (9.04)	88.50 (3.54)	-- (--)	1,187.50 (47.50)
(v) CDST	2.00 (0.08)	4.00 (0.16)	-- (--)	-- (--)	-- (--)	6.00 (0.24)

\* Figures in the parenthesis indicated estimated cost in US dollars.

4. Implementation Period:

(i) Commencement: July 1985

(ii) Completion: June 1990

5. Project Objectives and Justification: Enclosed herewith.

6. Provision in

(i) Five year Plan:

(ii) ADP:

7. Financing Arrangement:

	<u>Amount</u>	<u>Source</u>
(a) Local cost	6.00	GOB
(b) Foreign exchange	1,187.50	Govt. of Japan

8. Project Components:

Components of the sub-project/program indicating estimated cost there of:

	Estimated costs (in lakh US dollars)		
	F.B.	Taka	Total
1) Construction of library building	3.00	--	3.00
2) Construction of godown, central store, garrage and workshop buildings	3.90	--	3.90
3) Construction of staff housing	35.40	--	35.40
4) Construction of security fencing	3.60	--	3.60
5) Construction of guesthouse	1.60	--	1.60
6) CDST	--	0.24	0.24

9. Same as technical assistance

10. Justification for the various facilities requested:

Library:

The space of the existing library built in the functional building is inadequate and location seems to be inappropriate. It is already apparent that within next 2-3 years the existing library room will not have enough space for accommodating books, journals and reading space. On the other hand, the available space of the functional building is inadequate to accommodate the supporting staff. It is proposed that the existing library space be converted to the general office space for accommodating the secretarial and other administrative staff.

A separate building for library should then be constructed

away from office and class room noises. The library is proposed to be a two-storied building with stack room in the first floor and reading room facilities in the ground floor.

Godowns:

Two godowns, one for keeping fertilizers and other similar inputs and one for keeping bulk quantity of farm produce are needed at IPSA.

Garrage/Workshop:

This facility is needed to conduct regular maintenance work of all farm machinery, vehicles and related accessories with space for keeping them overnight. The garrage space would provide for about 30 such machinery/vehicles.

Store:

There is no central storage building for keeping office equipment stationeries/laboratory equipment/glass wares etc., Such buildings need be specialized in construction & design to accommodate a large stock of wide variety of articles in a systematic manner.

Staff Housing:

The IPSA has a sanctioned strength of 200 staff of various cadres. Being located away from most urban & civil facilities, the campus needs to be self sufficient in most amenities. Staff Housing appears to be one of the topmost priorities to be developed immediately. As such provision has been requested to be made for accommodation 100% of the teaching staff and 70% of the support staff as an immediate measure. The proposed housing plan incorporates government guidelines as to floor space/amenities allowed to different categories of staff.

Security Fencing:

Since IPSA is located in an isolated place and surrounded by



occasional public dwellings, a security fencing is essential for two reasons:

- (1) to protect experimental material from grazing animals set loose by the public and.
- (2) to restrict unauthorized entries of unwanted persons with ulterior motives like theft, robbery or damage to properties.



資料- 2. PRILIMINARY PROJECT PROFORMA (PPP)

1. Project Title: Strengthening of Institute of Postgraduate Studies in Agriculture (IPSA). Formerly bangladesh College of Agricultural Science (BCAS).
2. Proposed Implementing authorities:
  - (a) Sponsoring Ministry/Division: Agriculture & Forests Division, Ministry of Agriculture.
  - (b) Executing Agency: Institute of Postgraduate studies in Agriculture(IPSA), Bangladesh Agricultural Research Institute (BARI).
3. Estimated Capital costs: in lakh Taka (lakh US dollar)
  - (a) Total 5,110.25 (204.41)
  - (b) FEC 3,410.25 (136.41)
4. Annual Recurring Expenditure: (in lakh US dollar)
  - (a) Local currency 280.00
  - (b) FEC 68.75
  - (c) Proposed mode of financing (i.e. whether GOB or other agencies or both will provide local financing) Both GOB and Govt. of Japan
5. Implementation period: 5(five) years begining from July 1985.
6. How the proposed capital investment is proposed to be recovered or be otherwise useful to the organization, sector or the economy:

The project being an academic institution it is hard to asses directly the outcome in quantitative terms. However, it is envisaged that out turn of about 100 M. Sc(Ag)/Ph.D. graduates every year will be an important input for the agricultural organizations in general. These graduates will contribute greatly towards the agricultural production in the country.

7. Whether the project is included in:

(a) Five year plan: Yes / No

(b) ADP: Yes / No

8. Major items of work:

Construction works for staff housing, laboratories,  
glass house, greenhouse ect.  
Equipment for laboratories,  
Farm infrastructure and implements,  
library development,  
Chemicals and glasswares,  
Recruitment of teaching staff and consultant services,  
Foreign training and in-country training.

9. External assistance

(a) Expected project Aid. (in lakh Taka)

Technical Assistance: 2,225.75

Grant Assistance: 1,187.50

(b) Expected Reimbursible portion of Project Aid: 1,187.50

10. (a) Whether any preliminary/  
exploratory discussion  
with any aid donor has  
taken place: Yes

(b) If yes, with whom and with  
what results: With Govt. Japan.  
Govt. Japan has shown interest  
in assisting the project in the  
form of Technical Assistance  
and Grant in Aid.

11. Whether any feasibility  
study conducted: Does not arise.

If yes, please indicate the date  
of such study and the organization/  
firm which has done the study:

12. Whether any consultants have been engaged for the project: No.  
But Japanese Govt. has been sending some teams/missions to establish/ascertain the technical aid needs of IPSA.
- If yes, please indicate the cost and man-months of such experts:
13. (a) Whether any cost has already been incurred for the scheme Does not arise.  
If yes, indicate the detailed list of items on which expenditure has been incurred with itemwise amounts of expenditure:  
(b) Please state source of financing for expenditure incurred:
14. Whether existing manpower of the Executing agency will execute the project or additional manpower will be required. In case of additional manpower requirement, indicate details with cost: Additional manpower will be required, Details given in appendix I.
15. Reasons for non-submission of the usual PP now: Regular PP is still being prepared. But donor agency requires request immediately to process at their end.
16. Date by which formal PP will be submitted to the planning Commission Before March 1985.
17. Brief description of the project indicating objectives, priority and links with sectional and/or national plans and programmes Given as Appendix II.

APPENDIX-I Details of Additional Manpower Requirements (1985-86)

Position	Number of Posts	Scale of Pay	Total Amount Needed for 5 Year Period
Professor	9	2,350 - 2,750/-	24,80,760/-
Assoc Professor	5	2,100 - 2,600/-	10,64,652/-
Asstt. Professor	11	1,400 - 2,225/-	24,81,864/-
Provost	2	500/- (fixed)honorarium	60,000/-
House Tutors	2	250/- (fixed)honorarium	30,000/-
Senior Scientific Assistants	6	470 - 1,135/-	7,85,820/-
Cafeteria Manager	1		
Fieldman	4	370 - 745/-	4,30,992/-
Electrician	2	300 - 540/-	
Plumber	2	250 - 362	8,87,761/-
Total			74,22,864/-

## APPENDIX-II

Brief description of the project indication objective, priority and links with sectorial and/or national plans and programmes

Project objectives:

To impart training to postgraduate students leading to MS and PhD degrees through fundamental and applied research in the various disciplines of Agriculture, organize short courses for research scientists and extension personnel and conduct basic research to the extent required for backstopping applied research of various crop research institutes.

Justification:

Higher education in agriculture was initiated in Bangladesh with the establishment of the then Bengal Agricultural Institute (BAI) at Dhaka in 1938. Till 1961, BAI was the sole educational institution offering BS degree in Agriculture in Bangladesh. In view of increased demand for agricultural education, Bangladesh Agricultural University was established in Mymensingh in 1961. Major thrust of BAI and BAU has been undergraduate studies although provision for higher education leading to MS degrees had been created to cater to such needs. BAI started postgraduate studies in agriculture leading to M.Sc.Ag. in the early fifties while BAU started the postgraduate program with its own graduates in 1966. However, for various reasons, the program never gained confidence enough to attract students for degrees beyond M.S.Ag. Higher education leading to MS or PhD in the various fields of agriculture, therefore, stagnated.

There is a shortage of MS and PhD level trained manpower to implement the various agricultural research and educational programs of the country. Bangladesh is depending mostly on foreign donors for postgraduate studies/training in agriculture requiring substantial financial involvement. Moreover, commitments towards such support are also uncertain.

Agricultural production principles and problems are location specific. Higher training, particularly at postgraduate level in

developed countries with dissimilar climate, crops, and management factors frequently turn out to be less than effective and without any direct bearing on Bangladesh problems. In-country MS and PhD programs, therefore, can benefit us on both these counts. Complexities in agricultural production processes and rapid expansion of national agricultural research capabilities in Bangladesh during the past few years accentuated the need for such highly trained technical manpower.

The Bangladesh College of Agricultural Sciences (BCAS) was initially established to produce BS level graduates with emphasis on postgraduate programs. Before it became functional, another agricultural college at Dumki, Patuakhali got started with the first batch of students admitted in 1979. With BUR, BAI and Dumki Agricultural College, all offering undergraduate programs and having the capacity to meet the annual demand for agricultural graduates within the country, the BCAS lost its thrust in the undergraduate program.

In the backdrop of a stagnated higher agricultural educational program unable to cater to the needs of the country, a meeting of the representatives of BARI, BAU and the Ministry of Agriculture was held on October 3, 1983 which recommended the transformation of BCAS into a graduate school named the "Institute of Postgraduate Studies in Agriculture" (IPSA) to offer MS and PhD programs in the various disciplines of agriculture thereby deleting the undergraduate program. It is to be noted here that the Martial Law Committee on Reorganization of various institutes/organizations examined the new set up and formally approved it. This has also received the final approval from the CMLA and the president of the country.

IPSA therefore aims at offering formal graduate programs on various aspects of agricultural sciences designed on the basis of agroecological and socioeconomic factors prevailing in Bangladesh. The institute, if provided with adequate facilities and support will be able to offer such higher training at much lesser cost. A large number of highly qualified scientists from BARI and BRRI are available on part time basis to teach and supervise thesis research of MS and PhD students.

