3-4 Construction Planning

3-4-1 Construction Mothod

(1) Jatisari Pests Forecasting Center

a. The works for the Jatisari Center are composed of the following construction works.

- Farm land consolidation to make the experimental farm for studies on rat of paddy field,
- Intake works and shifting works of irrigation canal to take water from Jatiluhur Tertiary Canal,
- Works for auxiliary water resources by a deep well pump,
- Foundation works for a laboratory for studies on rat, etc. and new construction and repairing works for other related facilities.

b. Each work shall be carried out by general contractors except for the provision of one diesel engine generator (10KVA) for DGFCA by JICA and the provision of fence panels covering a length of 640m for installation work of rat fences also by JICA.

c. If main works are started after May, the number of no-rainfall-days in a month is estimated at 24 ∿ 28 days, therefore, the available days for working in a month will be 25days.

d. Equipment works shall be applied to land grading, concrete work, pipe work, etc.

Dump track (4t)	:	For carrying purchased soil into the site.
Bulldozer (3t)	:	For land grading and compaction
Road roller (3t)	:	For rolled compaction of gravel and asphalt
Concrete mixer	:	Work for concrete canal and a pump shed, etc.
Vibrator	:	- ditto-
Percussion Type Boring Machine	:	For digging a deep well
Engine Weldor	:	For installation of rat fences and other welding work
Pipe cutter	:	For pipe work
Drainage pump	:	For bypass works, temporary works and dry works

e. The bulk factors of soil shall be as follows.

Soil Proterty	Natural Grand Soil	Excavated Soil	Compacted Soil
Sand	1.0	1.2	0.95
Sandy soil with Gravel	1.0	1.25	0.9
Gravel	1.0	1.2	1.0
Clay (general)	1.0	1.35	0.9
Clay (in the farm)	1.0	1.35	1.0

f. For road bed, sandy soil with gravel is required, and this soil shall be taken from borrow pits within 10 Km from the Center. Gravel for road paving shall be purchased.

g. Surplus soil shall be moved to the land between the farm and the site for buildings and shall be graded.

h. The land for contractors' site office, house accomodation for laborers, keeping place of materials, ware house etc. is the space to the west of the entrance of the Center. About contractors' entry into the site, consultation with officials of the Center shall be required beforehand.

i. The existing maintenance road outside of the Center shall be used as a construction road. Some part of the fence will be removed for executing the work, and the fence shall be installed again. Works for foundation of the rate laboratory, deep well, etc. will be done in the site for the building, however, the existing brick pavement in the site shall not be used for the road, therefore, a temporary construction road outside the brick pavement shall be made and used.

j. The cost of electricity and water for the works shall be covered by the Temporary Work Cost of the contractor, however, when the contractor want to use facilities of the Center, consultation with officials of the Center shall be required.

k. As for boring works of a deep well, existence of ground water layer shall be confirmed from the

ground surface by electric prospective survey before boring. After establishing the deep well (casing), the well shall be washed and cleaned well, then a pumping test shall be carried out.

(2) Celuk Field Laboratory

a. The works for Celuk F.L are to be operated in the laboratory (0.5 ha) and in the existing paddy field (0.4 ha), and the main works are earth work, concrete work, masonry work, pipe work, fencing work, etc. Machine works are carrying purchased soil into the site by a dump truck, preparing concrete for the regulating water tank by a concrete mixer, rolled compaction for gravel metalling, etc., and other works shall be done by manpowr.

b. There are no materials provided for the works. The Contractor shall prepare rat fences also, and factory processing and on-site-processing will be necessary for the construction.

c. The surface soil within the depth of 40cm from the ground surface is used for the paddy field in the farm, and surface soil treatment shall be done. Such surface soil should be kept put aside temporally, therefore, the transportaton plan for cutting and banking work requires full of care.

d. The scheduled date for the commencement of the work is to be after Hari Raya. The number of rainy days from May upto July is 6 days in a month on the average, so the available days

for construction will be 25 days in a month.

e. The Contractor shall negotiate and consult with officials of the Laboratory over the usage of an open space to the north west of the site of the Laboratory for the temporary office of the Contractor.

f. When the installation of the foundation for fences is carried out, special care will be necessary so as to maintain the flow of irrigation and drainage canal located outside the boundary of the site.

3-4-2 Construction Time Schedule

The required time for the improvement works for the facilities of Jatisari Center and Celuk F.L is as follows. As for the Chart of the Construction Time Schedule, see Fig - 15 and 16.

ITEM	Required Time		Remarks
	Jatisari	Celuk	
	month	month	
Preparatory Period for the Contract	1.0	-	including the in Celuk
Preparatory Period for construction	0.5	0.5	
Construction Period	3.5	2.2	
Running Test Period	0.2	0.1	
Demobilization Period	0.3	0.2	
Total	5.5	3.0	

The Contract is composed of all the works of both Jatisari and Celuk, that is, one contract for two works. The contract period shall be 5.5 months including preparatory period for the Contract (1 month) and settlement period (0.3 month).

The improvement works of Jatisari and Celuk shall be commenced at the same time, and the works in Celuk will be completed faster than that in Jatisari. The overall construction time schedule is shown in the following figure.

Fig.-15

CONSTRUCTION TIME SCHEDULE (JATISARI)

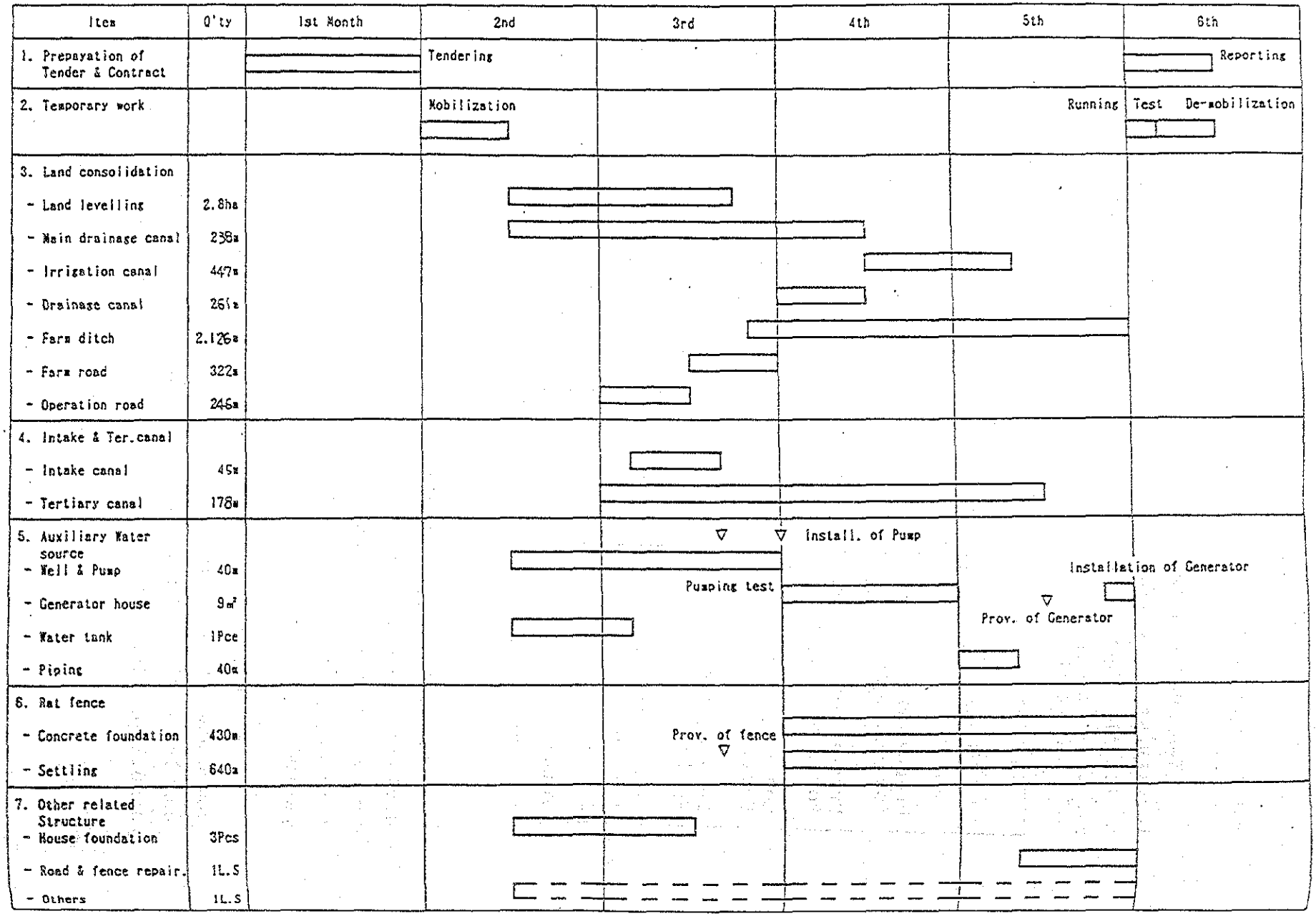


Fig.-16

CONSTRUCTION TIME SCHEDULE (CEIUK)

Item	Q'ty	1st Month	2nd	3rd	4th	5th	6th
1. Preparation of Tender & Contract					Reporting		
2. Temporary work			Mobilization		Running Test / De-Mobilization		
3. Land consolidation							
- Land levelling	0.5ha						
- Irrigation canal	130m						
- Drainage canal	230m						
- Farm road	200m						
- Cross drain	1L.S						
4. Intake & Farm pond							
- Intake canal	60m						
- Turnout	1Pce						
- Farm pond	1Pce						
- Piping	1L.S						
5. Rat fencing							
- Foundation	275m		Fabrication of fence				
- Installation	275m						
6. Other related Str.							
- Access road	1Pce						
- Masonry Wall	77m						
- Fence repair	1L.S						
- Mounding	500m^3						
- Others	1L.S						

CHAPTER 4 COST ESTIMATION

4-1 Procurement Method for Materials supplied by JICA

This improvement work is necessary to be carried out immediately as the infrastructure improvement works for expediting smooth operation of the project type technical cooperation activities.

However, the project budget is limitted, therefore the rat fences and a diesel engine generator for Jatisari Center are necessary to be supplied by means of JICA's procurement method. As for the said rat fences the supplying procedure has already promoted, and will be manufactured and delivered to Jatisari Center at an early date. It is desirable to procure equipments in Indonesia, however, considering specifications and standards of equipments a diesel engine generator will be procured in Japan.

(1) Materials to be supplied through the Project Experts (JICA)

a. Rat fences covering 640m (320 panels)

Standard:

Height x Width:	1.50x2.00m/panel
Supporting Pole:	L - 3x30x30
Connecting Plate:	PL - 3x20
Wire Net:	Plain Mesh (Galvanized) Diameter of wire ϕ 0.9mm, 4 mesh (Pitch 6.4mm)
Galvanized iron plate:	Coloured, long size 0.27mm thick, width 914mm

(2) Equipment & Materials to be procured in Japan

a. Diesel engine generator: 1 unit

Standard: Type: DCA-14LBM
50Hz, 200V/220V, 10KVA

Engine: S2E, 14ps/1,500rpm

Attachment: Duct & Pipe, etc.

Volume & Weight : $1.7m^3$, G/W 570kg

The above two items are necessary to be procured so as to be in time for the Construction Time Schedule.

4-2 Project Cost

(1) Estimation of Construction Cost

The standard price used by CIPTA KARYA's office at Jatisari and Denpasar and that used by a office of irrigation project and market prices are applied to the material cost and the labor cost.

The construction cost is including cost for temporary works, common temparary works, site expenses, general administration, over head, profit and value added tax.

The conversion rate ¥1.0 = Rp.12.8 was applied to the calculation

(2) Project Cost

The total project cost will be as follows.

1.	Infrastructure Improvement Works	¥22,400,000
2.	Supplied Equipment and Material	¥ 1,500,000
	Project Cost	¥23,900,000

The Cost for the rat fences is excluded in the Project Cost because the fences will be supplied as materials for studies of expert. The details of the Project Cost are summerized in the tables attached hereto.