The IPSA will remain under the administrative control of BARI



while it follows the academic programs of BAU at least for the first few initial years. As per original project proposal approved by the Planning Commission, it is envisaged that the IPSA (former BCAS) will eventually turn to be a fullfledged institution of higher agricultural education with its own curriculum.

The IPSA now offers graduate courses in seven departments viz. Agronomy, Horticulture, Genetics and Plant Breeding, Soil Science, Entomology, Plant Pathology, and Crop Botany. Similar programs are being planned for Agricultural Extension. A batch of 40 M.Sc. Ag. students in various fields of agriculture, originally enrolled in BAI but later on transferred to IPSA, have just completed their final examination. Regular classes of the second batch of 84 students for 1982-83 academic session started on September 17, 1984.

In addition to trained MS and PhD level students, IPSA will conduct fundamental research aiming at strengthening the applied research activities of BARI, BIRRI and other similar organizations as feed-back mechanism. It will also conduct specialized training programs for research and extension personnel.

The Institute owns about 80 hectares of land for establishing experimental farm and residential, dormitory and other acnilliary facilities. The land has been cleared from forest and it will take time and effort to build it into an experimental farm. However, till it is ready for experimentation, the facilities in BARI and BIRRI BIRRI can be utilized for the purpose of graduate students and faculty. The laboratory space is highly inadequate for changed situation. For running the graduate program effectively laboratory facilities need to be extended and well equipped. Liekwise, greenhouse and glasshouse facilities for controlled environment studies will have to be created.

A technical assistance program was being considered by the Japan Government based on undergraduate requirements mainly. In view of the change in the emphasis and objectives of the project, it is now desirable that the entire project be reviewed and the requirments be modified and or extended as needed. The original project plan contains serious gaps and omissions especially in view of new

developments. It is therefore essential that necessary facilities in the form of expert services, physical facilities and manpower are provided to enable the IPSA to serve its purpose fully.

It may be mentioned here that the Japanese Government has shown keen interest in providing IPSA with all necessary technical aid. Several high powered Japanese Missions visited IPSA recently and through of process of elaborate discussions with various officials of the Ministry, with all such facilities. A copy of their letter of intention to this effect which has been communicated to the Bangladesh Govt. is also attached herewith.

The project should receive top priority. The project aims to produce quality manpower to strengthen agricultural research and education sector. Currently huge amounts of money is being spent for producing MS and PhD level graduates from abroad which can be saved substantially if the IPSA is implemented fully. On the other hand the research works conducted by the graduate students in IPSA will have direct bearings on the technology being generated in our agroecological and socio-economic context.

資料-3. 工事請負契約書(案)

CONTRACT  
FOR  
CONSTRUCTION OF  
EXPERIMENT FARM AND ITS RELATED FACILITIES  
FOR  
THE INSTITUTE OF POSTGRADUATE STUDIES  
IN  
AGRICULTURE

CONTRACT

For Construction of Experiment Farm  
and its Related Facilities for the  
Institute of Postgraduate Studies in Agriculture.

This Contract is executed on this \_\_\_\_ day of \_\_\_\_\_ at the JICA  
Dhaka Office Between

Japan International Cooperation Agency, Dhaka Office by

\_\_\_\_\_ Title \_\_\_\_\_

as its authorized representative of the JICA Dhaka Office, hereinafter  
called "the JICA" of the one part, and \_\_\_\_\_  
whose office is situated at \_\_\_\_\_

\_\_\_\_\_ Represented by  
\_\_\_\_\_ Nationality \_\_\_\_\_ Title \_\_\_\_\_

hereinafter called "the Contractor" of the other part.

Both parties mutually agree under the terms of this  
Contract as follows:-

Article 1 Purpose of Agreement and Contract Price.

The JICA agrees to employ the Contractor and the  
Contractor agrees to perform the works for the construction of experiment  
farm and its related facilities for the Institute of Postgraduate Studies  
in Agriculture located at \_\_\_\_\_

Total \_\_\_\_ items, for the total amount of \_\_\_\_\_ Taka.(  
\_\_\_\_\_) , hereinafter called  
Contract Price"

The following documents shall form integral part of this Contract:-

General specification of this contract

Technical specification

Guideline for construction control

Bill of quantities & drawings

Article 2 Performance Bond.

As a security for the faithful performance of the works under this Contract, the Contractor has on the execution of this Contract deposited a performance bond with the JICA Taka

in cash, or in lieu thereof a Bank Guarantee issued by the .....

..... bearing the number ..... and dated.....

in the amount of \_\_\_\_\_ Taka ( )

which represents five (5) percent of the Contract Price, the name of the issuing bank and the form of the bank guarantee are to be approved by the JICA.

The JICA will return the performance Bond in cash or the Bank Guarantee to the Contractor as the case may be at the end of the Twelve (12) months after final acceptance of the works by the JICA as stipulated in Article 15 of this Contract, provided that the completed works shall not show any defect or damage caused through the fault of the Contractor, or through the fault of any new Contractor in the case of termination of Contract by the JICA under Article 4.

Should the Contractor be default, the JICA shall have the right to demand payment from all or any part of the performance Bond. In addition, the Contractor shall remain liable for the full loss sustained by the JICA.

Article 3 Payment.

The JICA agrees to effect payments for the works to the Contractor in the following manner:-

a. Advance Payment, to be effected upon the bringing of equipment and materials required for the works and properly stored at the job site by the Contractor not later than and of value estimated by the Engineer not less than ten (10) percent of the Contract Price, not later than fifteen (15) Days after the estimation is made by the Engineer.

b. Subsequent Payments, to be effected according to the progress of the works satisfactorily executed by the Contractor and accepted by the Engineer, by not more than 3 instalments. Each payment shall be deducted by the full amount of advance payment, balance of which shall be further deducted by ten (10) percent as retention money on each payment.

c. Final Payment, to be effected upon the satisfactory completion of the works by the Contractor and accepted by the Engineer, of the remaining amount of the Contract Price plus all retention money deducted under (b) above.

Payments under (b) and (c) shall be effected within forty (40) days after the respective acceptance of the works by the Engineer.

Taxes payable by the Contractor, if any, shall be deducted at source by the JICA on each payment.

It is expressly understood that payments by the JICA do not mean acceptance responsibilities under the Contract.

Article 4 Completion Time.

The Contractor agrees to satisfactorily complete the work within \_\_\_\_\_ days (completion time) from the date hereof which will become due on \_\_\_\_\_ (completion date) and he agrees to commence the works at the site on or before \_\_\_\_\_ (commencement date) which will be within 7 days after the date hereof.

If the Contractor fails to commence the works by the above named date, or should in the course of the construction any event occurs which may reasonably cause the JICA to believe that the Contractor will not be able to complete the works on the completion date, or should the Contractor fail to complete the works by the completion date, or should the Contractor fail to meet any of the Contract requirements, the JICA shall have the right to terminate this Contract by giving written notice to the Contractor.

However, in case that the Contractor fails to complete the works by the completion date, or to meet any of the Contract has the ability for completion of the works within reasonably extended period, the Contractor may be permitted by the JICA to continue the works beyond the completion date but within the extended time.

Article 5 Penalty.

In case that the Contractor is in default as mentioned in Article 4, the Contractor agrees to be responsible to the JICA as follows:-

5.1 In case of the termination by the default of commencement for the works, The Contractor shall pay a penalty of \_\_\_\_\_ Taka ( \_\_\_\_\_ ) Per day counting from the commencement date until the new Contract is completely executed with a new Contractor

for this works, the period of which is included the time spent for finding the new Contractor and executing the new Contract etc.

5.2 In case the JICA thinks that the Contractor will not be able to complete the works within the completion time and thereby terminates this Contract, the Contractor shall pay a penalty of \_\_\_\_\_ Taka ( ) per day counting the number of days in the same manner as prescribed in 5.1 above. However, the JICA may reduce such number of days according to the ratio between the completed works and the total Works as may be decided by the Engineer.

5.3 In case the Contractor fails to complete the works by the completion date or to meet any Contract requirement, the Contractor shall pay a penalty of \_\_\_\_\_ Taka ( ) per day counting from the date following the completion date until the works satisfactorily completed and accepted by the Engineer.

#### Article 6 Compensation.

If the JICA sustains any losses as direct or indirect damages caused by the Contractor's failure, the Contractor shall compensate the JICA for such losses. The parties agree that time is essential for the completion of the Works.

#### Article 7 The JICA's Right for Default.

The JICA has the sole and absolute right to decide whether to terminate the Contract, to impose only the penalty on the Contractor or to claim the compensation for the damage as stated in Article 5 or Article 6. The money due to the JICA exercising its right under this article shall be retained and deducted from any money due to the Contractor but yet unpaid, including from the performance Bond. If the total amount of the loss is larger than the money above-mentioned, the Contractor agrees that the JICA has the right to retain the construction equipment,



materials and supplies etc. and demand payment of the balance from such equipment etc. or proceeds of sale thereof.

Article 8 Contractor's Responsibility on Termination of this Contract.

After the Contract has been terminated in accordance with the foregoing Article 4, the JICA shall have the right to employ another Contractor (hereinafter called the "New Contractor") to carry on the remaining parts of the works, and the payment for the Contractor that fail to complete the work shall be made out of the necessary Contract price for the remaining works. Should the remaining amount after payment of the advance and subsequent payments from the Contract Price, be insufficient to effect payment to the new Contractor, the difference between such remaining amount and actual cost estimated by the JICA for the satisfactory completion works carried out by the new Contractor, shall be deemed as direct loss sustained by the JICA, and the Contractor shall pay such difference to the JICA within ten (10) days from the date of request by the JICA, failing which interest at the rate of eighteen (18) percent per annum shall be charged thereon.

Article 9 Engineer.

The Engineer, authorized to act on behalf of the JICA will be appointed by the JICA and the Engineer is entitled to do all things that the JICA may do so. The Engineer shall control and supervise the works all the times whether it is in the preparation or implementation of the works and the Contractor shall promptly furnish all necessary facilities for proper inspections of the works in accordance with the Engineer's request. At any moment the Engineer can request the Contractor to stop the works, if necessary and the Contractor shall have no claim on the JICA for extension of the completion time due to such suspension of the works under this Article.

The Inspection will not be deemed as the acceptance of the works, and the Contractor shall not be relieved from his responsibility to meet the Contract requirements by the fact that the Engineer exercise their duties. Should it be found that the works have not been satisfactorily performed in the faithful manner, the Contractor shall correct any part of the works indicated by the Engineer within the period specified by the Engineer.