BREAKDOWN OF PROJECT COST

A.	Construction Cost			
	I. Jatisari Center			
	1) Land Consolidation	2.8 ha	Rp.	51,700,000
	2) Intake and Tertiary Canal	1 L.S.	Rp.	14,500,000
	3) Auxiliary Water Resources	1 L.S.	Rp.	45,800,000
	4) Installation of Rat Fence	1 L.S.	Rp.	15,900,000
	5) Other Related Structures	1 L.S.	Rp.	19,800,000
	6) Temporary Works	5%	Rp.	7,385,000
	Sub Total		Rp.	155,085,000
	II. Celuk Field Laboratory			
	1) Land Consolidation	0.5 ha	Rp.	9,700,000
	2) Intake and Regulating Water Tank	1 L.S.	Rp.	9,400,000
	3) Rat Fence	1 L.S.	Rp.	8,800,000
	4) Other Related Structures	1 L.S.	Rp.	15,182,000
	5) Temporary Works	5%	Rp.	2,154,000
	Sub Total		Rp.	45,236,000
	Total		Rp.	200,321,000
	III. Indirect Cost			
	1) Common Temporary Works and Site Expenses	2.5%	Rp.	5,008,000
	2) Overhead Expenses	10%	Rp.	20,533,000
	3) V.A.T. (P.P.N.)	10%	Rp.	22,586,000
	Sub Total		Rp.	48,127,000
	Total		Rp.	248,448,000
B.	Reservation	1 L.S.	Rp.	24,832,000
C.	Miscellaneous	1 L.S.	Rp.	13,440,000
	Grand Total		Rp.	286,720,000
			¥	22,400,000

4 - 3 BILL OF QUANTITIES

SUMMARY OF BILL OF QUANTITIES

No. 1

DIVISION	TOTAL (Rp.)
A. CONSTRUCTION OF STRUCTURES FOR JATISARI CENTER	
1. Improvement of Land Consolidation	
1-1 Land Consolidation	Rp.
1-2 Main Drainage Canal	Rp.
1-3 Main Irrigation Canal	Rp.
1-4 Lateral Drainage Canal	Rp.
1-5 Farm Road	Rp.
1-6 Operation & Maintenance Road	Rp.
Sub total	Rp.
2. Improvement of Intake Facilities & Tertiary Canal	
2-1 Intake & Intake Canal	Rp.
2-2 Tertiary Canal	Rp.
Sub total	Rp.
3. Improvement of Auxiliary Water Resources	
3-1 Deep Well	Rp.
3-2 Installation of Submersible Pump Facilities	Rp.
3-3 Generator House	Rp.
3-4 Regulating Water Tank	Rp.
Sub total	Rp.

No. 2

DIVISION	TOTAL (Rp.)
4. Improvement of Rat Fence	
4-1 Foundation	Rp.
4-2 Installation of Rat Fence	Rp.
4-3 Automatic Gate	Rp.
Sub total	Rp.
5. Improvement of Other Related Structures	
5-1 Foundation of Bertebrate Laboratory	Rp.
5-2 Foundation of Net House	Rp.
5-3 Improvement of Existing Operation Road	Rp.
5-4 Improvement of Access Road & Gate	Rp.
5-5 Repairement of Fence	Rp.
5-6 Miscellaneous Work	Rp.
Sub Total	Rp.
6. Temporary Works	Rp.
Total	Rp.
B. CONSTRUCTION OF STRUCTURES FOR CELUK FIELD LABORATORY	
1. Improvement of Land Consolidation	
1-1 Land Consolidation	Rp.
1-2 Irrigation Cnal	Rp.
1-3 Drainage Canal	Rp.

No. 3

DIVISION	TOTAL (Rp.)
1-4 Farm Road	Rp.
Sub total	Rp.
2. Improvement of Intake & Regulating Water Tank	
2-1 Intake Canal & Turnout	Rp.
2-2 Regulating Water Tank	Rp.
Sub total	Rp.
3. Improvement of Rat Fence	
3-1 Rat Fence	Rp.
Sub total	Rp.
4. Improvement of Other Related Structures	
4-1 Access Road	Rp.
4-2 Masonry Concrete Rotaining Wall	Rp.
4-3 Mounding Works	Rp.
4-4 Repairement of Fence	Rp.
4-5 Miscellaneous Works	Rp.
Sub total	Rp.
5. Temporary Works	Rp.
TOTAL	Rp.
TOTAL (Jatisari & Celuk)	Rp.

No. 4

DIVISION	TOTAL (Rp.)
C. INDIRECT COST	
1. Common Temporary Works and Site Expenses	Rp.
2. Overhead Expenses	Rp.
3. V.A.T. (P.P.N.)	Rp.
GRAND TOTAL	Rp.

BILL OF QUANTITIES

Item	Description	Unit	Quantities	Unit Price (Rp)	Price (Rp)	Remarks
	Jatisari Center					
1.	Improvement of Land Consolidation					
1-1	Land Cosolidation					
a.	Land Levelling					
101	Excavation by equipment	m^3	1,872.0			L=50 m
102	Excavation by manpower	"	468.0			
103	Hauling	"	468.0			L=50 m
104	Fill and compaction	"	468.0			
	Sub-total					
b.	Land Shape Adjustment					
105	Irrigation Canal (fill and preparation)	m	1,062.0			Earth ditch
106	Drainage Canal (excavation,fill and preparation)	"	1,064.0			Earth ditch
	Sub-total					
c.	Miscellaneous Works					
107	Access road to field and land preparation,etc.	L.S.	1.0			10 %
	Total					
1-2	Main Drainage Canal					
108	Excavation by manpower	m^3	357.0			

Item	Description	Unit	Quantities	Unit Price (Rp)	Price (Rp)	Remarks
109	Backfill with compaction by manpower	m^3	119.0			
110	Hauling of surplus soil	"	238.0			
111	Reinforced concrete	"	105.00			
112	Levelling concrete	"	11.90			
113	Reinforcement bar	ton	4.200			
114	Form	m^2	666.40			
115	Cobble stone	m^3	35.70			
116	Culvert	place	1.0			
117	Miscellaneous works concrete joint, slope finishing,etc.	L.S.	1.0			
	Total					
1-3 Main Irrigation Canal						
118	Excavation by manpower	m^3	143.0			
119	Backfill with compaction by manpower	"	72.0			
120	Hauling of surplus soil	"	71.0			
121	Leveling concrete	"	8.96			
122	Plain concrete	"	31.36			
123	Cobble stone	"	17.92			
124	Form	m^2	358.40			
125	Concrete plate for culvert and access to fields	pce	54.0			0.1x0.4x1.0 m
126	Wooden stop log	pce	40.0			
127	Miscellaneous work concrete joint, backfill, fill,slope finishing,etc.	L.S.	1.0			
	Total					
1-4 Lateral Drainage Canal						
128	Excavation by manpower	m^3	141.0			

Item	Description	Unit	Quantities	Unit Price (Rp)	Price (Rp)	Remarks
129	Hauling of surplus soil	m^3	141.0			
130	Masonry concrete	"	105.70			
131	Mortar plastering	m^2	410.00			
132	Reinforced concrete plate for culvert and access to fields	pce	50.0			0.1x1.2x1.0 m
133	Drain pipe with wire net PVC ϕ100 x 2 pce	pce	1.0			
134	-ditto- PVC ϕ100 for farm ditch	pce	10.0			
135	Miscellaneous work	L.S.	1.0			
	Total					
1-5 Farm Road						
a.	Main Farm Road					
136	Excavation by manpower	m^3	420.0			
137	Earthfill by manpower	"	420.0			
138	Earthfill for purchased sandy soil	"	375.0			
139	Placement of crushed stone	"	63.00			
140	Miscellaneous work slope finishing,etc.	L.S.	1.0			5 %
	Sub-total					
b.	Lateral Farm Road					
141	Excavation by manpower	m^3	180.0			
142	Earthfill by manpower	"	180.0			
143	Earthfill for purchased sandy soil	"	130.0			
144	Placement of crushed stone	"	17.00			

Item	Description	Unit	Quantities	Unit Price (Rp)	Price (Rp)	Remarks
145	Miscellaneous work slope finishing,etc.	L.S.	1.0			5 %
	Sub-total					
	Total					
1-6 Operation & Maintenance Road						
146	Excavation by manpower	m^3	180.0			
147	Earthfill by manpower	"	440.0			
148	Earthfill for purchased sandy soil	"	396.0			
149	Placement of crushed stone	"	73.80			
150	Finishing for excavated slope	m^2	160.0			
151	Finishing for filled slope	"	160.0			
152	Concrete side ditch	m	215.0			
153	Concrete plate for culvert	pce	6.0			0.1x0.4x1.0 m
154	Miscellaneous work	L.S.	1.0			
	Total					
	Total (1-1~1-6)					
2. Improvement of Intake Facility & Tertiary Canal						
2-1 Intake & Intake Canal						
a.	Intake					
201	Evcavation by manpower	m^3	4.0			
202	Backfill with compaction by manpower	"	1.5			
203	Earthfill by manpower	"	3.0			
204	Reinforced concrete	"	0.92			

Item	Description	Unit	Quantities	Unit Price (Rp)	Price (Rp)	Remarks
205	Levelling concrete	m^3	0.16			
206	Reinforcement bar	ton	0.037			
207	Form	m^2	6.90			
208	Masonry concrete	m^3	0.63			
209	Screen	pce	1.0			
210	Miscellaneous work	L.S.	1.0			
	Sub-total					
b.	Intake Canal					
211	Excavation by manpower	m^3	10.0			
212	Backfill with compaction by manpower	"	5.0			
213	Earthfill by manpower	"	10.0			
214	Reinforced concrete	"	0.66			
215	Levelling concrete	"	0.97			
216	Reinforcement bar	ton	0.026			
217	Form	m^2	71.30			
218	Strainer	pce	1.0			
219	Sluice valve 100A	"	1.0			JIS B2062
220	Concrete plate for culvert	"	6.0			0.1x0.4x1.0 m
221	Steel wire net	"	2.0			
222	Check plate	"	1.0			0.8x0.8 m
223	Plain concrete	m^3	2.30			
224	Cobble stone	"	2.00			
225	Miscellaneous work concrete joint, installation of pipes, slope finishing, etc.	L.S.	1.0			
	Sub-total					
	Total					

Item	Description	Unit	Quantities	Unit Price (Rp)	Price (Rp)	Remarks
2-2 Tertiary Canal						
226	Excavation by manpower	m^3	178.3			
227	Backfill with compaction by manpower	"	80.8			
228	Earthfill by manpower	"	89.2			
229	Reinforced concrete	"	54.58			
230	Levelling concrete	"	9.32			
231	Reinforcement bar	ton	2.729			
232	Form	m^2	408.25			
233	Reinforced concrete plate for culvert	pce	90.0			
234	Cobble stone	m^3	28.00			
235	Miscellaneous work concrete joint,slope finishing,etc.	L.S.	1.0			
	Total					
2-3 Other Related Structure (Drainage Canal in the Home Yard)						
236	Concrete pipe syphon (ø300)with concrete boxes	place	1.0			
237	Reinforced concrete flume	m	131.0			
238	Cross culvert	place	1.0			
239	Miscellaneous work concrete joint,foundation work,earth work,etc.	L.S.	1.0			
	Total					
3. Improvement of Auxiliary Water Resources						
3-1 Deep Well						

Item	Description	Unit	Quantities	Unit Price (Rp)	Price (Rp)	Remarks
301	Temporary work	L.S.	1.0			
302	Percussion drilling	m	40.00			ϕ200 mm
303	Electrical logging	time	1.0			
304	Installation of casing pipes,PVC 150A	m	40.00			Including screen pipes
305	Finishing work of drilling hole	m	40.00			
306	Pumping test	hr	72.00			
307	Cleaning of hole	m	40.00			
308	Depreciation cost of equipments	L.S.	1.0			
309	Transportation	L.S.	1.0			
310	Miscellaneous work	L.S.	1.0			
	Total					
3-2 Installation of Submersible Pump Facilities						
311	Submersible pump for deep well with accessories	set	1.0			Pump type 50-BHS,5-2.2 class
312	Installation of pump facilities	L.S.	1.0			
313	Test run	hr	24.00			
314	Miscellaneous work	L.S.	1.00			
	Total					
3-3 Generator House						
315	Excavation by manpower	m^3	10.6			
316	Backfill with compaction by manpower	"	3.0			
317	Hauling of surplus soil	"	7.6			
318	Cobble stone	"	2.41			

Item	Description	Unit	Quantities	Unit Price (Rp)	Price (Rp)	Remarks
319	Levelling concrete	m^3	0.27			
320	Reinforced concrete	"	11.90			
321	Plain concrete	"	1.96			
322	Form	m^2	104.40			
323	Reinforcement bar	ton	0.700			
324	Painting of ceiling and wall	m^2	45.00			
325	Installation of aluminium sash window,H-1406	pce	2.0			
326	Installation of aluminium sash door,folding type	"	1.0			W1.6xH1.8 m
327	Water proof mortar	m2	16.00			
328	Mortar plastering	"	9.00			
329	Installation of Diesel engine generator	set	1.0			10KVA with pipe and duct
330	Test run	day	2.0			
331	Miscellaneous work	L.S.	1.0			
	Total					
3-4	Regulating Water Tank					
332	Excavation by manpower	m^3	43.0			
333	Backfill with compaction by manpower	"	20.0			
334	Hauling of surplus soil	"	43.0			
335	Masonry concrete	"	40.00			
336	Water proof mortal	m^2	63.60			
337	Reinforced concrete	m^3	4.00			
338	Plain concrete	"	0.50			
339	Form	m^2	25.00			
340	Wooden cover	m^3	0.23			
341	Reinforcement bar	ton	0.320			
342	Mortar plastering	m^2	35.40			
343	Sluice valve,100A	pce	1.0			JIS B 2062

Item	Description	Unit	Quantities	Unit Price (Rp)	Price (Rp)	Remarks
344	Piping,PVC 100A	m	30.00			
345	Check plate	pce	1.0			0.9x0.9 m
346	Miscellaneous work	L.S.	1.0			
	Total					
4. Improvement of Rat Fence						
4-1 Foundation						
401	Excavation by manpower	m^3	484.0			
402	Earthfill by manpower	"	155.0			
403	Backfill with compaction by manpower	"	363.0			
404	Reinforcement bar	ton	0.600			
405	Cobble stone	m^3	32.30			
406	Levelling concrete	"	10.75			
407	Plain concrete	"	105.30			
408	Form	m^2	769.50			
409	Concrete joint and other miscellaneous work	L.S.	1.0			
	Total					
4-2 Installation of Rat Fence						
411	Steel support	pce	70.0			
412	Installation of fence panel	m	640.00			
413	Fabrication of corner panel	pce	5.0			L=2 m/pce
414	Miscellaneous work	L.S.	1.0			
	Total					
4-3 Automatic Gate						

Item	Description	Unit	Quantities	Unit Price (Rp)	Price (Rp)	Remarks
415	Fabrication and installation of gate	pce	1.0			H1.3xB3.0 m
416	Plain concrete	m^3	0.21			
417	Form	m^2	2.20			
418	Miscellaneous work plug concrete,cobble stone, etc.	L.S.	1.0			
	Total					
5. Improvement of Other Related Structures						
5-1 Foundation of Bertebrate Laboratory						
501	Excavation by manpower	m^3	32.0			
502	Backfill with compaction by manpower	"	16.0			
503	Hauling of surplus soil	"	16.0			
504	Cobble stone	"	8.17			
505	Levelling concrete	"	1.57			
506	Reinforced concrete	"	8.29			
507	Plain concrete	"	4.85			
508	Form	m^2	65.80			
509	Reinforcement bar	ton	0.300			
510	Swing faucet,13A	pce	1.0			Horizontal type
511	Installation of PVC 20A	m	50.0			
512	Anchor bolt	set	950.0			ø13,L=200 mm
513	Miscellaneous work	L.S.	1.0			
	Total					
5-2 Foundation of Net House						
514	Excavation by manpower	m^3	41.5			
515	Backfill with compaction by manpower	"	20.0			

Item	Description	Unit	Quantities	Unit Price (Rp)	Price (Rp)	Remarks
516	Hauling of surplus soil	m^3	21.5			
517	Cobble stone	"	19.39			
518	Levelling concrete	"	1.76			
519	Reinforced concrete	"	11.85			
520	Plain concrete	"	21.03			
521	Form	m^2	111.66			
522	Reinforcement bar	ton	0.404			
523	Swing faucet,13A	pce	1.0			Horizontal type
524	Anchor bolt	set	28.0			
525	Miscellaneous work	L.S.	1.0			
	Total					
5-3 Improvement of Existing Operation Road						
526	Excavation by manpower	m^3	188.4			
527	Hauling of surplus soil	"	188.4			
528	Asphalt pavement	m^2	480.00			
529	Trimming of ditch	m	314.00			
530	Masonry concrete	m^3	45.00			
531	Miscellaneous work	L.S.	1.0			
	Total					
5-4 Improvement of Access Road & Gate						
532	Removal of existing gate	pce	1.0			
533	Removal of concrete	m^3	2.00			
534	Excavation by manpower	"	15.0			
535	Foundation work	m^2	40.00			
536	Asphalt pavement	"	40.00			
537	Plain concrete	m^3	0.42			
538	Form	m^2	4.48			
539	Fabrication and installation of steel gate	pce	2.0			

Item	Description	Unit	Quantities	Unit Price (Rp)	Price (Rp)	Remarks
540	Cobble stone	m^3	0.10			
541	Miscellaneous work	L.S.	1.0			
	Total					
5-5	Repair of Fence					
542	Installation of new fence (barbed wire)	m	45.00			
543	Repair of existing rat fence	m	750.00			
	Total					
5-6	Miscellaneous Work	L.S.	1.0			
6.	Temporary Works	L.S.	1.0			5 %
	Total (1 to 6)					

Item	Description	Unit	Quantities	Unit Price (Rp)	Price (Rp)	Remarks
	Celuk Field Laboratory					
1.	Improvement of Land Consolidation					
1-1	Land Consolidation					
a.	Land Levelling					
701	Excavation of surface soil by manpower	m^3	840.0			Including deposit
702	Excavation by manpower	"	420.0			
703	Hauling	"	420.0			
704	Earthfill by manpower	"	420.0			
705	Backfill of surface soil with compaction by manpower	"	840.0			Including hauling
	Sub-total					
b.	Miscellaneous Works					
706	Access road to field and land preparation, ridge, etc.	L.S.	1.0			
	Total (a~b)					
1-2	Irrigation Canal					
707	Excavation by manpower	m^3	50.0			
708	Backfill with compaction by manpower	"	25.0			
709	Earthfill by manpower	"	25.0			
710	Cobble stone	"	6.00			
711	Levelling concrete	"	3.00			
712	Plain concrete	"	10.50			
713	Form	m^2	120.00			

Item	Description	Unit	Quantities	Unit Price (Rp)	Price (Rp)	Remarks
714	Concrete plate	pce	30.0			0.1x0.4x1.0 m
715	Stop log	"	10.0			
716	Miscellaneous work	L.S.	1.0			
	Total					
1-3 Drainage Canal						
717	Excavation by manpower	m^3	64.0			
718	Backfill with compaction by manpower	"	35.0			
719	Earthfill by manpower	"	29.0			
720	Cobble stone	"	6.40			
721	Levelling concrete	"	3.20			
722	Plain concrete	m^3	12.80			
723	Form	m^2	160.00			
724	Drain pipe PVC 100A	m	8.00			2 m/pce x 4 places
725	Miscellaneous work	L.S.	1.0			
	Total					
1-4 Farm Road						
a.	Main Farm road					
726	Excavation by manpower	m^3	308.0			
727	Hauling of surplus soil	"	308.0			
728	Earthfill for purchased sandy soil	"	62.0			
729	Placement of crushed stone	"	16.90			
730	Miscellaneous work slope finishing,etc.	L.S.	1.0			
	Sub-total					

Item	Description	Unit	Quantities	Unit Price (Rp)	Price (Rp)	Remarks
b.	Lateral Farm Road					
731	Excavation by manpower	m^3	56.3			
732	Hauling of surplus soil	"	56.3			
733	Earthfill for purchased sandy soil	"	59.0			
734	Placement of crushed stone	"	13.80			
735	Miscellaneous work slope finishing,etc.	L.S.	1.0			
	Total (a~b)					
2. Improvement of Intake and Regulating Water Tank						
2-1 Intake Canal and Turnout						
a.	Intake Canal					
801	Excavation by manpower	m^3	22.0			
802	Backfill with compaction by manpower	"	12.1			
803	Earthfill by manpower	"	10.0			
804	Cobble stone	"	2.40			
805	Levelling concrete	"	1.10			
806	Plain concrete	"	4.40			
807	Form	m^2	55.00			
808	Miscellaneous work	L.S.	1.0			
	Sub-total					
b.	Turnout					
809	Cobble stone	m^3	0.20			
810	Levelling concrete	"	0.10			
811	Plain concrete	"	0.40			

Item	Description	Unit	Quantities	Unit Price (Rp)	Price (Rp)	Remarks
812	Concrete plate	pce	5.0			
813	Stop log	"	2.0			
814	Form	m^2	5.00			
815	Miscellaneous work	L.S.	1.0			
	Sub-total					
	Total (a~b)					
2-2	Regulating Water Tank					
816	Excavation by manpower	m^3	60.5			
817	Backfill with compaction by manpower	"	9.0			
818	Cobble stone	"	3.42			
819	Levelling concrete	"	13.69			
820	Reinforced concrete	"	49.53			
821	Form	m^2	229.13			
822	Mortar	m^3	56.30			
823	Wooden cover	"	0.500			
824	Step	pce	25.0			
825	Reinforcement bar	ton	3.960			
826	Installation of SGPW40A	m	9.00			
827	Installation of PVC 100A	"	21.00			
828	Installation of sluice valve 40A	pce	2.0			JIS B2051
829	Installation of sluice valve 100A	"	1.0			JIS B2062
830	Concrete and steel support of pipe 40A	"	5.0			
831	Check plate	"	1.0			0.9x0.9 m
832	Hauling of surplus soil	m^3	51.5			
833	Miscellaneous work	L.S.	1.0			
	Total					

Item	Description	Unit	Quantities	Unit Price (Rp)	Price (Rp)	Remarks
3. Improvement of Rat Fence.						
3-1 Rat Fence						
a.	Foundation Works					
901	Excavation by manpower	m^3	124.0			
902	Backfill with compaction by manpower	"	74.0			
903	Earthfill by manpower	"	50.0			
904	Brick with mortar	"	1.11			
905	Plain concrete	"	3.92			
906	Form	m2	54.60			
907	Concrete block	m^3	11.60			
908	Miscellaneous work	L.S.	1.0			
	Sub-total					
b.	Material of Rat Fence					
909	Rat fence	m	275.00			
	Sub-total					
c.	Installation of Rat Fence					
910	Installation of fence	m	275.00			Including field welding work
911	Miscellaneous work	L.S.	1.0			
	Sub-total					
d.	Gate					
912	Fabrication and installation of steel gate	pce	1.0			1.2x2.7 m

Item	Description	Unit	Quantities	Unit Price (Rp)	Price (Rp)	Remarks
913	Foundation concrete	m^3	0.09			
914	Form	m^2	1.20			
915	Miscellaneous work earth work,cobble stone, plug concrete,etc.	L.S.	1.0			
	Sub-total					
	Total (a-b)					
4. Improvement of Other Related Structures						
4-1 Access Road						
1001	Removal of asphalt	m^3	8.4			
1002	Removal of fence	m^2	10.0			
1003	Excavation by manpower	m^3	35.4			
1004	Backfill with compaction by manpower	"	4.0			
1005	Hauling of surplus soil	"	31.4			
1006	Asphalt pavement	m2	32.0			
1007	Miscellaneous work	L.S.	1.0			
	Total					
4-2 Masonry Concrete Retaining Wall						
1008	Excavation by manpower	m^3	140.0			
1009	Backfill with compaction by manpower	"	25.0			
1010	Hauling of surplus soil	"	115.0			
1011	Masonry concrete	"	109.00			
1012	Weep hole,PVC 40A	pce	55.0			L=1.0 m
1013	Filter for weep hole	"	55.0			
1014	Cobble stone	m^3	3.00			

Item	Description	Unit	Quantities	Unit Price (Rp)	Price (Rp)	Remarks
1015	Levelling concrete	m^3	1.50			
1016	Plain concrete	"	6.50			
1017	Form	m^2	77.00			
1018	Installation of drain pipe, PVC 150A	m	8.00			
1019	Capping concrete	m^3	3.60			
1020	Mortar plastering	m^2	154.00			
1021	Miscellaneous work	L.S.	1.0			
	Total					
4-3	Mounding Works					
1022	Excavation of surface soil	m^3	100.0			Excavation & Deposit
1023	Earthfill of purchased soil	"	500.0			
1024	Miscellaneous work	L.S.	1.0			
	Total					
4-4	Repair of Fence					
1025	Installation of burbed wire	m	200.0			
	Total					
4-5	Miscellaneous Work	L.S.	1.0			
	Total					
5.	Temporary Works	L.S.	1.0			5 %
	Total (1 to 5)					
	GRAND TOTAL					Jatisari & Celuk

CHAPTER 5 BID DOCUMENTS (DRAFT)

5-1 Contract

5-2 Technical Specification

5-1 Contract (draft)

CONTRACT

FOR

CONSTRUCTION OF INFRASTRUCTURE IMPROVEMENT WORKS

ON

THE FOOD CROP PROTECTION PROJECT (PHASE - II OF ATA 162)

IN

INDONESIA

INDONESIA OFFICE

JAPAN INTERNATIONAL COOPERATION AGENCY

CONTRACT

For Construction of Infrastructure Improvement Works on the Food Crop Protection Project (Phase - II of ATA-162) in Indonesia

This Contract is executed on the ____ day of _____ 1988 at the JICA Indonesia Office between

Japan International Cooperation Agency, Indonesia Office by Mr. Yasuo KITANO Title Resident Representative as its authorized representative of the JICA Indoneisa 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 (a)

DESCRIPTION OF WORKS

The Contractor shall carry out the construction of Infrastructure improvement works, hereinafter called "the Works", consisting of land consolidation, irrigation canal, drainage canal, roads, deep well, water tank, rat fence and related structures for the both centers which are Jatisari Pests Forecasting Center in Karawan, West Java and Celuk Field Labroatory in Gianyar, Bali under the Food Crop Protection Project (Phase-II ofATA-162).