Article 10 Prohibition for the Equipment Removal.

Should the Contractor fail to complete the Works during the completion time or the Engineer thinks that the Contractor will not be able to satisfactorily complete the works, any equipment and materials brought to the site for use on the Work shall not be removed without the prior approval of the Engineer in writing.

Article 11 Rectification of the Defective Construction.

For a further period of One (1) year after satisfactory completion and final acceptance of the works by the JICA, whether completed by the Contractor or by the new Contractor in case of termination of Contract under Article 4, any damage to the works which is caused by the Contractor's fault, either because of defective workmanship of the use of inferior materials or any other cause, shall be made good as necessary by the Contractor to the satisfaction of the JICA at no extra cost.

In case of the termination of the Contract, the JICA may decide which part of the works should come under the Contractor's responsibility, and requests the Contractor to make good of the damage works. Should the Contractor fail to do so within period specified after receipt of written request to do so from the JICA, the JICA shall have the right to employ another person to carry out such work and the Contractor agrees to bear all expenses incurred.

Article 12 Discrepancies among the Contract Documents.

If, prior to or during the course of construction, any discrepancies are found in the drawings and/or the technical specifications etc. attached to this Contract, the Contractor shall follow the ruling given by the Engineer at no additional cost to the JICA.

Article 13 Temporary facilities and Method of Construction.

The Contractor may decide the temporary facilities, office, warehouse, etc. and the methods of construction by itself without the approval by the Engineer. However, the Engineer reserves the right to suggest the Contractor more suitable facilities and/or methods. If the Engineer suggests them to the Contractor, the Contractor shall negotiate with the Engineer but without being required to follow such suggestion.

Article 14 Modification of Plan.

If the Engineer finds it necessary to make modification of construction design, and/or materials and so forth during the course of construction, the JICA has the right to order the modification of the works to the Contractor, and such order shall be made in writing from the Engineer to the Contractor.

The JICA agrees to adjust upwards or downwards the necessary expense for such modification to the Contractor, which will be estimated by unit price in the Contractor's proposal in case of modification of quantities of construction works. In the case of additional works which are not quoted by unit price in the Contractor's proposal, the Engineer will make estimation thereof and the JICA will pay to the Contractor for such additional works accordingly. But if the Contractor does not agree to such estimation, the Contractor is then entitled to negotiate with the JICA. Also the extension of the completion time

due to the modification shall be given by the JICA who shall have the sole right to decide the number of days of such extension.

Article 15 Acceptance of the Works.

When the entire work has been completed, the Contractor shall submit the invoice in written form indicating the work actually completed to the Engineer. If there are compliance with drawing or technical shall accept the works as the final acceptance of satisfactory completion works within ten (10) days after the receipt of the written form and it shall be deemed that the final acceptance has been made on such date of the receipt of the written form.

On the other hand, should non-compliance with drawings or technical specifications or defects be found in the works executed by the Contractor, the Engineer will have the right not to accept the works and to order the rectification of the works. If the required period for the rectification of the works is beyond the completion date, the Contractor shall not be relieved from its responsibility to pay the penalty as stipulated under clause 5.3, and after the completion of rectification of the works, then the final acceptance will be made in the same manner as described in the first paragraph of the Article.

During the course of construction, whether in the construction period of extension period specified in the last paragraph of Article 4, the JICA has the right to accept part of the works already completed in the written form which shall be considered as part of final acceptance. However, both parties shall negotiate with each other for the maintenance and usage of the accepted part of the works, and the contractor is not entitled to request the extension of the completion time due to any interruption caused by the use of such accepted works by the farmers, the JICA, the Engineer or the officers of Bangladesh Government authorities, or any delay in repairing such accepted works.

Article 16 Construction Engineer.

The Contractor shall appoint a construction engineer at his own expense for the supervision of the work performance, who shall be authorized to act on behalf of the Contractor, and the instructions given to him shall be deemed as given to the Contractor. Such construction engineer shall be a well English-speaking person and accepted by the Engineer, who shall stay at the job site all the time and shall not leave without obtaining the prior approval of the Engineer. If the Contractor replaces the construction engineer. The Contractor shall obtain the prior approval from the Engineer in writing.

Article 17 Replacement of Engineer and Foreman.

The Engineer may request the Contractor to remove any of the Contractor's foremen or engineers if it appears to the Engineer that such foreman or engineer is incompetent for his job or is not capable of handling his workmen or staff, and the Contractor shall promptly replace any such foreman or engineer. No extra cost or claim for extension of time will be allowed because of such replacement.

Article 18 Sub-Contractor.

The Contractor shall not Sub-contract or assigning any portion of the works under this Contract without obtaining the prior approval of the JICA who has the sole right to decide which portion of the works may be sub-contracted or assigned to the Sub-Contractor. However, the Contractor shall be fully responsible for the works done by the Sub-Contractor.

Article 19 Notice.

All Notice required by this Contract shall be defective only at the time of receipt thereof, and only when received by the parties concerned at following address:-

The JICA Dhaka Office, c/o Japanese Embassy

The Contractor

All Notices required by the terms of this Contract shall be made in writing in English Language, and delivered by registered mail or hand delivery.

Article 20 Dispute.

In the event of any dispute arising from the interpretation and performance of the terms of this Contract, both parties agree to make the best attempt with sincerity and in good faith to negotiate and amicably settle such dispute, failing which the parties agree to refer such dispute to arbitration under Bangladesh Commercial Arbitration Rules and Regulation, Dhaka, by 2 arbitrators, each of which is to be appointed by each party. Of either party fails to appoint its arbitrator within 7 days or should the arbitrators fail, within fifteen (15) days after their appointment, to agree upon the decision of the dispute or no decision is reached on the appointment of an umpire, then the dispute shall be brought before the Court in Bangladesh for decision under the laws and procedures of the Bangladesh.

This Contract is executed in duplicate of the same tenor, one of the original copy to be kept by JICA and the other original copy to be kept by the Contractor. Both the JICA and the Contractor have set their signatures and affixed the seals thereto in the presence of the witnesses.

.....JICA

Mr. , Director, Dhaka Office,  
Japan International Cooperation Agency.

.....Contractor.

.....Witness.

.....Witness.





資料-4. 工事仕様書(案)

Specification

Section 1. General Specification

Technical Specification

Section 2. Earthwork

Section 3. Concrete Works

Section 4. Land Reclamation Works

Section 5. Farm Road Works

Section 6. Farm Pond Works

Section 7. Tubewell Construction Works

Section 8. Irrigation Pipeline Works

Section 9. Drainage Canal Works

Section 10. Pumping Station Construction Works

Appendix A. Guideline for Construction Control

## Specification

### Section 1. General Specification

#### 1. 1 Scope of Works

The Experiment Farm Construction Project is located in the Institute of Postgraduate Studies in Agriculture (IPSA) Campus, SALNA. The extent of farm area is shown on the Drawings and total area is 7.8 ha.

The works to be carried out by the Contractor under the Contract will include:

- (1) Land consolidation work for experiment farm of about 10.0 ha.
- (2) Construction of irrigation facilities
  - (i) Deep Well = 250 mm  
H = 110 m
  - (ii) Pumping station 1 unit
  - (iii) Farm pond V = 35 X 25 X 2.5 m
  - (iv) Irrigation pipeline networks L = 1,535m
- (3) Construction of farm roads
  - (i) Trunk road (width 7.0 m) L = 1,054m
  - (ii) Branch road (width 4.0 m) L = 1,119m
- (4) Construction of drainage canals
  - (i) Farm ditch L = 1,720m
  - (ii) Drainage culvert 3 places

The Drawing shall be accurate and clear denoting the scope of works.

#### 1. 2 Work Schedule

The Contractor shall submit his work schedule before the commencement of the works at the job site. If the Contractor intends to change the work schedule, the approval from the Engineer shall be obtained prior to the modification of schedule.

Also the Contractor shall submit the machineries scheme including the numbers, and kind of machineries and using period of them.

#### 1. 3 Notices

The JICA and the Contractor shall submit the notices to each other, as necessary, in accordance with Article 19 in the Construction Contract Document within reasonable time except that special articles are provided in Construction Contract Document and Specification of this Contract.

#### 1. 4 Field Test and Inspection

The field tests in accordance with the Technical specifications and the demands from the Engineer shall be the responsibility for the Contractor. The charges for such field test shall be included in the total amount of the construction cost, and the Contractor is not entitled to claim any amount of the field test charges.

#### 1. 5 Modification of Plan

In case the JICA estimates the cost for the modification in accordance with Article 14, and if there are two portions, one for the increase and the other for the decrease of the construction cost resulting from such modification, the JICA shall have the right to offset them in the payment and pay or claim the difference between the increase of the construction cost as the case may be.

#### 1. 6 Release from the Works

After the final acceptance of the works by the JICA, the Contractor shall remove its own temporary facilities, office, warehouses, surplus material, debris and so forth which were provided by itself within 15 (fifteen) days. Upon approval of the Engineer for the removal of the above-mentioned facilities etc. the Contractor will be released from its responsibility of the works but remains responsible under 1 (one) year guarantee of the works as specified in Article 11 in this Construction Contract Document.

## 1. 7 General Obligations of the Contractor

### (1) Temporary office and residence

In case the Contractor intends to build the temporary office, residence and so forth, the Contractor shall submit the plan to the Engineer for approval at least 10 (ten) days in advance of the commencement of such works.

The Contractor is required to always keep the buildings and facilities in good condition and to make proper drainage and sanitary system. Should the Contractor build them outside of the job site, the Contractor shall arrange with the owner of such land and at its own expense.

### (2) Fuel storage

In area of temporary office and residence, the fuel tank capacity shall not exceed 1,000 litres and shall be far away from the buildings.

Fuel storage and transportation shall be done with care and shall have a good system of fire prevention. If storage licence is required, the Contractor shall arrange for obtaining it.

### (3) Other facilities

All necessary facilities for the construction works and the Contractor's convenience shall be provided and maintained in good condition by the Contractor.

### (4) Transportation

The Contractor shall make transportation of materials, equipment, earth and the rail in the campus and on the public roads carefully, and if necessary of in case the Engineer indicates, shall arrange the traffic control staff at the indicated points.