Article 1 (b)

The JICA agrees to employ the Contractor and the Contractor agrees to perform the Works as specified below.

I. Jatisari Pests Forecasting Center

1. Land Consolidation

(a)	Land levelling	A = 2.8 ha
(b)	Irrigation canal	L = 447 m
(c)	Main drainage canal	L = 238 m
(d)	Drainage canal	L = 261 m
(e)	Farm ditch	L = 2,126m
(f)	Farm road	L = 322 m
(g)	Operation road	L = 246 m

2. Intake and Irrigation Canal

(a)	Intake	1 place
(b)	Intake canal	L = 45 m
(c)	Tertiary canal	L = 178 m

3. Auxiliary Water Resources

(a)	Boring of deep well	L = 40 m
(b)	Installation of deep well pump	ϕ50 mm
(c)	Generator house	A = 9.0 m^2
(d)	Installation of generator	1 pce
(e)	Water tank	V = 36 m^3

4. Installation of Rat Fence

(a)	Concrete foundation	L = 430 m
(b)	Fabrication of additional fence material	1 L.S.
(c)	Installation of fence	L = 640 m
(d)	Automatic gate	1 pce

5. Other Related Structures

(a)	Foundation of invertebrate laboratory	1 place
(b)	Foundation of net house	2 places
(c)	Repairment of existing operation road	L = 157 m
(d)	Improvement of access road & gate	2 places
(e)	Ordinary fencing and repairment of existing fence	1 L.S.
(f)	Miscellaneous work	1 L.S.

II. Celuk Field Laboratory

1. Land Consolidation

(a)	Land levelling	A = 0.5 ha
(b)	Irrigation canal	L = 130 m
(c)	Drainage canal	L = 230 m
(d)	Farm road	L = 200 m

2. Intake & Farm Pond

(a)	Intake canal	L = 60 m
(b)	Turnout	1 place
(c)	Farm Pond	1 place
(d)	Piping	1 L.S.

3. Rat Fence

(a)	Fabrication of fence & gate	L = 275 m
(b)	Foundation	L = 275 m
(c)	Installation of fence	L = 275 m

4. Other Related Structures

(a)	Approching road	h = 10 m
(b)	Masonry wall	L = 77 m
(c)	Mo u nding	V = 500 m^3
(d)	Repairment of existing fence	1 L.S.
(e)	Misellaneous work	1 L.S.

III. General Works (Preparatory works, temporary works and other common works) 1 L.S.

The detailes of the above terms are given in the attached drawings and specifications.

Article 1 (c)

The following documents shall be deemed to form, be read and constructed as Part of the Contract:

i) Contract

ii) Technical specification

iii) Drawings

iv) Bill of Quantities

Article 2

CONTRACT PRICE

The Contract price is fixed in Rp. _____

(Say Pupiah _____)

which consists of:

a. Construction cost based on the Bill of Quantities in Rp. _____ and (Say Rupiah _____ _____) and

b. Indonesian value added tax, namely P.P.N. in Rp. _____ (Say Rupiah _____ _____).

Overhead, profits and other duties and taxes except P.P.N. shall be already calculated in the Unit price of Bill of Quantities.

Article 3

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 Rp. _____ (_____) in cash, or in lieu thereof a Bank Guarantee issued by the _____ bearing the number _____ and dated _____ in the amount of Rp. _____ (_____) 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 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 19 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 by in 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 4

COMPLETION TIME

The Contractor agrees to commence the Works at the site within ten (10) days from the date of signing of this Contract (Commencement date) and the Contractor agrees to satisfactorily complete the Works within ____ days (completion time) after the date hereof which will become due on _____ 1988 (completion date).

In a case where it is clear that the Contractor is failing to fulfil his obligations within the period referred to in the preceeding Article. The Contractor shall inform the JICA of this as soon as possible and if the JICA agrees that the delay is due to such causes as natural calamity or others for which the Contractor is not liable, a reasonable extension of time shall be approved. In tis case, the sum referred to in Article 15 shall not be collected.

The Contractor agrees to satisfactorily complete the Works in Celuk Field Laboratory within the date of _____, 1988 (Partial Acceptance).

Article 5

CONSTRUCTION METHOD AND TEMPORARY WORKS

The constructin method including implementation schedule and plan of the temporary works such as installation of temporary facilities, offices, warehouses, construction roads, electric wiring, etc. shall be submitted by the Contractor and approved by the JICA at least one (1) week in advance of the commencement of the Works.

Article 6 (a)

PROCESS OF CARRYING OUT OF WORKS

The Contractor shall carry out the work in accordance with the drawings and specification referred to in Article 1(c). And in cases where it is necessary for carrying out such work as is not mentioned therein for the purpose of promoting the present construction or for reasons of established practices, the Contractor shall carry out the said work under the direction of the JICA. In cases where the Contractor finds any doubt in the plans of construction, the Contractor shall ask the JICA for the necessary directions before commencing the work on that part for which there exists some doubt.

Article 6 (b)

COMPLIANCE WITH STATUES AND REGULATIONS

In the execution of the works mentioned in the Article 6 (a), the following conditions will prevail :

1. General conditions on construction works execution of the public works in Indonesia (Supplement State Paper No 14571).
2. General regulations on inspection of construction materials for construction of buildings in Indonesia.
3. Local construction regulations.
4. Decision No 12/1977 of the President of the Republic of Indonesia.

Article 7

CARE OF WORKS

The Contractor shall follow the direction of the JICA or the Engineer to be appointed by the JICA (hereinafter called "the Engineer"). As to materials for the construction, the Contractor shall use only those inspected and approved by the JICA or the Engineer. In cases where any defective work has been done as a result of such use of materials which have not been inspected by the Engineer, the Contractor shall be liable to change the materials or repair the work at his own cost and responsibility. The construction shall be carried out in accordance with the proper technique and durability shall be the principal aim as regards to the construction.

Article 8

EMPLOYMENT OF WORKMEN

As to the workmen to be hired by the Contractor for the works, the Contractor shall assume the responsibility as entrepeneur or employer, as provided for by laws and regulations in Indonesia.

Article 9

SUB-LETTING

The Contractor shall not assign or sublet to a third party the whole or part of the construction, except in cases where the Contractor has obtained written approval from the JICA.

Article 10

DAMAGES TO PERSONS OR PROPERTIES

In cases where any damages are caused to the JICA or a third party, materials or buildings, through carelessness on the part of the Contractor during the course of works or transportation of materials, the Contractor shall be liable to repair or compensate such damages at his own expense by the date appointed by the JICA or the third party.

Article 11

MODIFICATION OF PLAN

If the JICA finds it necessary to make modification of construction design, quantities 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 JICA 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 bill of quantities of this Contract in case of modification of quantities of construction works.

If the Contract shall not contain any rates applicable to the extra or additional work, then suitable prices shall be agreed upon between the JICA and the Contractor. In the event of disagreement, the Engineer shall fix such prices as shall in his opinion be reasonable and proper.

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 12

PRICE ADJUSTMENT

In case costs of materials and works have risen sharply as a result of Rupiah-devaluation against US Dollar in Indonesia, the JICA at the request of the Contractor, is open to negotiation on reasonable adjustment of a part of the Contract price on the basis of unit prices of Bill of Quantities. However, the adjustment rates will be subject to total approval from the JICA.

Article 13

RIGHT TO RESCIND CONTRACT AND PENALTY

In cases where the Contractor fails to fulfill his obligations under this contract, the JICA may rescind the whole or part of the Contract.

In such a case, the JICA may collect from the Contractor, as a penalty, a sum of 10 percent (10%) of the amount of rescinded construction in additions to the amount of rescinded construction. When the damage sustained to the JICA on account of the nonfulfillment of Contract by the Contractor exceeds the sum referred to in the preceding sentence, the JICA may further demand the Contractor for payment of the excess.

Article 14

FULFILLMENT OF OBLIGATIONS BY THIRD PARTY

In cases other than provided for in the preceding Article, where the fulfillment of obligations by the Contractor is regarded to be difficult, the JICA may have a third party to fulfill the whole or part of the Contractor's obligations, at the cost of the Contractor. Even if liability of the Contractor exceeds the Contract price of construction referred to in Article 2 in consequence of this, the Contractor may not raise any objection to it.

Article 15

LIQUIDATE DAMAGE FOR DELAY

In cases other than provided for in Article 13, where the Contractor fails to complete the construction with his own responsibility within the time limit referred to Article 4, the Contractor shall be liable for payment of a sum equivalent to 0.05 percent (0.05%) of the Contract price of construction referred to in Article 2, per day of delay within a period fixed by the JICA.

Article 16

DAMAGED CAUSED BY NATURAL CALAMITY, ETC.

In cases where serious damage occurs to the completed part of the works, or the materials, tools, etc., already carried into the field of construction, the Contractor shall promptly inform the JICA of the fact. If such damage is caused by natural calamity, such as an earthquake, a flood, a war, an epidemic, or a general trade strike, rioting or other unavoidable reasons, while it is concluded that the Contractor has taken normal precautions to avoid the occurrence of such damage, the JICA shall be liable for the amount of the damage which shall be fixed through negotiations between the JICA and the Contractor.

Article 17

REPORT FOR COMPLETION OF CONSTRUCTION

At the time of completion of the construction, the Contractor must report to the JICA promptly in writing.

Article 18 (a)

INSPECTION

The work at any stage shall be subject to inspection to be conducted by the JICA or the Engineer appointed by the JICA, in the presence of the Contractor, and necessary labor and articles required for such an inspection shall be provided by the Contractor.

Article 18 (b)

In cases where the work fails to pass the inspection referred to in the proceeding paragraph, the Contractor shall carry out necessary repairs at his own cost, under the direction of the JICA.

Article 19

DATE OF COMPLETION OF CONSTRUCTION AND OBLIGATION THEREAFTER

The date of Completion of Construction shall be regarded as that on which the final work, including removal of temporary

construction and cleaning, has passed the inspection referred to in Article 18, and on that date the object of the construction shall be delivered to the JICA by the Contractor. For a period of one year thereafter, any defect in the construction, the cause of which, in the opinion of the JICA, is judged to be attributable to faulty or inadequate techniques or materials employed by the Contractor, shall be immediately repaired or improved at the cost of the Contractor .

Article 20

PAYMENT

The JICA agrees to effect payments for the Works to the Contractor in te following manner :

a. Advance Payment, to be effected upon the bringing of equipment and materails required for the Works and properly stored at the job site by the Contractor, and of value estimated by the JICA. Rupiah _____ _____ (Rp._____) which corresponds to Thirty (30) percent of the Contract Price shall be paid upon signing of this Contract at the request of the Contractor.

b. Interim Payment, to be effected according to the progress of the Works satisfactorily executed by the Contractor and accepted by the JICA Rupiah _____

_____

(Rp._____) which corresponds to Thirty (30) percent of the Contract Price shall be requested for the payment once during the course of construction at the request of the Contractor. In case that value of the executed construction works estimated by the JICA is less than fifty (50) percent of the Contract Price, interim payment shall be deducted by the full amount of advance payment, balance of which correspond to value of the executed construction works.

c. Final Payment, to be effected upon the satisfactory completion of the Works by the Contractor and accepted by the JICA. The remainder of Rupiah _____

_____

(Rp._____) which corresponds to Forty (40) percent of the Contract Price, shall be paid after the Final Certificate by the JICA for payment to the Contractor.

Payment under (b) and (c) shall be effected within ten (10) day after the respective acceptance of the Works by the JICA.

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

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

Article 21

SETTLEMENT OF DISPUTE

If there arises any dispute with regard to this Contract or the Drawings or Specifications referred to in Article 1 (c), the JICA and the Contractor shall make efforts for settlement of the dispute with mutual consultation.

Article 22

ARBITRATOR

Should the JICA and the Contractor fail to reach a mutual agreement on such dispute as mentioned in the preceding Article, then it shall be referred to an Arbitrator or Arbitrators acceptable to and appointed by both the JICA and the Contractor, and the decision of this Arbitrator or these Arbitrators shall be binding on both the JICA and the Contractor.

THE CONCLUSION OF THE CONTRACT

Revenue stamp duty of the Contract will be paid by the Contractor. Two copies of the Contract shall be prepared with the signature of both parties to each of the copies, one copy to be held by each party.

Jakarta, (Date)

EMPLOYER	CONTRACTOR
Yasuo KITANO Resident Representative Japan International Cooperation Agency Indonesia Office	Director of (Name of Company)
WITNESS BY	WITNESS BY
	JICA Short Term Expert

5-2 Technical Spesification (Draft)

TECHNICAL SPECIFICATIONS

FOR

CONSTRUCTION OF INFRASTRUCTURE IMPROVEMENT WORKS

ON

THE FOOD CROP PROTECTION PROJECT (PHASE - II of ATA - 162)

IN

INDONESIA

INDONESIA OFFICE

JAPAN INTERNATIONAL COOPERATION AGENCY

TECHNICAL SPECIFICATIONS

TECHNICAL SPECIFICATIONS

PART 1 SPECIAL PROVISION

1-01 APPLICATION

This specification is applicable to "Construction of Infrastructure Improvement Works on the Food Crop Protection Project (Phase II-of ATA-162) in Indonesia". Main work quantities are stipulated in Article 1 of this Contract. Specifications entered in the drawing shall be treated in reference to this technical specifications.

1-02 ENGINEER

"Engineer" means the engineer who was appointed to supervise the works by the JICA.

1-03 SITE REPRESENTATIVE OF THE CONTRACTOR

Site representative of the Contractor shall be well qualified in construction or have enough experience of construction. The Contractor shall submit career history of a site representative to the Engineer for his approval.

1-04 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.

1-05 The Contractor shall exercise utmost care so that his construction operations will not damage any existing structure except such structures as specified to be dismantled. Any damges on such existing structure or

facilities shall be made good by the Contractor at his expense.

1-06 If it is necessary in the prosecution of the work to interrupt or obstruct the flow of existing water supply pipe, the flow of artificial drains and the drainage of the surface, the Contractor shall provide for the same during the progress of the work in such a way that no damage shall result to either public or private interest. For any neglect to provide for either natural or artificial pipeline or drainage which he may interrupt, he shall be held liable for all damges which may result there from during the progress of the work.

1-07 The Contractor is expected to visit the location of the work and make his own estimate of the facilities needed for the work. In the successful execution of the construction, the Contractor is expected to familiarize himself with local conditions, availability of labor, transportation facilities, water and electric supply, uncertainties of weather and other contigenencies. From investigations, made at site, it is believed that topographical conditions are approximately as shown on the drawings, but the nature of the materials and the depth of satisfactory foundations, are not guaranteed. It is experessly understood that JICA will not be responsible for any deduction, interpretation, or conclusions made by the Contractor. JICA does not guarantee that other materials will not be encountered or that the proportions of the several materials will not vary from those indicated by the drawings.

1-08 Elevations referred to the datum plane are to be determined from benchmarks established by JICA or the Engineer at the site of the work.

1-09 SETTING-OUT

The Contractor shall entirely be responsible for accurate setting-out the works including staking of centerlines for canals and roads, etc. based on the information supplied on the Drawings and the instructions given by the Engineer.

All stakes, benchmarks, etc., placed by the Engineer in laying out the works shall be carefully guarded and preserved by the Contractor, and in such case stakes or marks are misplaced or rendered useless through the carelessness or negligence of the Contractor or his agents, employees

or workmen, they shall be replaced by the Contractor at his expense.

The Contractor shall execute the work to the lines and grades given by the drawings and/or Engineer. The Contractor shall, at his own expense, furnish all stakes, templates, pattern, platforms and labor that may be required in setting or laying out any part of the work.

The costs to conform to the requirements of this Clause shall be entered in the Lump Sum Price of the Site Expenses in the Bill of Quantities.

1-10 DRAWINGS TO BE FURNISHED BY THE CONTRACTOR

The Contractor shall submit the drawings of centerline survey results and longitudinal section in two copies for the construction of pipeline and roads, etc.

Construction of any part of the above works shall not commence until the Drawings have been approved by the Engineer, and there after no change shall be made to any drawing so approved without permission of the Engineer.

In addition to the above, during the working execution, the Contractor shall at his own expense prepare reinforcement drawings based on the Drawings supplied by the JICA at needed for performance of the works.

These reinforcement drawings shall include such bar placing drawings, bar list and any otehr reinforcement drawings as may be required to facilitate fabrication and placement of reinforcement.

All reinforcement drawings prepared by the Contractor shall be submitted to the Engineer for approval. All costs incurred by the Contractor in complying with the requirements of this Clause shall be deemed to be included in the item of Site Expenses in the Bill of Quantities.

1-11 ASSISTANCE TO ENGINEER'S STAFF

The Contractor shall render all necessary assistance to the Engineer and shall provide as required by and for use of the Engineer, sufficient quantities of pegs, poles, straight edges, stagings, moulds, templates, profiles and all other requisites for checking the Contractor's setting out and the measurement of the Works.

The cost of all labor and materials required by the Engineer for the said purposes shall be borne by the Contractor. All cost incurred by the Contractor in complying with the requirements of this Clause shall be deemed to be included in the Site Expenses of Bill of Quantities.

1-12 REPORTS

The Contractor shall submit daily or weekly reports to each work section to the Engineer.

The report shall contain, but not limited to, the following data: Weather conditions, staff and labor force employed on the Work, materials used, work in progress, work in preparation, laboratory test data, accidents, photographs and all other information relevant to the progress of the Works.

The payment of all costs incurred by the Contractor in complying with requirements of this Clause shall be deemed to be included in the Site Expensesof Bill of Quantities.

1-13 FIELD TEST AND INSPECTION

The field tests in accordance with the specifications and the demands from the Engineer shall be the responsibility for the Contractor. The charges for such fields test shall be included in the item of Site Expenses in the Bill of Quantities.

1-14 CLEARANCE OF THE WORK SITE

Upon completion of the works, the Contractor shall clear the site within period of construction.

1-15 COMMON TEMPORARY WORK AND SITE EXPENSES

The Contractor shall price the General Works in the Temporary Works and Site Expenses of the Bill of Quantities covering all costs and expenses for preparatory works, common temporary works and other common site expenses such as :

- Mobilization and demobilization of equipments (Cause 2-03 and 2-05)

- Maintenance of temporary access road and Construction of haul road (Clause 2-02) / 1.
- Land hiring for the Contractor's yard
- Construction, maintenance and subsequent removal of offices, stores, workshops, staff quarters and labor camps with fencing (Clause 2-03)
- Installation, operation, maintenance and subsequent removal of water and electric supply system for the Contractor's offices, workshops, staff quarters and labor camps (Clause 2-03)
- Centerline survey and furnishing of drawings (Clause 1-09 and 1-10)
- Assistance to Engineer's staff for certificates (Clause 1-11)
- Setting out pipeline, roads and structures and staking of reference pegs (Clause 1-09)
- Field tests including provision of testing apparatus, testing engineer, labor and consumables (Clause 1-13)
- Submit of periodical reports and color photographs (Clause 1-12)
- Other works but not limited to.

Note / 1. ; As to this item shall be priced in the item of Temporary Works in the Bill of Quantities.

PART 2 GENERAL CONSTRUCTION FACILITIES

2-01 SCOPE

This part covers the construction and/or maintenance of access roads, setting up of Contractor's camp facilities, providing camp security and the disposition of the Contractor's various facilities at the end of the Contract.

2-02 ROADS

(a) The Contractor shall improve, repair and widen, if necessary, existing roads to satisfactorily meet his haulage requirements. He shall also construct all other roads within the construction area which he deems necessary in the prosecution of his work. The improving, widening and maintaining of existing roads and constructing and maintaining new roads shall be made by the Contractor at his expense, and same shall be the responsibility of the Contractor during and up to the completion of all construction work under the Contract.

2-03 CONTRACTOR'S CAMP FACILITIES

(a) If the Contractor deems necessary, he shall grade his camp site; construct his office, employee's housing, warehouses, machine and repair shops, fuel storage tanks; and provide such other facilities that the Contractor deems necessary for maintaining health, peace and order in the camp and work areas.

(b) The location, construction, operation and maintenance of such camps and facilities within the both areas of the Jatisari Center and Celuk F.L. shall be subject to the approval of the Engineer. At least ten (10) calendar days prior to the date on which the Contractor desires to begin to work on in feature of camp construction, the Contractor shall submit for the approval of the Engineer drawings and specifications in sufficient detail to permit determination of suitability of the construction in compliance with these specifications, and no camp construction of any kind shall be undertaken until such drawings and specifications have been approved by the Engineer.

2-04 CAMP SECURITY

The Contractor shall provide his own security force to the extent that he deems necessary for maintaining peace and order in the camps and work areas and to safeguard materials and equipment including fencing.

2-05 DISPOSITION OF CAMP AND CONSTRUCTION FACILITIES

After the completion of the work covered by the Contract, the enitire camp of the Contractor, including its water supply system, quarters, warehouses, shops and other facilities therein; and all other temporary installations at work areas shall be removed by the Contractor and the site shall be cleared.

PART 3 CARE OF WATER DURING CONSTRUCTION

3-01 SCOPE

In accordance with specifications contained in this part, the Contractor shall care the water during construction so that construction work can be performed in areas free from water. Care of water during construction shall include provision for drainage and pumping system for dewatering foundation areas and the co6struction of temporary bulkheads necessary for the protection of construction operations from encroachment by water.

3-02 DRAINAGE AND PUMPING

The Contractor shall be responsible for dewatering the foundation areas so that work may be carried on in a suitably dry condition, draining and/or pumping all water during the process of construction until its completion. The contractor shall construct drainage ditches, holes, or culverts; furnish, operate, andmaintain at his own expense all necessary pumps, to keep all work areas in ample dry condition, and prior to final acceptance of the work by the Contracting Officer, the Contractor shall remove, fill or plug all temporary drainage structures and pumping equipment at his expense.

3-03 PAYMENT

No separate payment shall be made for the care of water during construction. But the cost of furnishing, constructing, operating, maintaining, and removal of temporary drainage structures, canals, and pumping system necessary to keep construction operations free from water shall be included in the item of Temporary Works as indicated in the Bill of Quantities

PART 4 OPEN EXCAVATION AND FOUNDATION PREPARATION

4-01 SCOPE

In accordance with the Specifications contained in this part, and as shown on the drawings, or otherwise directed by the Engineer, the Contractor shall perform all required open excavation and foundation preparation pertinent to the construction work.

4-02 OPEN EXCAVATION

(a) General

Open excavation under these Specifications consists of the removal, hauling, dumping, and satisfactory disposal of all materials from required excavations for pipe work, roads, and miscellaneous excavations for other strucutres included under this Contract. Open excavation shall be performed to the lines and grades shown on the drawings or established by the Engineer. The Engineer may modify slopes of excavation to fit conditions encountered during construction. Such changes or modifications shall not be considered by the Contractor as a basis for additional compensation over and above the unit prices bid. All necessary precautions shall be taken to preserve the ground outside the specified lines and grades in the soundest possible condition.

(b) Foundation in Loose Material

When the surfaces of excavation upon or against which concrete or stone masonry or embankment fill is to be placed consist of loose materials, the said loose materials shall be removed or replaced with suitable materials and compacted in a manner satisfactory to the Engineer. The cost of removing the loose

materials shall be paid for under the pertinent bid items for open excavation. The cost for the replacement with suitable materials and the compaction of the same shall be paid for under the pertinent bid items for fill.