## 1. 8 General text

The Contractor shall implement the works in accordance with the Contract Documents in broad sense such as construction Contract Document in narrow snese, General Specification, Technical Specification and Guideline for Supervision. Should the events occur that the both

parties can not reach agreement on the interpretation of the above-mentioned Contract Documents in broad sense, both parties shall negotiate with sincerity and good faith for settlement of any disagreement, failing which the decision of the JICA shall prevail.

## Section 2. Earthwork

### 2. 1 General

This Section deals with matters common to earthwork for respective works. Any and all earthwork shall conform to the stipulations set forth in this section unless otherwise specified therein. The term of "earthwork" will mean and include all classes of grading, leveling, ditching, earth-moving, all other excavation backfill and banking construction work.

All earthwork shall be performed accurately to the lines, grades and dimensions as shown on the Drawings or as directed by the Engineer. The Contractor shall furnish all labours, materials, equipment and supplies and perform all operations in connection with excavation, trimming, construction of embankment, excavation and backfilling around structures, and all incidental grading, subject to the terms and conditions of the Contract and in strict accordance with these specifications and the applicable drawing.

### 2. 2 Land Clearing,

- (1) The Contractor shall clear the land including the rough levelling of existing boundary borders, trees, stumps, anthills and so forth.
- (2) The abandoned materials above-mentioned such as trees and stumps which are taken out shall be brought to the places where the Engineer indicates, then burnt and destroyed.

### 2. 3 Classification of Excavation

#### (1) Rock excavation

Rock excavation includes all solid rock in place which can not be removed smoothly by such excavating machinery such as a bulldozer, power shovel or scraper until loosened by blasting or wedging. All boulders or detached pieces of solid rock less than one cubic meter in volume shall not be recognized

as rock.

(2) Common excavation

Common excavation includes all materials other than rock including, but not restricted to, earth, gravel, and soft or disintegrated rock which can be treated efficiently either by hand tools or excavating machiner as mentioned above.

2. 4 Excavation Line

The Contractor shall remove from the excavation line all loosened rock, fractured rock and/or loosened material which may slide. Any over excavation shall be filled with suitable compacted material, and shall be tamped or rolled with suitable tools and equipment to form a firm foundation for the structures. Excess excavation below the foundation of a concrete structure shall be filled with suitable concrete or compacted materials approved by the Engineer.

2. 5 Disposal of Excavated Material

Excavated materials may be used for backfilling and/or embarking unless otherwise specified or directed by the Engineer. Excavated material in excess of requirements, shall be disposed of in the disposal area appointed by the Engineer. Waste material shall be piled by taking sufficient measures to avoid injury or damage to adjacent area and properties.

2. 6 Excavation for Structures

The Contractor shall perform the required excavation for construction of structures. On excavation work, the Contractor shall exercise care and precaution for safety to the satisfaction of the Engineer. Especially, in case of deep excavation, sheathing or retaining shall be made. Sliding or falling of the slope shall be repaired immediately by the Contractor at his own expense. The Contractor shall be held entirely responsible for accidents. Approval by the Engineer of the excavation method and safety shall not relieve the Contractor of his responsibility.

Excavation for the foundation of concrete structure shall be to the elevations as shown on the Drawings or as directed by the Engineer. The Contractor shall prepare the foundations for the concrete structure by methods which will make firm foundations for the concrete structure.

The bottom end side slopes of earth excavation upon or against which concrete is to be placed, shall be finished by hand to the directed dimensions and with suitable tools to form firm foundations.

Surface against which concrete is to be placed shall be cleaned of all loose and objectionable materials by means of brooming, high velocity air or air and water jets, or by other approved means. Prior to placing concrete, the prepared surfaces shall be inspected by the Engineer.

If the foundation material is excavated beyond the lines required to receive the structure, the over-excavation shall be filled with suitable materials and compacted in accordance with the requirements of Paragraph 2.7. (3). If the natural foundation material is disturbed or loosened during the excavation process or otherwise, it shall be compacted in place or, where directed it shall be removed and replaced with suitable material and compacted in accordance with the requirements of Paragraph 2.7 (3). Any and all excess excavation conducted by the Contractor for any purpose or reason except for additional excavation as may be directed by the Engineer, shall be at the expense of the Contractor. Fill and compacting of fill for such excess excavation or over-excavation, shall be at the sole expense of the Contractor.

Where concrete is to be placed directly upon or against rock, the excavation shall be sufficient to provide for the minimum thickness of concrete at all points. This minimum thickness shall be maintained as much as practicable. All loose or shattered rock shall be removed. Any over-excavation shall be filled completely with concrete at the expense of the Contractor, including the cost of all work and materials required.

#### 2.7 Backfill and Banking

(1) Insofar as practicable backfill and banking material shall be obtained from material removed in excavating, but when sufficient suitable material is not available from this source, additional material shall be obtained from approved borrow pits. Materials used for backfill or banking shall not include rocks, boulders, large roots and other organic matter. Materials which are excessively moist shall not be used directly for banking and backfill.

Where the ground surface under the banking is not suitable, as determined by the Engineer, for a foundation for the banking, the Contractor shall strip the area under the banking of such unsuitable material to such depth as may be directed.

(2) Backfill and Banking

The Contractor shall undertake the work, providing measures for draining lest runoff and leakage water should be stored in the surface of land.

Extra banking is not given on the Drawing. Nevertheless, it shall be taken as 10% of the depth or height of backfill or banking unless specified. The quantities of the extra banking shall not be calculated as quantities of work for which payments will be made. The costs required for the extra banking shall be included in the unit price of banking and/or backfill.

(3) Compacting

Before the material for the first layer of the banking is placed, the foundation of the banking shall be prepared and provided in 2. 2 and shall be moistened and compacted in the manner hereinafter specified for each layer of compacted banking to be placed thereon. The banking including extra banking shall be compacted to the elevation and to the top widths and side slopes.

Where compacting of earth materials as required, the materials shall be deposited in horizontal layers and compacted as specified in this Paragraph. The distribution of materials shall be such that the compacted material will be homogeneous and free from lenses, pockets, breaks, or other imperfections.

The Contractor's operations in the excavation of materials for the compacted banking shall be such as will result in an acceptable gradation of materials to provide for impermeability and stability after being compacted. The maximum dimensions of stones placed in the compacted banking shall not exceed 0.12 metre, and should stones larger than 0.12 metre be found in otherwise approved material, these materials shall be removed the the Contractor before the commencement of compacting operation. This Paragraph shall also apply where sloping walls or slabs are to be placed directly on earth foundations without intervening forms, and where compacted banking is required in the bottom of the structures.



In the place specified by the Specifications, compaction shall be made by utilization of earth material containing an appropriate mixture of clay or silt. Prior to the commencement of the work stated hereinabove, the Contractor shall obtain the approval of the Engineer concerning the following items:

- The capacity of compacting machinery
- The thickness of the horizontal layer
- Method of Compacting
- Reports of the compaction tests which were conducted in compliance with instruction(s) from the Engineer, if any

The excavation and placing operations shall be such that the materials when compacted will be sufficiently bound to secure the best practicable degree of compaction, impermeability, and stability. The dry density of the soil fraction in the compacted material shall in no case be less than 85 percent of the laboratory standard maximum dry soil density as determined for the materials being compacted. Insofar as practicable, and as determined by the Engineer, moistening of the material shall be supplemented by sprinkling at the site of compaction if necessary and mixing by such equipment as disc harrows.

If the moisture content is less than optimum for compaction, the compaction operations shall not proceed, except with the specified approval of the Engineer, and if the moisture content is greater than optimum for compaction, the compaction operations shall be delayed until such time as the material has dried to the optimum moisture content. No adjustment in price will be made on account of any operation of the Contractor in drying the materials or on account of delays occasioned thereby.

### Section 3. Concrete Works

#### 3. 1 General

All concrete works shall be performed as established on the Drawing or directed by the Engineer. Unless specifically provided in this specification, the concrete shall be produced, transported, placed, cured, finished and tested in accordance with the ASTM or JIS provisions.

#### 3. 2 Materials

##### (1) Cement

(i) Cement used in Concrete mixture shall be normal portland cement, properties of which shall be in accordance with ASTM-C150 or JIS-R5210.

(ii) Cement shall be reliable brand, good quality and absolutely dry.

(iii) The Contractor shall construct a water-proof cement storage shed at the job site, floor of which shall be higher than the ground surface at least 30 (thirty) cm.

(iv) The Contractor shall not keep cement at the job site more than 1 (one) month, and the storage period is counted from the date when the cement is transported from the manufacturing factory to the job site.

(v) During the course of construction, the Contractor shall not use cement for the works properties of which are changed, especially consolidated.

##### (2) Fine aggregate

(i) Fine aggregate shall be river sand that is clean and rigid without organic matter and other substance.

Fine aggregate shall have the properties as shown in following table.

No.	Experimentation	Allowance Index	Remarks
1.	grading	95% of material shall pass though the sieve No. 4 and 90% of material shall not pass through the sieve No. 100	by weight
2.	dust passed through the sieve No. 200	not exceeding 3%	
3.	fineness Modulus	not less than 2.3 not more than 3.1	
4.	organic unpurity (Tested by the method of Sodium hydroxide 30% type)	the color of the material after the experiment shall show paler than the standard color No. 3	
5.	very mild material ASTM c-142	not exceeding 1%	by weight

(ii) The Contractor shall keep fine aggregate at clean and good drainage place, which shall be protect against the mixture with harmful substance such as clay, soil and so on.

(3) Coarse aggregate

(i) The Contractor shall use crushed stone as coarse aggregate which is rigid and durable substance without organic and harmful materials.

(ii) Coarse aggregate shall have the grading as shown in the following table.

Sieve Size	Passing Percent by Weight
2"	100
1-1/2"	90 - 100
1"	20 - 55
3/4"	0 - 15
3/8"	0 - 5

(iii) Coarse aggregate shall have the properties as shown in following table:

No.	Experimentation	Allowance Index	Remarks
1.	Dust passed through the sieve No. 200	not exceeding 1.5 Y	by weight
2.	Very mild material (ASTM c-142)	not exceeding 0.25%	by weight
3.	Other mild material	not exceeding 5.0Y	by weight
4.	Stability test method	lost part shall not exceeding 12% of total weight	solphate sulphate method
5.	Abraston	lost part shall not exceed 40 Y of total weight	by Los-Angeles Abrasion Test method

(4) Water

Water used concrete mixture shall not contain harmful substances such as oil, acid, salt and so on. Should the Engineer thinks that water used for the concrete mixture is harmful, the Contractor shall inspect the water as following way; the Contractor makes two kinds of cylindrical mortar test pieces one used actual field water that the Contractor will use, another used standard water that the Engineer specifies.