4-03 DISPOSITION OF EXCAVATED MATERIALS

(a) Spoil Areas

The Contractor shall submit for the approval of the Engineer locations, areas, drawings, and other necessary specifications of spoil area which the Contractor proposes to use for the work under this Contract, and any kind of disposition shall not be undertaken before obtaining the said approval. Excavated material not suitable for fill or otherwise not needed shall be wasted in approved spoil areas. Spoil piles shall be constructed to the stable slopes of the material being wasted. Any spoil pile exceeding two (2) meters in height shall not be performed. Spoil material shall be spread and graded so that surface drainage will not be concentrated and will not create and/or accelerate undesirable erosion in spoil areas.

4-04 DEMOLITION, REMOVAL, AND DISMANTLING

When specified in the drawing or the Engineer, existing concrete and/or stone masonry structures, such as concrete masses, stones, etc., shall be demolished and disposed of accordingly.

4-05 FOUNDATION PREPARATION

(a) Fill on Earth

All horizontal and sloped earth surfaces, upon which embankment material is to be placed or other foundation surfaces whose locations are specifically indicated by the Engineer, shall

consist of undisturbed or compacted material and shall be clean, damp, free from standing or running water and free from organic matter; and shall be suitable as a foundation for the material to be placed upon them.

(b) Concrete and/or Stone Masonry

All horizontal and sloped earth surfaces upon which concrete and/or stone masonry is to be placed shall be undisturbed or of approved compaction, clean and damp, free from standing or running water, and shall be otherwise suitable as a foundation for the concrete and/or stone masonry to be placed upon them.

4-06 MEASUREMENT FOR PAYMENT

Open Excavation

A survey of the areas to be excavated shall be made by the Contractor prior to the commencement of the work under this Contract, and all measurements of excavation shall be based on this survey without regard to any change that may occur during the prosecution of the work. All such surveys shall be the subject to check and approval by the Engineer. Volumes will be computed and shall be the amount between the original ground determined by the survey and the slopes, lines and grades shown on the drawings or established by the Engineer.

PART 5 BACKFILL AND EARTHFILL

5-01 SCOPE

In accordance with the specifications contained in this section and as shown in the drawings or otherwise directed by the Engineer, the Contractor shall furnish and place the earthfill for construction work, backfill for related structures. Any work of fill and backfill shall not commenced without prior approval of the Engineer. The slope of the embankment shall be finished to the designed gradient by providing fixed rules.

5-02 EARTHFILL

The earthfills shall be constructed to the lines, grades and cross sections indicated on the drawings, unless otherwise directed by Engineer. The Engineer may increase or decrease the slopes of the fill or make such other changes in the design as may by deemed necessary to produce a stable structure. Change in quantities of materials resulting from prescribed changes in section, shall not make cause for claims for increased unit prices. Generally, a tolerance of plus or minus 0.05 meter from the slope lines and grades shown on the drawings will be allowed in the finished surfaces of the embankments except that the tolerances shall not be continuous over an area greater than twenty (20) square meters.

The fill material shall be dumped and spread in horizontal layers having an uncompacted thickness of not over 20 cm. When material is spread, chunks larger than 10 cm in size shall be broken down by approved means or removed.

5-03 BACKFILL

Backfill, as used herein, is defined as refill for structures. The materials used for backfill for structures shall be free from roots, stones of more than five (5) centimeters in diameter, and other objectionable materials and subject to the approval of the Engineer. Backfill

materials shall be placed in layers, each layer being not more than twenty (20) centimeters thick before compaction, thoroughly compacted by means of power tampers or by other means of approved by the Engineer.

5-04 MEASUREMENT FOR PAYMENT

(1) Earthfill

(a) Measurement:

Measurement for payment of earth fill will be calculated on the number of cubic meters of material placed between the foundation lines as determined on the basis on drawings or a survey made after completion of the excavation and foundation preparation and the lines, grades and slopes shown on the drawings. No allowance will be made for foundation or embankment settlement.

(b) Payment

Payment shall constitute full compensation for all work in connection with the excavation from borrow areas including clearing, grubbing and stripping of borrow areas, hauling, stock-piling, rehandling, foundation preparation, placing, spreading, sprinkling, drying, breaking up, compacting, removal of objectionable material, and all other work required for the construction, protection and maintenance of the fills.

No adjustment in payment will be made for substitution of materials and for additional compaction.

(2) Backfill

Measurement for payment of backfill shall be calculated on the number of cubic meters of materials placed among the original ground line, or designated line of backfill and the structure and the neat pay lines of excavation shown in the drawings. Payment will be made on the unit price bid per cubic meter of backfill.

PART 6

LAND CONSOLIDATION

6-01 SCOPE

The land consolidation involves such kinds of construction works as earth works, stone masonry works and concrete works in connection with the construction of land shape adjustment, land levelling, farm road, irrigation and drainage canals and appurtenant structure. It is considered: that earth works for the land consolidation such as open excavation, foundation preparation and earth fill shall be performed by the Contractor in accordance with the Specification indicated in PART 4 and PART 5 and that stone masonry works and concrete works for the land consolidation such as pavement and placing of concrete shall be carried out by the Contractor based on the Specification described in PART 7 and PART 8. Under the circumstances stated above, the Specifications contained in this part shall prescribe the rules and matters, for which special attention shall be taken by the Contractor from the view-point of the execution for each of the Consturction work on the land consolidation.

6-02 GENERAL

(a) Preparation of Construction

Prior to the commencement of construction works for the land consolidation, an attention shall be taken on interception of the excess rain water drained from the out-side area of the experimental field so that the excess rain water will not flow into the area of the experimental field and then the construction works for the land consolidation shall be executed under a dry condition that the surface water on the experiemntal field has almost been eliminated from the ground.

(b) Procedure of Construction Work

The construction works for the land consolidation should commence fundamentally from the work of land levelling including land shape adjustment firstly and continue in due course with the work of farm road, drainage

canal and irrigation canal.

6-03 LAND SHAPE ADJUSTMENT AND LAND LEVELLING

(a) Land Levelling

The construction of land levelling including land shape adjustment shall be prosecuted by taking the following procedure, as a standard type of the construction for land levelling;

Cut and earth fill -- Land Levelling - Land Shape adjustment.

(b) Elimination of Pebbles, Stumps and Others

Gravels, pebbles, stumps, roots and the other organic materials, those are obstructive substances for the cultivation of the land shall be disposed either by burying them into the ground up to a depth, under which the land cultivation would not be affected by them or by carrying them out to the spoil areas.

(c) Exclusion of Water Accumulated

In the case that there are water accumulated in the depression and are water stayed in the existing drainage channel, the Contractor shall be responsible for dewatering the depression as well as the existing drainage channel so that theearth fill for both the depression and the existing drainage channel may be carried out in a suitably dry condition, draining all water during the process of the construction until its completion.

(d) Cut and Earth Fill of Land

The earth materials necessary for embankment of the lower land in elevation shall be provided with those excavated from the higher land in elevation within the experimental field. For formulating the land levelling, the elevation of each plot in the experimental field after a completion of the land levelling, has been decided by taking such a way as the volume of earth materials necessary for the embankment would have well-balanced, as a whole, with those excavated.

(e) Prevention for Settlement of Embankment

The special care shall be taken on the embankment works for such areas as a settlement of the embankment would be anticipated even a little after a completion of the work, in order to keep a settlement of the embankment as small as possible. The Contractor will have liable to pay attention on the embankment works for the depression as well as for the area where the height of embankment would be comparatively high.

(f) Erection of Foot Path

The foot path shall be constructed with well compaction of earth fill materials to the lines, grades and cross sections indicated on the drawings, unless otherwise directed by the Engineer.

(g) Final Arrangement of Land

The arrangement of land for each plot in the experimental field shall be finalized to the lines and grades shown in the drawings so as to not disturb the cultivation of the experimental field.

6-04 FARM ROAD

(a) The farm road shall be constructed by using earth materials graded well from fine particle to coarse particle and be completed by compaction with hand operated mechanical tampers after a layer of fill material has been dumped and spread.

(b) The surface of farm road shall be finalized by constructing middle portion of the road higher in height than each side of the road, of which the cross sectional gradient is three (3) percent.

(c) During the period of construction for farm road, the contractor will always pay attention on drainage of rain water to prevent the surface of road from becoming muddy.

6-05 FARM DITCHES

(a) The embankment along the irrigation canal and the drainage canal shall be constructed by using earth materials not containing pervious particles such as sands and pebbles and by taking compaction of the earth materials for each lay of the embankment in order to prevent seepage through the cross section of the embankment, and shall be completed to the lines, grades and the designed shape indicated on the drawings, unless otherwise directed by the Engineer.

(b) The turn-outs shall be erected at the locations shown in the drawings, unless otherwise directed by the Engineer.

PART 7 · STONE MASONRY WORK

7-01 SCOPE

In accordance with the specifications contained in this Part, and as shown on the drawings or as otherwise directed, the Contractor shall furnish all plant, labor, equipment and materials, and perform all operations in connection with the construction of stone masonry.

7-02 MATERIAL

(a) General

Samples of stone proposed for use as provided herein shall be submitted to the Engineer for approval prior to delivery of any such material to the site of work. Unless otherwise specified, all samples shall be obtained by the Contractor and delivered at his expense to a point designated by the Engineer at least 20 days in advance of the time when the placing of the material is expected to begin.

(b) Sand for Mortar

Sand for mortar shall conform to the requirements for PART 8 relative to fine aggregate for concrete.

7-03 FOUNDATION PREPARATION

Areas on which stone work is to be done shall be prepared in accordance with the requirements of PART 4. Where such areas was excavated below the designed line for foundation, they shall be brought to grade by filling with gravel or other materials approved by the Engineer and well compacted, and no additional payment will be made for foundation preparation and any materials thus required.

In the same manner, when such areas are above the designed line for foundation, said areas be brought to grade and the foundation similarly prepared without additional payment.

7-04 STONE MASONRY

(a) General

Stone masonry shall be placed at the locations as are indicated on the drawings or otherwise directed. Mortar, sand and stone shall conform to the applicable requirements of paragraph 7-02 as to quality and physical properties. Mortar cement shall conform to the applicable requirements of PART 8. The stone shall be kept free from dirt, oil, or any other injurious material which may prevent the proper adhesion of the mortar. Individual stones shall have a thickness of not less than 10 centimeters.

(b) Construction

Mortar shall be one (1) part cement and three (3) parts sand in volume unless otherwise provided. All shaping or dressing of stone shall be done before the stone is laid, and no dressing or hammering which will loosen the stone will be permitted after it is placed. Each stone shall be cleaned and moistened with water before being set. All stones shall be well bedded in freshly-made mortar. After completion, in case any stone is moved or the joint broken, the stone shall be removed, the mortar shall be thoroughly cleaned from bed and joints, and the stone reset in fresh mortar.

7-05 MEASUREMENT FOR PAYMENT

Measurement for payment for stone masonry will be based on the number of cubic meters acceptably placed as computed from the neat lines and grades indicated on the drawings or as directed in the field.

PART 8 CONCRETE WORK

8-01 SCOPE

In accordance with the specifications contained herein and as shown on the detail drawings or otherwise directed, the Contractor shall:

(a) Furnish all materials, and manufacture, transport, place, finish, protect and cure concrete;

(b) Furnish, construct, erect and dismantle forms;

(c) Construct expansion and contraction joints and furnish and place waterstops, joint fillers, and sealing compound, if required; and,

(d) Prepare, clean, cut, bend and place steel reinforcement.

8-02 CEMENT

(a) General

Cement for mortar and concrete work shall be Portland Cement which conforms to the requirements of the Standard Specifications for Portland Cement (A.S.T.M. Designated C150-69).

(b) Storage

Cement shall be stored in a dry, weather tight and properly ventilated warehouse with adequate provisions for the prevention of absorption of moisture. All storage facilities shall be subject to approval and shall be such as to permit easy access for inspection and identification. Cement which has been stored for more than one month or which are suspected to be damp shall not be used unless otherwise approved by the Engineer.

8-03 FINE AGGREGATE

(a) Composition

Fine aggregate shall be natural sand not including organic matter and other foreign substances.