In case the compression strength of former is larger than 90 (ninety) percent of the latter at 7th (seven) day and 28th (twenty-eight) day after making test pieces the Contractor may use the actual field water. If not, the Contractor shall look for another water source by the Contractor's responsibility.

3. 3 Mixing Design of Concrete

Concrete shall have the proportion as follows;

	Compressive Strength 28 days	Mixing portion Cement:Fine A: Coarse A	8 - 12 cm
Reinforce concrete	$f'_c = 210 \text{ kg/cm}^2$	1:2:3 (by volumn)	8 - 12 cm
Plain concrete	$f'_c = 180 \text{ kg/cm}^2$	1:2:3 (by volumn)	8 - 12 cm
Lean concrete	-	1:4:6 (by volumn)	-

Fine A: fine aggregate  
Coarse A: coarse aggregate

Other proportions for mixed design may be indicated by the Engineer at the job site, if it is necessary.

#### 3. 4 Slump Test

The Contractor shall make slump test in each batch in accordance with JIS 1101. In case the Contractor intends to place concrete, the Contractor shall not pour the concrete without prior inspection for the value of slump test by the Engineer. After the completion of the concrete Works, the Contractor shall submit the data of slump test to the Engineer.

#### 3. 5 Mixing the Concrete

The Contractor shall use a power-driven concrete mixer and quantities of cement, aggregate and water in concrete mixture shall be measured correctly in each time. The driving time for mixing concrete shall be more than 2 (two) minutes and less than 5 (five) minutes in order to make concrete with constant consistency and good quality. Take out from the concrete mixer, concrete shall be placed in the form within 30 (thirty) minutes. The concrete mixer shall be checked and cleaned every day and the Contractor shall remove concrete debris attached the concrete mixer.

### 3. 6 Concrete Form Work

(1) Concrete form shall be rigid and strong enough to support the weight of concrete without deformation, and the Contractor shall make concrete form tightly in order to prevent water seepage from unsolid concrete.

(2) The Contractor may use wood form, plywood form and steel form, in any case surface of form shall be smooth and have no damage.

(3) In case the Contractor set up concrete form, the iron embedded within concrete to hold the form shall be cut at concrete surface.

(4) Before placing concrete, concrete form shall be inspected by the Engineer for correctness of size, good preparation and so on.

(5) Before placing concrete, the Contractor shall paint oil on inner side of concrete form for good separation between concrete and concrete form after solidness of concrete.

### 3. 7 Placing Concrete

(1) Before placing concrete, the Contractor shall check and clean the floor and the surface of concrete form.

(2) After a batch of concrete is placed, the surface height of concrete in concrete form shall have same height in a block, and the height of placed concrete layer shall be less than 40 (forty) cm. in each placing.

(3) The Contractor shall place concrete continuously into a block of structure such as wall, slab and so on.

(4) In case the new concrete is placed on solid concrete, the Contractor shall take out laitance, loose aggregate, low quality concrete on the surface of solid concrete.

### 3. 8 Compaction of Concrete

After placing concrete, the Contractor shall compact concrete by using immersion type vibrator. Should the Contractor intends to use another type of vibrator, the Contractor shall obtain the prior permission

of the Engineer.

### 3. 9 Curing

The Contractor shall cure concrete completely with water. If the Contractor intends to use curing chemical, the Contractor shall obtain the prior permission of the Engineer.

### 3. 10 Reinforcement

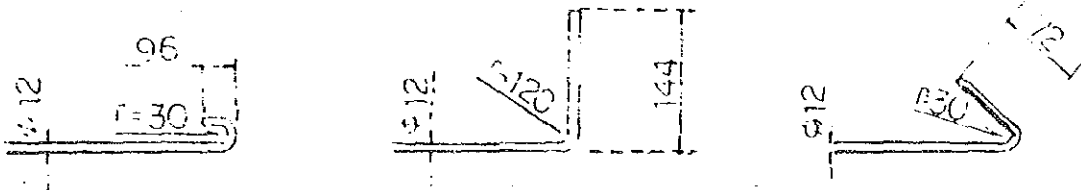
#### (1) Material

Reinforcement which is used in reinforce concrete works shall be round bar or deformed bar in accordance with ASTM designation A-7-55 and A-141-55 or JIS G 3112, also it shall be good quality and never using before.

#### (2) Shaping steel bar

(i) The Contractor shall make shape of steel bar in accordance with the drawings without heat. Should the Contractor heat material to make shape, the Contractor shall obtain the prior permission of the Engineer.

(ii) The Contractor shall shape steel bar before assembling it and in case steel bar is bent for making hook and corner, the Contractor shall bend as follow:



#### (3) Assembling steel bar.

(i) Steel bar shall be connected in order not to move by wire not less than 2 rounds.

(ii) In case the Contractor set steel bar, it shall be supported by spacer that is made from mortar and its specification is as follows:

ratio Cement : sand = 1 : 1

- thickness
- 1) In case bottom of structure, thickness is not less than 8 (eight) cm, from ground surface to the steel bar.
  - 2) in case side of structure, thickness is not 5 (five) cm. from concrete surface to steel bar.

(4) Overlapping steel bar

In case that two straight steel bars are connected, the Contractor shall use wire for connection and bind the steel bars at several places, especially in case tensile stress functions on steel bars, two steel bars shall overlap each other as follows:

$$l = \frac{\sigma_{sa}}{4 \tau_{oa}} \phi$$

where  $l$  = length of overlapping

$\sigma_{sa}$  = tensile strength of steel bar

$\tau_{oa}$  = Cohesive strength between concrete and steel bar

$\phi$  = diameter of steel bar



## Section 4. Land Reclamation Work

### 4. 1 Scope

The work under this Section shall consist of clearing and grubbing and grading works, all in accordance with the Drawing and these specifications or as directed by the Engineer.

### 4. 2 Work Preparation

Prior to the work, the planned area shall be isolated from outside drainage to prevent the water coming in. During the work, surface water in the planned area shall be removed as much as practicable.

### 4. 3 Clearing and Grubbing Work

(1) The Contractor shall conform the boundary of work area in attendance of the Engineer before the commencement of work and shall place boundary posts, if necessary.

(2) Clearing and grubbing work shall conform to the requirements specified under Section 2. 2.

### 4. 4 Cutting and Banking

(1) Primary cutting and banking shall be made within the planned area as a rule.

(2) Cutting and banking work shall conform to the requirements specified under Section 2. 6 and 2. 7.

(3) Slope surface shall be finished evenly with the grade given in the Drawings.

(4) In case of over-excavation, the Contractor shall dispose according to the instruction of the Engineer. Its cost shall be borne by the Contractor.

(5) If natural crumbling, landslide, etc. occur or threaten to occur during cutting work, the Contractor shall execute the work in consultation with the Engineer.

## Section 5. Farm Road Works

### 5. 1 Scope

The scope under this Section shall cover the construction of Farm roads consisting of Trunk and Branch roads. The work shall include grubbing clearing embankment and excavation, all in accordance with the Drawings and these specification, or as directed by the Engineer.

### 5. 2 Earthwork

The earthwork needed for construction of the roads shall be conducted according to the applicable provisions of Section 2.

### 5. 3 Earth Materials

The farm road base shall be formed with those earth materials as surplus in excavation of ditch, when those materials are appropriate or equivalent in quality to those found in borrow pits.

### 5. 4 Compaction

The base of the embankment shall be compacted with roller and thickness of one compaction shall be about 30 cm in spread. During compaction, water shall be sprinkled for keeping optimum moisture content of the materials.

## Section 6. Farm Pond Works

### 6. 1 Scope

The scope under this Section shall consist of the preparation works, excavation, compaction of foundation, embankment and construction of outlet and spillway for the pond, all in accordance with the Drawings and these specification, or as directed by the Engineer.

### 6. 2 Earthwork

The earthwork needed for construction of the farm pond shall be conducted according to the applicable provisions of Section 2.

### 6. 3 Earth Materials

The excavated earth materials shall be used for the embankment material for the farm pond, and if those excavated soil are deemed unsuitable

for the purpose, the embankment materials shall be borrowed from pits with soil in suitable texture.

#### 6. 4 Compaction

Foundation of the farm pond shall be compacted with roller carefully, and also the dike section shall be compacted with roller. Thickness for one compaction shall be spread about 30 cm.

Also, compaction water shall be sprinkled for keeping optimum moisture content of the materials.

#### 6. 5 Slope Protection

Finishing work of embankment slopes shall be made by compacted with hand rammer and with turf planted for protection of slopes from erosion.

#### 6. 6 Concrete Work

The concrete work needed for construction of the farm pond shall be conducted according to the applicable provisions of Section 3.

#### 6. 7 Brick Masonry

(1) The work under this Clause consists of all brick masonry work shown in the Drawings.

(2) Local products can be used and it shall be the first class.

(3) All bricks shall be laid after applying mortar.

#### 6. 8 Pipe Installation

(1) The pipe shall be polyvinyl chloride pipes (PVC pipes) and conform to JIS K6741 class VP unless otherwise noted. The pipe shall be suitable for field cutting and jointing.

(2) Pipe installation shall conform to the requirement specified in Section 8. 3.

#### 6. 9 Screen and Fence

(1) Materials used in the construction of the screen and fence shall be of first grade quality and shall be subject to the approval of the Engineer.

(2) The installation of screen and fence shall be carried out in accordance with the Drawings.

## Section 7. Tubewell Construction Works

### 7. 1 Scope

The standard design of tubewell to be constructed under this contract is shown on Drawings. The tubewell is to consist of casing pipe and screen enveloped with sieved gravel sunk into vertical drilled hole.

The location of the detailed point of the well to be constructed shall be selected by the Engineer.

The Contractor shall execute rock sampling, electric logging, pumping test and other test in accordance with the contract. The works to be done by the Contractor include the compensation for the access road, construction of necessary temporary works and the furnishing of all labour, transportation, equipment and drilling rigs, vehicles, consumables, etc., necessary for the complete and satisfactory construction and testing of the above-mentioned tubewell.

### 7. 2 Job Site

The Contractor shall propose a layout for his construction facilities including access road at the well site designated by the Engineer and shall stake the area as may be necessary for this work upon getting the Engineer's approval for the layout.

### 7. 3 Conductor Pipe Setting

Prior to the drilling work the conductor pipe shall be set vertically to the suitable depth to protect the collapse of the surface soil and to accommodate the mud water circulation.

### 7. 4 Method of Drilling Work

The Contractor shall drill the hole of 550 millimeter in diameter, vertically to the depth of 110 meters either by ordinary rotary method by reverse circulation method or by percussion method at his option.

In case of reverse circulation method, drilling fluid will be essentially water. No bentonite may be added to the drilling fluid without

the approval of the Engineer.

In case of percussion method, the weight of tubular bit shall have sufficient weight for this hole.

#### 7. 5 Electric Logging

Electric well logging shall be immediately after hole reaches the designated depth. The method and procedure shall be directed by Engineer. At the boring of tubewell, depth of soil layers shall be measured to make geologic column and shall completed the boreholes in specified depth.

#### 7. 6 Installation of Casing Pipe and Screen

The contractor shall install the casing pipe and screen in the drilled hole. The screen shall be installed correctly to fit the aquifers. The installation of casing pipes and screens shall not be commended before the gravel to be used is stored at the work site.

The screen in well is designed to be 10m long, however, this length is adopted for the convenience of the tenderers but actual length and position of the screen to be installed and the depth of the well shall be designated by the Engineer.

#### 7. 7 Gravel Packing

The annular space between casing pipe and screen and the well of drilled hole shall filled with gravel which shall be clean, washed durable gravel composed of well rounded quartzitic, granitic or andestic particles. Gravel to be used here of shall be a natural gradation ranging between the strict size limits of 5 mm and 15 mm in diameter. Gravel shall contain no limestone or other calciferous materials, no organic materials such as wood fragments and no lignite.

#### 7. 8 Development of the Well

Once the gravel has been placed fully from the bottom of the well to the land surface, the drilling fluid shall be completely flushed from the well by water. The well shall be developed by cleaning and washing the screen using nearly full fitting swab and then by the use of air compressor to simultaneously produce water from the well. Gravel must

be added to keep the annulus full to surface during development.

The Contractor shall continue the development using not only the said works but also other effective methods approved by the Engineer until water becomes clean.

#### 7. 9 Step Draw Dawn Test

After well is fully developed, the Contractor shall execute a step-draw down test at the well with a suitable test pump.

The test method and procedure shall be directed by the Engineer.

#### 7. 10 Continuous Pumping Test

The Contractor shall carry out the continuous pumping test after step drawdown test.

The test method and procedure shall be directed by the Engineer.

#### 7. 11 Water Quality Test

During the continuous pumping test the Contractor shall obtain water samples for water quality test. Water temperature, PH, electric conductivity will be measured by the Contractor and chemical analysis may be made if the said data show any abnormality.

In such case the Contractor shall collect and submit water samples in polyethylene sampling bottles at the request of the Engineer.

#### 7. 12 Well Cap

Upon satisfactory completion of the well the Contractor shall install a temporary well cap to the well to prevent the entrance of foreign matter into well.

#### 7. 13 Site Restoration

Upon completion of the work at the side, the Contractor shall remove all his rig, equipment, remaining materials, debris, and buildings of any and restore the site as nearly as possible to their original condition, excluding the completed well and the fittings to be left at the site.

## Section 8. Irrigation Pipeline Works

### 8. 1 Scope

This Section deals with matters of irrigation pipeline. The pipeline is composed of the main and distributory pipeline. All pipe, fittings and appurtenances shall be supplied by the JICA.

The Contractor shall furnish and transport materials, equipment and supplies needed for the construction of these pipelines above-mentioned and perform installation and testing of them at the site in accordance with Specifications and Drawings.

### 8. 2 Pipes

The pipe shall be polyvinyl chloride pipes (PVC pipes) and conform to JIS K6741 class VP, unless otherwise noted. The pipe shall be suitable for field cutting and jointing.

### 8. 3 Installation

#### (1) Excavation of trench

The section of excavation for laying pipes are shown on the Drawings. The excavation of trenches shall be made in accordance with specification described in Section 2. Additional costs for the excavation exceed the limits and backfill to such sections other than by direction of the Engineer shall be borne by the Contractor.

#### (2) Pipe bedding

The Contractor shall make pipe beds for pipelines as shown on the Drawings.

The bedding material shall be carefully placed on the bottom of the prepared trench, hand tapped and shaped to fit the lower portion of the pipe conduit barrel. Care shall be taken to ensure that the pipe will be uniformly supported on the bedding material.

#### (3) Pipe joints

Joints for pipe shall be taper sized solvent welding method, and shall construct the jointing in accordance with the manufacture's technical instruction. In making connections, clean dirt, moisture and

oil from pipe and fittings. Particular care shall be taken not to overstress threaded connections at joint.

(4) Pipe cutting

When cuts are necessary, they shall be perpendicular to the axis of the pipe and smooth. Cut shall be made with tools in conformity with the pipe manufacture's recommendations.

(5) Appurtenant equipment

Such as sluice valves and air valves shall be carried out in accordance with the manufacture's instruction.

(6) Protection device

Such as concrete thrust block or locking device shall be done in accordance with the Drawings.

## Section 9. Drainage Canal Works

### 9. 1 Scope

The scope under this Section shall consist of excavation of drainage canals and construction of necessary structures.

### 9. 2 Earthwork

Earthwork for drainage canals shall be in accordance with Section 2.

### 9. 3 Curvert

Where shown on the Drawings or as directed by the Engineer, reinforced concrete pipes should be laid. Inlet and outlet structures shall be constructed at the ends of the pipeline as shown on the Drawings or as directed by the Engineer. Pipe installation shall comply with the applicable provisions of Paragraph 8. 3 (Section 8). Concrete works shall comply with the Section 3.



## Section 10. Pumping Station Construction Works

### 10. 1 Scope

The work under this Section shall consist of earth work, concrete work, brick masonry work and carpentry work, all in accordance with the Drawings and these specifications or as directed by the Engineer.

### 10. 2 Earthwork and Structure Excavation

Earthwork shall conform to the requirements specified in Section 3.

### 10. 3 Concrete Work

Concrete work shall conform to the requirements specified in Section 3.

### 10. 4 Reinforcing Steel Bars

All reinforcing steel bars shall conform to the requirements specified in Section 3.

### 10. 5 Brick Masonry

(1) The work under this clause consists of all brick masonry work shown in the Drawings.

(2) Local products can be used and it shall be the first class.

(3) All bricks shall be laid after applying mortar.

### 10. 6 Carpentry

(1) The work under this paragraph consists of all carpentry work shown in the Drawings.

(2) Local timber can be used, and it should be the first class.

(3) All frameworks shall be jointed by optimum jointing method.

### 10. 7 Roofing

Local materials can be used and the construction method shall conform to Bangladesh specifications.

### 10. 8 Electric Equipment

All electric equipments for lighting, fitting, and other purpose concerning the pumping station shall comply with the Drawings.

Appendix A. Guideline for Construction Control

1. Objective

During the course of construction the Contractor shall implement the works according to the Technical Specifications, drawings and so on, however, it is very difficult to control the quality and quantity exactly from the technical point of view. So the Engineer determines the range of allowable error, and the Contractor shall control quality and quantity within this range of allowable error.

2. Method

For the dimensions of the works such as length, width, thickness of the facility, the Contractor shall measure them at the completion of the Works, write the dimensions on the draagings by red ink and submit them to the Engineer. Should the dimensions of the facility are out of the range of allowable error, the Contractor shall rebuild for correct dimensions. For the quality control such as slump test, field density of compacted earth and so on, the Contractor shall get the data during course of construction and submit them to the Engineer. The Contractor shall not use the material of not good quality out of the range of allowable error.

1. Guideline for Measurements (1)

Description	Item	Range of allowable error(mm)	Guideline			
			Measurement Section	by result table	Written on the drawing with red ink.	by control graph
Earth work	Elevation	± 50	one section every 60 m. Length		actual dimensions are written on the drawings.	
	Width B <sub>1</sub> , B <sub>2</sub>	± 100				
		Bank Cut	-100 -200	Elevations at Center and both edges.		
Concrete foundation	Elevation EL.	± 30	one section every 40 m. in case the length of a block is not more than 40 m, 2 Sections a block.	Elevation, Width, Height, Length are written in a table.	actual dimensions are written on the drawings.	
	Width W.	- 30				
	Height h.	- 30				
	Length L.	-200				
Concrete pipe	Elevation	± 30	2 Section a block in case the length of a block is not	Elevation, Width, Height, Length are written in a	actual dimensions are written on the drawingth.	
	Width a.	- 50				
	Height n.	- 30				

Guideline for Measurements (2)

Description	Item	Range of allowable error (mm)	Measurement Section	Guideline		
				by result table	Written on the drawing with red ink.	by control graph
	Length L.	-200	less than 40 m.	table." Table contains design dimension and difference between them.		actual dimension

Guideline for Measurements (3)

Description	Item	Range of allowable error (mm)	Guideline		
			Measurement Section	by result table	by control graph
Land levelling	Elevation	<p>+ - 50</p> <p>more than 75% of total points shall be in the range of + 40 mm</p>	<p>Elevation at 14 point shall be measured in the soil bin as specified in this remarks.</p>	<p>Write on the drawing with red ink.</p>	<p>actual elevations are written on the drawing which will be made by the Contractor at the scale of 1 - 100</p>

Guideline for Measurements (4)

Description	Item	Range of allowable error (mm)	Measurement Section	by result table	Write on the drawings with red ink.	by control graph.
Water supply pipe	error of center line in straight	50	One section every 20 m. length in case			actual dimensions are written on drawings.
	error of center line in curve	100	their length not more than 20 m			
	elevation	± 30	2 sections			

2. Guideline for Quality Control

Description	work	Item	Test item	Guideline
Concrete	Concrete		Compressive strength (plain and reinforced concrete).	<p>Designed strength is specified in the Technical Specifications. Probability that the strength of test pieces does not reach at 80% of the designed strength, shall not more than 5%.            And probability that the strength of test pieces does not reach to the designed strength shall not be more than 25%</p>