(b) Quality

Fine aggregate shall consist of hard, tough, durable, uncoated particles. The shape of the particles shall be generally rounded or cubical and reasonably free from flat or elongated pieces. The fine aggregate shall conform to the following specific requirements:

1. Grading - Fine aggregate shall be well graded from fine to coarse and the gradation shall conform to the following requirements as delivered to the mixers:

Sieve Designation U.S. Std. Square Mesh	Cumulative Percentage by Weight Passing
No. 4	95 - 100
No. 16	60 - 75
No. 100	2 - 10

In addition to the grading limits shown above, the fineness modulus shall be in the range from 2.30 to 3.0.

(c) Storage

Fine aggregate shall be stored in such a manner as to avoid the inclusion of any foreign material in the concrete. Sufficient live storage shall be maintained at all times to permit continuous placement of concrete at the rate specified.

8-04 COARSE AGGREGATE

(a) Composition

Coarse aggregate shall consist of gravel, crushed gravel or rock, or a combination of gravel and crushed gravel or rock.

(b) Quality and Grading

1. Quality - Coarse aggregate shall consist of hard, tough, durable, clean and uncoated particles. All foreign materials and dust shall be removed by adequate processing. The particle shape of the smallest size of crushed coarse aggregate shall be generally rounded or cubical, and the coarse aggregate shall be reasonably free from flat and elongated particles in all sizes.

2. Grading - The coarse aggregate shall be well graded from fine to coarse. The grading of the aggregate as delivered to the mixer shall be as follows:

Sieve Designation U.S. Std. Sq. Mesh	Per Cent by Wt. Passing Individual Sieves 3/4" Max.
1"	100
3/4"	90 - 100
3/8"	20 - 55

3. Size - Unless otherwise directed, the maximum sizes of coarse aggregate to be used in the various parts of the work shall be 3/4 inch.

4. Storage - Storage of coarse aggregates shall be as that specified in paragraph 8-03(c) for fine aggregates.

8-05 AGGREGATE SAMPLES

Samples of the aggregate shall be furnished at a point designated by the engineer for his approval at least ten (10) days in advance of the time when the placing of concrete is expected to begin.

8-06 WATER

Water used in mixing concrete shall be fresh, clean and free from injurious amount of oil, acid, alkali, salts, or organic matter.

8-07 PROPORTIONING OF CONCRETE

(a) The Contractor shall design the mix proportion for every class of concrete placing for the approval of the Engineer. The Contractor shall carry out the mix test in case being requested by the Engineer. The test is to be made at the expense of the Contractor.

(b) The compressive strength of the age of 28 days shall be as follows and desirable mix proportion is also indicated.

Class	Minimum 28 days Compressive Strength	Mixing proportion by volume cement: fine aggregates: coarse aggregates
A (Reinforced Concrete)	210 kg/cm^2	1 : 2 : 4
B (Plain Concrete)	160 kg/cm^2	1 : 3 : 6
C (Concrete Layer)	135 kg/cm^2	1 : 4 : 6

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

8-08 MIXING

(a) Equipment

Concrete shall be mixed by portable concrete mixer unless otherwise approved by the Engineer.

(b) Measurement

The measurement of every ingredient of concrete shall be made in weight. Nevertheless, the measurement in volume is admitted subject to the approval of the Engineer.

(c) Mixing Time and Method

The mixing time of concrete shall be more than two (2) minutes and less than five minutes. Over mixing, requiring the introduction of additional water to preserve the required consistency, will not be permitted. The mixer shall be completely emptied before receiving the materials for the succeeding batch and shall be kept clean and washed out after stopping work at the end of each shift.

On commencing work, the first batch shall contain sufficient excess of cement, sand and water to coat the inside of the drum to avoid the reduction of the required mortar content of the mix.

8-09 CONVEYING

(a) General

Concrete shall be conveyed from mixer to forms, as rapidly as practicable, by methods which will prevent segregation or loss of ingredients. There shall be no vertical drop greater than 1.5 meters

except where suitable equipment is provided to prevent segregation and where specifically authorized. Belt conveyors, chutes or other similar equipment in which the concrete is delivered to the structure in a thin, continuously exposed flow, will not be permitted except for very limited or isolated sections of the work. Such equipment shall be arranged to prevent objectionable segregation.

8-10 PLACING

(a) Approval

Approval of the Engineer shall be obtained before starting any concrete pour.

(b) General

Concrete shall be worked into the corners and angles of the forms and around all reinforcement and embedded items without permitting the material to segregate. Not more than three (3) cubic meters shall be deposited in one pile for compaction. Free water shall be collected in depressions away from the forms and removed by bailing prior to placement of additional concrete. All concrete placing equipment and methods shall be subject to approval.

(c) Cooling of Aggregates

The aggregate shall be cooled by wetting if it is drier than the condition known as saturated, surface dry.

(d) Concrete on Earth Foundation

All concrete shall be placed upon clean, damp surfaces free from standing or running water. Prior to placing concrete, the earth foundation shall be satisfactorily compacted in accordance with approved methods.

(e) Concrete on Other Concrete

Surface upon or against which concrete is to be placed shall be clean, free from oil, standing or running water, mud, drummy rock, objectionable coatings, debris, and loose, semi-detached or unsound fragments. To insure a firm and tight bond between fresh concrete and other concrete, concrete surfaces, where necessary, shall be chipped or roughened as directed by the Engineer. All surfaces shall be wetted thoroughly to keep them in a completely moist condition before placing concrete. All approximately horizontal surfaces shall be covered with a layer of mortar of the same-sand ratio as used in the concrete mix before the concrete is placed.

(f) Consolidation of Concrete

Concrete shall be placed and consolidated with the aid of mechanical vibrating equipment or of hand-spading and tamping. In no case shall vibrators be used to transport concrete inside the forms. In placing concrete through reinforcement, care shall be taken that no segregation of the coarse aggregate occurs.

8-11 FORMS

(a) General

Forms shall be used, wherever necessary, to confine the concrete and shape it to the required lines, or insure against contamination of the concrete. Forms shall have sufficient strength to withstand the pressure resulting from placement and vibration of the concrete, and shall be maintained rigidly in correct position. Forms shall be sufficiently tight to prevent loss of mortar from the concrete. Forms for exposed surfaces against which backfill is not to be placed shall be lined with a form grade plywood or sheet steel. Steel panel forms may also be used.

(b) Cleaning and Oiling of Forms

At the time concrete is placed in the forms, the surfaces of the forms shall be free from incrustations of mortar, grout, or other foreign material that would contaminate the concrete or interfere with the fulfillment of the Specifications' requirements relative to the finish of formed surfaces. Before concrete is placed, the surfaces of the forms shall be oiled with a commercial form oil that will effectively prevent sticking and will not stain the concrete surfaces.

(c) Removal of Forms

Forms shall be removed as soon as practicable in order to avoid delay in curing and to make possible earliest practicable repair of surface imperfections, but in no case shall they be removed before approval. Any needed repair or treatment shall be performed at once, and shall be followed immediately by the specified curing. Forms shall be removed with care so as to avoid injury to the concrete, and any concrete so damaged shall be repaired.

8 -12 CURING AND PROTECTION

(a) General

All concrete shall be moist cured for a period of not less than seven (7) consecutive days by an approved method or combination of methods applicable to local conditions, except that the curing period may be reduced to three days for concrete made with high-early-strength cement. The Contractor shall have all equipment needed for adequate curing and protection of the concrete on hand and ready to install before actual concrete placement begins.

(b) Water Curing

Concrete shall be kept wet by covering with an approved, water-saturated material or by a system of perforated pipes or mechanical sprinklers or by any other approved method which will keep all surfaces continuously (not periodically) wet. Water for curing shall be generally clean and free from any element which might cause objectionable staining or discoloration of the concrete.

8-13 REPAIR OF CONCRETE

Repair of imperfections in formed concrete shall be completed within twenty four (24) hours after removal of forms at no additional cost to JICA. Fins shall be neatly removed from exposed surfaces. Concrete that is damaged or honeycombed must be removed to sound concrete and replaced with drypack, mortar, or concrete as hereinafter specified. Where large bulges and abrupt irregularities protrude, the protrusions shall be reduced by bush-hammering and grinding. Drypack filling shall be used for holes left by the removal of fasteners from the ends of form tie rods.

8-14 DRYPACK MORTAR

Drypack shall consist of a mixture (by dry volume or weight) of one (1) part cement to 2-1/2 parts of sand conforming to paragraph 8-03, Fine Aggregate, except that in gradation, 100% shall pass a No.16 sieve. Only enough water shall be used to produce a mortar which, when used, shall stick together on being molded into a ball by a slight pressure of the hands, and shall not extrude water but will leave the hands damp.

8 -15 STEEL REINFORCEMENT

(a) General

The Contractor shall furnish deformed steel bar in accordance with the drawings and these specifications. The Contractor shall prepare, clean, cut, bend and place all reinforcements, as shown on the detail drawings or as otherwise directed. The Contractor shall furnish all chains, supports and ties. All reinforcement shall be reasonably free from loose, flaky rust and scale, and free from oil, grease and other coating which might destroy or reduce its bond with concrete.

(b) Relationship of Reinforcement to Concrete Surfaces

The distance from the edge of the main reinforcement to the concrete surface shall be 5 cm except such portions as shown in the drawings. The concrete covering the stirrups, spacer bars, and similar secondary reinforcement may be reduced by the diameter of such bars, unless otherwise indicated.

(c) Lapping

Lapping length at joints of the reinforcing bar shall be at least thirty times of the diameter of bar and shall be bound by steel wire.

(d) Supports

All reinforcements shall be secured in place by use of metal or concrete supports, spacers or ties. Such supports shall be of sufficient strength to maintain the reinforcement in place throughout the concrete operation. The supports shall be used in such a manner that they will not be exposed or contribute in any way to the discoloration or deterioration of the concrete.

8-16 MEASUREMENT FOR PAYMENT

(a) Concrete

1. Measurement for payment for plain or reinforced concrete, will be based on the volume of concrete in place within the lines and grades shown on the drawings.

2. No deduction will be made for rounded or bevelled edges, or space occupied by metal work, or embedded items such as supports, spacers or ties. The cost of construction joint treatment with the attendant loss of material shall be included in the unit price bid per cubic meter of concrete.

3. Payment at the unit prices bid shall constitute full payment for all costs for concrete work. The costs of any dewatering required to maintain dry conditions during the pouring of concrete, furnishing materials, and installing and removing such materials, shall be included in the item of Temporary Works as indicated in the Bill of Quantities.

(b) Steel Reinforcement

Measurement for payment for furnishing, preparing bar cleaning, cutting, bending, and placing steel reinforcement by the Contractor will be based on the number of kilograms placed in accordance with the detail drawings or as otherwise directed. Payment will be made for steel in laps as shown on the drawings; where bars are welded, payment will be made as if they were lapped. Payment will not be made for steel in laps or used which are solely for the convenience of the Contractor. Payment will be made at the unit price bid for steel reinforcement. No separate payment will be made for steel reinforcement supports, and the cost thereof shall be included in the unit price bid.

8 -17 WATERPROOFING WORK

(a) General

Waterproofing shall be preformed to the lines and grades shown on the drawings for the following structures :

1. Generator house

(b) Material for Waterproof Mortar

Sand and cement shall conform to the requirements for PART 8 relative to fine aggregate and cement. As to the waterproof agent, the MANOR or local mortar agent equivalent to JIS-A6101 can be used.

(c) Construction

Waterproofing mortar shall be placed at the inside walls and floor with the thickness of 1.5 cm after chipping work of the inside concrete surface as shown on the drawings or as otherwise directed by the Engineer.

The mortar shall be one (1) part cement and three (3) parts sand in volume unless otherwsis pvovided. Mixing rate of waterproof agent shall be three percent (3%) of cement weight. The mixing propertion per 10.0 m^2 is shown as follows ;

Cement	Fine aggregate	Waterproof agent
90 kg	0.18 m^3	2.7 kg

PART 9 CONSTRUCTION OF DEEP WELL

9-01 SCOPE

(a) In accordance with the specification contained in this part and as shown on the detail drawings, the Contractor shall furnish plant, labour, equipment, and materials, and perform all operations in connection with deep well required as a suction hole for submargible motor pump.

(b) The exact lacation, depth and diameter of the hole shall be decided based on the results obtained from an electric prospective survey which shall be executed by the Contractor.

(c) Additional instructions in the form of additional drawings or written or verbal instructions, may be given during the progress of the work and such will not be considered to be extra work within the meaning of the specifications.