3. Standard Test.  
1) Concrete.

description	testing item	guideline		remarks
		method	guideline for testing	
material	1. specific gravity test for aggregate.	JIS A 1109 JIS A 1110	the Contractor shall test once for each 300 m <sup>3</sup> required volume. If the Contractor use it from different sources, the Contractor shall test once for each sources.	
	2. absorption test for aggregate	JIS A 1109 JIS A 1110	if necessary, the Inspection Committee will indicate.	
	3. grading test for aggregate	JIS A 1102	the Contractor shall test once for each 300 m <sup>3</sup> required volume of fine aggregate 50 m.	
	4. physical test for cement 5. chemical test for cement	JIS R 5201 JIS R 5202	required volume of coarse aggregate. If the Contractor use it from different source, the Contractor shall test once for each source.  if necessary, the Inspection Committee will indicate.	



description	testing item	guideline		remarks.
		method	Guideline for testing	
concrete work	6. abrasion test for coarse aggregate. 7. harmful material test for aggregate.	JIS A 1120 JIS A 1121 JIS A 1126	if necessary, the Inspection Committee will indicate.	
	1. slump test	JIS A 1101	it is shown in the Technical Specifications.	
	2. surface water content test for aggregate	JIS A 1111	if necessary, the Inspection Committee will indicate.	
	3. air entrained test	JIS A 1116 JIS A 1117 JIS A 1118		
	4. compressive strength of concrete.	JIS A 1108	the Inspection Committee will indicate number, time, batch and so on for making test pieces.	
	5. bending strength of concrete	JIS A 1106		

2) Embankment

description	testing item	guideline		remarks.
		method	guideline for testing.	
material	1. specific gravity test	JIS A 1202	the Contractor shall take samples each 5,000 m <sup>3</sup> required volume and test in principle,	the Contractor shall take samples at least 3 shall take sample for a point.
	2. grading test	JIS A 1204	if the Contractor use it from different source, the Contractor shall take samples and test once for each different source,	
	3. liquid limit test	JIS A 1205		
	4. plastic limit test	JIS A 1206		
	5. compaction test	JIS A 1210 ASTM D 698-66 T		
embankment work	1. water content test	JIS A 1203	according to the day working schedule, the Contractor shall take at least 3 samples in the expected job area, in the morning and in the afternoon and test the soil	the workable range of water content will be shown by the Inspection Committee

description	testing item	guideline		remarks.
		method	guideline for testing.	
	2. field density test	JIS A 1214	<p>in case of road, the Contractor shall test field density at center and both edges of each layer of road every 50 m. length. In case of plot boarder and dike, the Contractor shall test field density at center of them every 100 m. length. If the length is not more than 100 m., the Contractor shall test field density twice for each structure.</p>	



資料 - 5. 申請書 (案)

昭和 年 月 日

国際協力事業団

総裁

殿

事務所長

氏名

印

下記によりモデルインフラ整備費パイロットインフラ整備費の支給を申請する。

- (1) プロジェクト名
- (2) 工 事 名        I P S A 実験圃場造成工事
- (3) 概 算 工 事 費    27,960千円 (積算内訳別添 参照)
- (4) 工 事 内 容
  - A) 工事概要        7.8haの実験圃場(畑 5.8ha, 果樹園 2.0ha)  
その他2.2haの造成と、これにともなう、農道及び用排水施設の建設を行う。
  - B) 主要工事数量
    - i) 圃場整地        圃場面積 7.8ha  
  
造成掘削土量 : 25,131m<sup>3</sup>
    - ii) 道路工        幹線道路        : 全巾7.0m、 延長1,054m  
支線道路        : 全巾4.0m、 延長1,195m
    - iii) 用水施設      井戸の深さ     : 110m  
調整池           : 1,500m<sup>3</sup>、  
ポンプ        深井戸ポンプ    φ100 - 1台  
              加圧ポンプ      φ100 - 1台  
送水管路、延長1,535m  
末端かんがい方式・スプリンクラー移動方式
    - iv) 排水施設       圃場内排水路 ; 1,720m  
横断暗渠工 : 11所

①工期

昭和 年 月 日 ~ 昭和 年 月 日

(5) 申請の事由

資料-6 工事施工業者

バングラデシュ国で比較的大きい規模の施工業者はつぎのとおりである。

(1) 土木・建築関係

- a) CONCORD ENGINEERS & CONSTRUCTION LTD.  
ENGINEERS & BUILDERS  
43, NORTH COMMERCIAL AREA, GULSHAN, DHAKA-12  
BANGLADESH  
PHONE : -601700, 606688.
  
- b) RANA CONSTRUCTION LTD.  
ROAD-14A, HOUSE NO-33,  
DHANMANDI RA. DHAKA-9, BANGLADESH.  
PHONE : -311689, 319610.
  
- c) GEOCON LED.  
ENGINEERS, CONTRACTORS  
6, MOTIJHEEL C/A, DHAKA-2, BANGLADESH  
PHONE : -232366, 238770
  
- d) GREEN ENGINEER LTD  
60/C PURANAPALTAN  
DHAKA-2, BANGLADESH  
PHONE : -316962, 238505.
  
- e) FAZLE AZIM ENGINEERS LTD.  
B-65, MALIBAGH CHOWDHURY PARA,  
DIT ROAD, DHAKA-19  
PHONE : -405345, 412746.

(2) 電気・機械・管工事関係

- a) SUPERIOR BUILDERS AND ENGINEERS LTD.  
30, PURANA PALTAN LINE )GROUND FLOOR)  
DHAKA-2, BANGLADESH.  
PHONE : -413213, 411872

b). TECHNICAL CONCERN LTD.  
326, DHANMANDI RA. ROAD-27  
DHAKA-9, BANGLADESHU.  
PHONE : -311348, 318541.

以上のうち、CONCORD ENGINEERS & CONSTRUCTION LTD. 及びFAZLE AZIM ENGINEERS LTD. は三井建設の下でIPSAの工事の経験をもっており、CONCORDは現在進行中の工事で約100億円に達している。なお、FAZLE AZIM は他よりやや小規模な会社である。



資料一 7 工事費明細書 (追加分— 3.6 ha )

工事費明細書

一金 8,000,000 円也

対円換算

$$\text{現地通貨 合計 } 800,000^{\text{TK}} \times \frac{1 \$ 257 \text{ 円}}{1 \$ = 25.69 \text{ 現地通貨}} = 8,000,000^{\text{円}}$$

名 称	数 量	单 位	单 価	金 額	単価表	備 考
1.圃場造成工事			TK	TK		
掘削押土	13,557	m <sup>3</sup>	33	447,381		
整地仕上	3.6	ha	7,130	25,668		耕起含む
小計				473,049		
2.道路工事						
幹線道路	506	m	21	10,626		
支線道路	886	"	14	12,404		
小計				23,030		
3.用水施設工事						
管路埋設	1	式		41,207		
4.排水施設工事						
圃場排水路(畑)	400	カ所	8	3,200		
" (田)	160	"	29	4,640		
横断暗渠 (P-I)	3	"	2859	8,577		
" (P-II)	4	"	3417	13,668		
小計				30,085		



管路埋設工 1 式 当り 単価表

一金

( 単価番号 号 )

名 称	数 量	单 位	单 価	金 額	備 考
管路埋設 6"	204	m	34	6,936	
4"	323	"	31	10,013	
3"	371	"	30	11,130	
2"	19	"	28	531	
制水弁据付 4"	1	カ所	663	663	
空気弁据付	1	"	663	663	
給水栓据付 (畑地)	1	"	663	5,967	
(水田)	9	"	663	5,304	
計				41,207	

数量一覧表（追加分）

名称	規格	単位	数量	備考
1. 圃場造成工事				
掘削押土	ブロック U-9	m	2,581	L = 60m A = 1.0ha
	U-10-A	"	3,273	L = 37m A = 0.5ha
	U-10-B	"	1,329	L = 66m A = 0.5ha
	P-1	"	3,781	L = 60m A = 0.8ha
	P-2	"	2,593	L = 46m A = 0.8ha
計			13,557	L = 52m A = 3.6ha
整地仕上、耕起		ha	3.6	
2. 道路工事				
幹線道路	B = 7.0m	m	506	土工事は圃場造成工事に含む
支線道路	B = 4.0m	"	886	
3. 用水施設工事				
管路埋設		式	1	φ150 - 204m, φ100 - 323m φ75 - 371m, φ50 - 19m
4. 排水施設工事				
圃場排水路（畑）		m	400	
〃（田）		"	160	
横断暗渠	Type P - I	カ所	3	
	Type P - II		4	

供与資材費（追加分）

円

名称	数量	単位	単価	金額	単価表	備考
1. 管路資材	1	式		3,117,000		
2. スプリンクラーセット	1			1,582,000		
計				4,699,000 <sup>円</sup>		

管路資材費明細書  
(現地調達分)

1,969,000 円

名 称	形 状 寸 法	数 量	单 位	单 価	金 額	単価表号	摘 要
PVC C Class Pipe	6" - C	204	m	381 <sup>円</sup>	77,724 <sup>TK</sup>		
	4" - C	323	"	169	54,587		
	3" - C	371	"	106	39,326		
	2" - C	18	"	57	1,026		
PVC Socket	6"	57	ヶ	155	8,835		
	4"	89	"	52	4,628		
	3"	102	"	38	3,876		
	2"	5	"	21	105		
PVC Bend	6" x 90°	1	ヶ	358	358		
	4" x 90°	2	"	174	348		
	3" x 90°	4	"	87	348		
	2" x 90°	2	"	31	62		
PVC Tee	6" x 3"	1	ヶ	352	352		
	4" x 3"	2	"	238	476		
	3" x 2"	5	"	110	550		
PVC Reducer	6" x 4"	1	ヶ	437	437		
	4" x 3"	1	"	78	78		
	3" x 2"	4	"	38	152		
SGR Elbow	2"	1	"	25	25		
鋼 管	2"	30	m	121	3,630		
計					196,923 <sup>TK</sup>		
		196,923 x	257	=	1,969,000 <sup>円</sup>		
			25.69				

管路資材費明細書

(日本から資材供与)

¥ 1,148,000 円

名 称	形 状 寸 法	数 量	単 位	単 価	金 額	単価表 番 号	摘 要
ドレッサーチーズ	φ150 x 2"	4	ヶ	26,976	107,904		
	φ 75 x 2"	5	"	4,452	22,260		
LAソケット	φ 50	1	"	191	191		
給水バルブ	φ 50	49	"	12,500	612,500		
スルースバルブ	φ150	1	"	32,100	32,100		
	φ100	1	"	17,200	17,200		
	φ 75	1	"	12,100	12,100		
ソケットフランジ	φ150	2	"	12,750	25,500		
	φ100	2	"	10,100	20,200		
	φ 75	2	"	6,800	13,600		
接 着 剤		10	kg	2,000	20,000		
計					883,555		
					1,016,000		資材増 15%
輸 送 費					132,000		
合 計					1,148,000		

スプリンクラーセット 資材費明細書

¥ 1,582,000円

名 称	形 状 寸 法	数 量	単 位	単 価	金 額	単価表号	摘 要
移動式アルミ管	2ライン1セット	1	当り				
取水キャップ	φ150	1	個	22,400	22,400		
取水ホース	φ150 l=1.0m	1	本		6,000		
アルミニウム管	φ150 接続継 l=4.5m 手付	4	"	10,200	40,800		
"	φ50 l=6.0m	6	"	11,600	69,600		
"	φ50 上継手 l=6.0m 付	8	"	12,500	100,000		
アルミニウム立上り管	φ20 三脚付 l=1.0m	8	"	5,200	41,600		
スプリンクラー		8	個	4,800	38,400		
チーズカップラー	φ50	1	"	12,800	12,800		
ベンドカップラー	φ50	2	"	6,900	13,800		
エンドプラグ	φ50	3	"	2,500	7,500		
圧力計		1	"		5,700		
パッキンの予備							
立上り用		8	個	240	1,920		
カップラー用		23	"	550	12,650		
継手 U-パッキング		1	"	150	150		
分水用		1	"	400	400		
計					373,720		
4セット					1,494,880		予備1セット含む
輸送費					88,000		
合 計					1,582,880		
					1,582,000		

供与資材数量一覧表（追加分）

名 称	規 格	単 位	数 量	備 考
1. 管 踏 資 材				
硬質塩ビ管	φ150 x 4.0m	m	204	
(直管)	φ100 x 4.0m	"	323	
	φ 75 x 4.0m	"	371	
	φ 50 x 4.0m	"	18	
TSソケット	φ150	ヶ	57	
	φ100	"	89	
	φ 75	"	102	
	φ 50	"	5	
曲 管	φ150 x 90°	ヶ	1	
	φ100 x 90°	"	2	
	φ 75 x 90°	"	4	
	φ 50 x 90°	"	2	
ドレッサーチーズ	φ150 x 2"	ヶ	4	
	φ 75 x 2"	"	5	
T字管	φ150 x 75	ヶ	1	
	φ100 x 75	"	2	
	φ 75 x 50	"	5	
片落管	φ150 x 100	ヶ	1	
	φ100 x 75	"	1	
	φ 75 x 50	"	4	
LAソケット	φ 50	ヶ	1	
エルボ	φ 50	ヶ	1	
鋼 管	φ 50	m	30	
給水バルブ	φ 50	ヶ	49	
スルースバルブ	φ150	ヶ	1	
	φ100	"	1	
	φ 75	"	1	







## 付属图面集

### DRAWING LIST

<u>TITLE</u>	<u>DWG. No.</u>
GENERAL PLAN (S=1/2,000)	1
GENERAL PLAN (S=1/1,000)	2
SKELTON OF PIPELINE SYSTEM	3
DEEP WELL	4
RESERVOIR	5
PUMP HOUSE	6
IRRIGATION FACILITIES	7
TYPICAL SECTION OF PIPELINE AND VALVES	8
TYPICAL SECTION OF ROADS AND DRAINAGE CANAL	9
DRAINAGE CANAL CROSSING	10
PROFILE OF FARM ROAD -1/3-	11
PROFILE OF FARM ROAD -2/3-	12
PROFILE OF FARM ROAD -3/3-	13



GENERAL PLAN OF THE EXPERIMENTAL FARM FOR THE INSTITUTE OF POSTGRADUATE STUDIES IN AGRICULTURE (IPSA), BANGLADESH



LEGEND

- : Plan for 1st Stage
- == : Plan for after 1st Stage
- U-3 : Farm Block NO.
- 0.5ha : Acreage for Cultivation
- E.L. : Planned Field Elevation in meter
- : Irrigation Pipeline Hydrant
- : Drain

- D.W.P. : Deep Well Pump
- P.H. : Pump House
- M.R. : Main Road
- S.R. : Secondary Road

SCALE 1:2,000



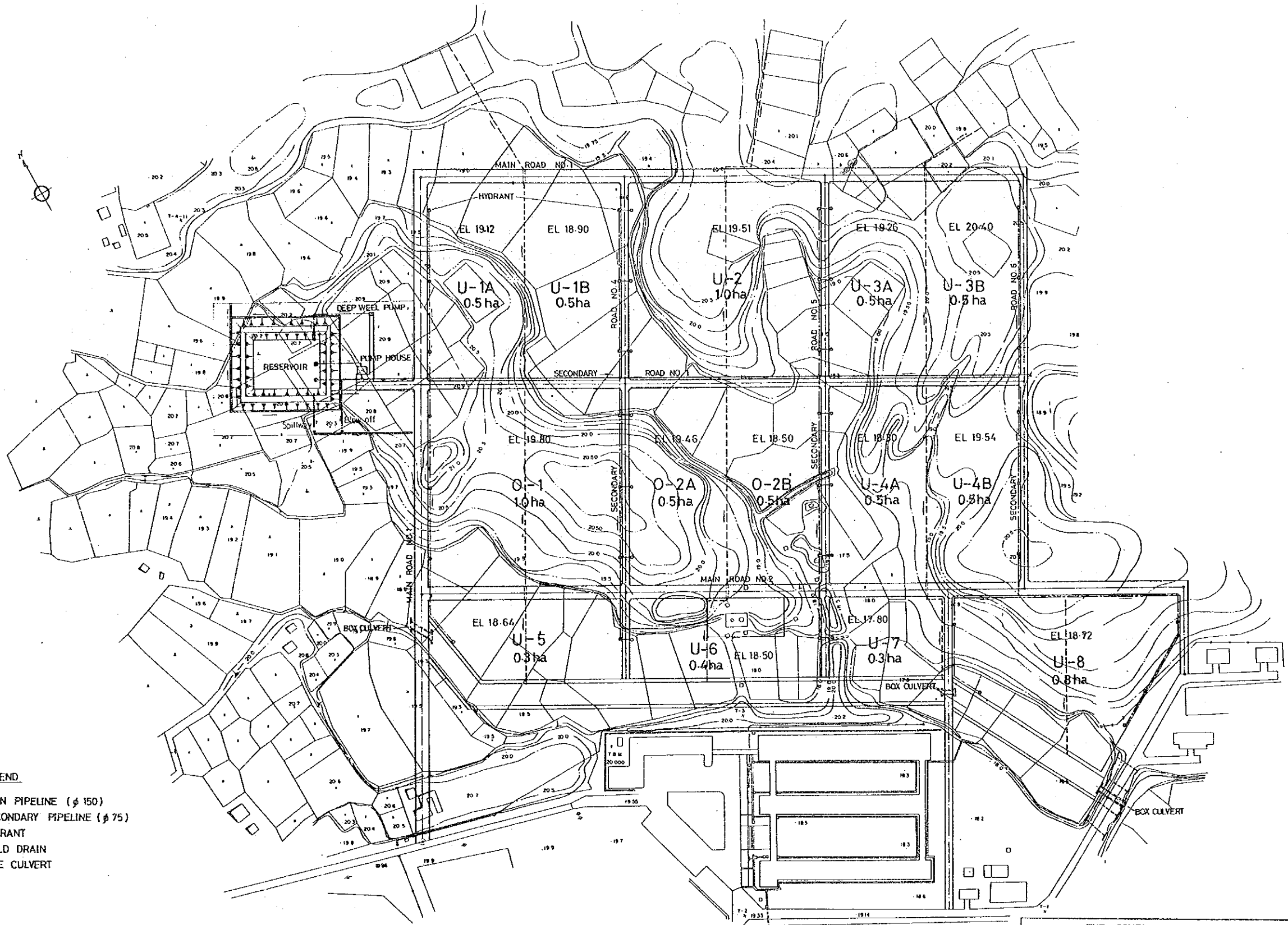
LEGEND

- : Electric Power Line
  - : Drainage Canal and Canal
  - : Farm House and Shop
  - : Temporary Store Room
  - : Temporary Storage Pond
  - : Plot Height, in Meter
  - : Center Line in Meter
- WS : Warehouse
  - L : Laboratory
  - E : Electrical Rooms
  - DW : Deep Well
  - P : Pump House and Storage
  - WT : Water Tower
  - : Main and Secondary Road

LEGEND

- : Plotted Field
  - : Field
  - : Forest of Broad Leaf
  - : Forest of Coniferous Tree
  - : Forest of Deciduous Tree
  - : Road (in Meter)
  - : Road (by Drink)
  - : Unplotted Field
- F : Functional Buildings
  - NB : Non-Residential Buildings (No. Number)
  - : Farm (No. Number)
  - : Farm (No. Number)
  - S : Staff Quarters
  - G : Guest House
  - H : Hostel (For Men)
  - H : Hostel (For Women)
  - H : Hostel (For Drink)
  - C : Community House

THE GOVERNMENT OF BANGLADESH EXPERIMENTAL FARM CONSTRUCTION PROJECT FOR THE INSTITUTE OF POSTGRADUATE STUDIES IN AGRICULTURE (IPSA), SALNA	
TITLE OF DRAWING GENERAL PLAN 1/2	
JAPAN INTERNATIONAL COOPERATION AGENCY TOKYO JAPAN	DWG.NO. 1



**LEGEND**

- MAIN PIPELINE (φ 150)
- - - SECONDARY PIPELINE (φ 75)
- HYDRANT
- - - FIELD DRAIN
- PIPE CULVERT

SCALE 1:1,000  
 0 50 100 METER

THE GOVERNMENT OF BANGLADESH EXPERIMENTAL FARM CONSTRUCTION PROJECT FOR THE INSTITUTE OF POSTGRADUATE STUDIES IN AGRICULTURE (IPSA), SALNA	
TITLE OF DRAWING <b>GENERAL PLAN 2/2</b>	
JAPAN INTERNATIONAL COOPERATION AGENCY TOKYO JAPAN	DW.GNO. <b>2</b>