9-02 MAKING HOLE

The hole shall be made at a depth and a diameter as shown on the drawings or as directed by the Engineer. The hole through overburden or unstable materials shall be cased and/or treated with cementation to prevent the caving-in of the hole. The hole shall be made by either purcussion or rotary machine and the selection of the machine shall be informed in advance by the contractor and approved by the Engineer. Confirmation of the depth shall be done using the inspection of the length of casing pipes in the presence of the Engineer.

9-03 INSTALLATION OF CASING AND FILTER

(a) Casing pipe shall be rigid polyvinyl chloride (PVC) pipe and designated in JIS, K6741 unless noted otherwise.

(b) The casing pipe shall be processed strainers at the appropriate positions which shall be adjusted water bed.

(c) The position of water bed shall be searched by an electric water detector or other method by the Contractor. After collating above tests, the suitable position of the strainer of casing shall be decided by the Contractor in the presence of the Engineer.

(d) Size of the slit perforated on the strainer shall be approximately five (5) millimeters in width and 15 cm in length, and its number and arrangement shall be shown as drawings. The processed casing pipe shall carefully be installed into the hole, and crevice between the hole and the casing shall be filled with appropriate filter materials approved by the Engineer.

9-04 WASHING

After installation of the casing and filter, all slime, clay and other washable materials containing in the hole and strainers shall be completely washed out as directed by introducing fresh water, air or a mixture of water and air pressure.

9-05 PUMPING TEST

After completion of making the deep well, pumping test shall be executed by the Contractor and checked by the Engineer. When the Engineer will approve the result of pumping test as a satisfactory, the works may be regarded as completion. In case of no approval by the Engineer, the Engineer may direct to make another hole to the Contractor and the

Contractor shall comply with the request.

9-06 PAYMENT

Measurement for payment for making hole will be based on the number of linear meters of hole made from the point where the works begins to the bottom of the hole in accordance with the detail drawings or as directed. Payment for making hole will be made at the applicable unit prices. Measurement for payment for casing pipe precessed strainers will be based on the number of linear meters. Payment will be made at the unit prices which shall include all costs incidential to processing assembling, locating, installing the pipe as shown on the drawing or as directed. Measurement for payment for filter materials will be based on the number of cubic meters acceptably placed as computed from the neat lines indicated on the drawings. Payment will be made at the unit price which shall include all costs for furnishing, hauling, handling, and placing the filter materials as required.

PART 10 PUMP FACILITIES

10-01 SCOPE

(a) Submergible deep wellpump shall be installed in the field of Jatisari Pests Forecasting Center. The submergible deep well pump shall be conformed to the following requirement of equivalent.

TYPE	:	Submergible Pumps for Deep Wells
MODEL	:	50 BHS 5-2.2 (EHARA)
CAPACITY	:	200 l/min.
PUMP DIAMETER	:	50 mm
HEAD	:	40 m
MOTOR	:	Submergible motor 200v, 3-phase, 2.2 kW, 50 Hz
START METHOD	:	Automatic-transformer
ACCESSORIES		
Well cover	:	D200 mm, 1 pce.
Discharge elbow	:	D50 mm, 1 pce.
Check valve	:	D50 mm, 1 pce.
Sluice valve	:	D50 mm, 1 pce.
Automatic air vent valve	:	1 pce.
Compound gage	:	1 pce.
Submergible cable	:	1.25 mm^2, 30 m
Low water level electrode	:	1 L.S.
Well frange	:	D50 mm, 1 set
Pipe flange	:	D50 mm, 1 set
Anchor bolt	:	1 set
Riser pipe	:	D50 mm, SGPW, 25 m
Control panel	:	Floor standing type, Indoor dust proof, Auto-transformer
Other sundries	:	1 L.S.

(b) The Contractor shall furnish the submergible deep well pump, casing pipes, riser pipes, fittings, bolts, nuts, and all other materials necessary to properly install the works shown on the drawings and as specified. As to the diesel engine generator itself (10 kvA. 200v/220v) shall be procured by the JICA.

(c) These facilities shall be strictly in accordance with the manufacturer's technical data and printed instruction and permitted by the Engineer. For all kinds of earth works required for the works, the specification for earth and foundation works, shall be applied.

10-02 INSTALLATION OF PIPE

Water pipe of deep well pump shall be right Carbon Steel Pipes for Ordinary Piping (SGPW, JIS G 3452). The pipes shall be suitable for field cutting and coupling.

Joints for SGPW pipe shall be approved by the Engineer before making connection. In making connections, cleaning dirt and moisture free from pipe and fittings shall be required.

Cutting of the pipe shall be kept to a minimum. When cuts are necessary, they shall be perpendicular to axes of the pipe and smooth.

10-03 INSTALLATION OF GENERATIOR

The Generator shall be procured by the JICA and the Contractor shall install the facilities.

The installation of the generator shall conformed to the manufacturer's instruction and the regulations of the Goverment of Indonesia.

PART 11 BUILDING AND FOUNDATION

11-01 SCOPE

In accordance with the Specifications and as shown on the drawings or otherwise directed by the Engineer, the Contractor shall furnish labor, equipment and materials and perform all operations in connection with the construction of buildings, including earthworks, grading of the houses foundation, concrete works, construction of column, walls, roof, windows, doors, finishings, electrical facilities, water supply facilities and other related works and facilities.

11-02 MATERIALS

All materials used in the building works shall be subject to the Engineer's approval. The Contractor shall submit the Engineer, samples of said materials prior to commencement of relative works for his approval.

11-03 BRICK WORK

Local products can be used and all bricks shall be laid after applying mortar. Mortar shall be prepared in the same way as for plastering. It shall be applied firmly to raked out and well wetted joints with a pointing trowel and well pressed in. All superfluous mortar shall be removed with a trowel.

External surfaces shall be finished with weather struck pointing and internal surfaces given flush pointing.

11-04 CARPENTRY

(a) The work under this paragraph consists of all carpentry works as shown in the drawings.

(b) Local timber can be used. All timber shall be sufficiently seasoned and planned smooth, straight true and free from cracks, cuts, breaks, loose or dead knots, borehole, and any other defect. Metal fittings suitable to local timbers shall be used.

(c) All frameworks shall be jointed by optimum jointing methods. Joints shall transmit required loads and withstand stresses, to which they will be subjected and shall be approved by the Engineer. Unless otherwise stated, all joints shall be fixed with as many nails of a proper type as required.

For columns, studs, beams, binders, joists, rafters, and purlins, one piece of timber extended between the supports or the base on which it is to be fitted shall be used. However, when inevitably it is necessary to joint at an intermediate position, such a method that has been approved to cause no hindrance in structure shall be employed.

11-05 ROOFING

The construction method shall conform to Indonesian specifications.

Wooden door and window work --- Wood fittings shown in drwings shallbe manufactured in Indonesia by local timber.

Articles of builders hardware shall be of approved type and well finished. Samples shall be submitted to the Engineer for approval before use. Screws shall be of the same metal as the main article.

All articles shall be fixed in a secure and efficient manner. Articles damaged during fixing shall be removed and new fixed at Contractor's expense. Surface of joinery where effected shall be made good.

Glass shall be 3 millimeters sheet glass of good quality, free from specks, bubbles, air holes and other defects. Sheet glass shall be plain, clear. The glass panes shall be fixed either with wood beads or shall be bedded in oil putty, sprigged, firmly back puttied finished to a chamfer. Rabbetes shall be painted one coat of oil paint before glazing. Each pane shall be whole square.

11-06 PAINTING

Painting shall not be carried out to exterior surfaces in wet weather. All surfaces must be thoroughly dry before applying paint. Painting shall not be carried out in windy weather as the paint is likely to be damaged by dust.

Contents of drums or tins shall be stirred well before using. When more than one coat is required to be done, each coat shall vary slightly in shade and shall be passed by the Engineer before the next coat is started. First coat should be thoroughly dry before the second coat is applied.

All brushes, tools, pots, etc. used in carrying out the work shall be clean and free from foreign matter and shall be thoroughly cleaned out before being used for different type of material. Paint shall be applied with proper paint brushes of good quality.

In using proprietary brands of paint, the materials shall be mixed, prepared and applied strictly in accordance with manufacturer's instructions.

11-07 ELECTRICAL AND WATER SUPPLY WORKS

All electrical works and water supply works shall be as shown on the drawings and Indonesian standard specifications or directed by the Engineer.

PART 12 OTHER RELATED CONSTRUCTION WORKS

12-01 GENERAL

The land consolidation works for the experimental field include, under this contract, construction works for appurtenant structure of main constuction works such as the construction of land shape adjustment, land levelling, farm road and irrigation and drainage canals and other related structures.

The said appurtenant structures include farm ditches; cross culverts; capping pipes for inlet and outlet of drain pipes; diversion facility; turn-out; including culvert; water valve; etc.

The majority of the appurtenant structures shall be either stone masonry structure of concrete structure, which shall be constructed by means of either the combination of earth work and stone masonry work or that of earth work and concrete work. It means that the Specification indicated in the PART 4, 5, 7 and 8 shall be adoptable for the construction of the appurtenat structure.

12-02 RAT FENCE

It is generally observed that rats have intensively magnified their damage to paddy fields and devoured the vast area of plant crops. Fasing the damage, the experimental field, likewise, will meet the gross impedence by the attack of rats. Therefore, the Laboratory shall be gurded by the installation of rat fence to avoid and culminate possible attack to the field by rats. They also carry epidemic bacteria that would affect appropriate experimentation in the field.

As to the fence panel for Jatisari center, the panells of 640 meter length shall be procured by the JICA and the Contractor shall fabricate the corner panells and other supporting steel materials as specifed on the drawings. On the other hand the Contractor shall furnish the all fence materials for Celuk Field Laboratory as specified on the drawings.

CHAPTER 6 ATTACHED DRAWINGS

DRAWING LIST

No.	Title of Drawing
	JATISARI
J-1	GENERAL PLAN OF JATISARI CENTER
J-2	IRRIGATION AND DRAINAGE CANAL
J-3	STANDARD TYPE OF LAND CONSOLIDATION
J-4	D-LINE IRRIGATION CANAL
J-5	A-E LINE IRRIGATION CANAL
J-6	E-C LINE DRAINAGE CANAL
J-7	MAIN DRAINAGE CANAL (F-LINE)
J-8	E-LINE FARM ROAD
J-9	PLAN OF FARM ROAD (1)
J-10	PLAN OF FARM ROAD (2)
J-11	A-LINE OPERATION ROAD/ B-LINE FARM ROAD
J-12	OPERATION ROAD & DRAINAGE CANAL IN HOME YARD
J-13	TERTIARY CANAL
J-14	DIESEL ENGINE GENERATOR HOUSE
J-15	DEEP WELL AND WATER TANK
J-16	FOUNDATION FOR NET HOUSE AND BERTEBRATE LABORATORY
J-17	RAT FENCE STRUCTURE
J-18	GATE STRUCTURE
J-19	OTHER RELATED STRUCTURES
	CELUK
C-1	GENERAL PLAN OF CELUK FIELD LABORATORY
C-2	IRRIGATION & DRAINAGE CANAL
C-3	FARM POND & PIPING WORK
C-4	MASONRY RETAINING WALL & ACCESS ROAD
C-5	RAT FENCE STRUCTURE
C-6	GATE STRUCTURE

GENERAL PLAN OF JATISARI CENTER

THE INFRASTRUCTURE IMPROVEMENT WORKS FOR THE FOOD CROP PROTECTION PROJECT

1. LAND CONSOLIDATION WORK FOR PADDY FIELD
   1. Land shape adjustment & land levelling — A= 2.8 ha
   2. Irrigation canal — L= 447 m
   3. Main drainage canal — L= 238 m
   4. Drainage canal — L= 261 m
   5. Farm ditch — L= 2126 m
   6. Farm road / B=2.0, 3.5 m — L= 322 m
   7. Operation road / B=3.5 m — L= 246 m
2. INTAKE AND IRRIGATION CANAL
   1. Intake / Q= 2 l/sec — 1 place
   2. Tertiary canal / Q=90 l/sec — L= 178 m
   3. Intake canal — L= 45 m
3. AUXILIARY WATER RESOURCES
   1. Deep well / ø200 mm — H= 40 m
   2. Deep well pump & operation power/ 50 mm — H= 40 m
   3. Generator house — A= 5.2*3.4 m²
   4. Water Tank/masonry / 4.4x3.9 m — V= 32.4 m³
4. INSTALLATION OF RAT FENCE
   1. Concrete foundation / H= 0.8 m — L= 630 m
   2. Net Fence / L= 640 m
   3. Automatic gate — 1 place
5. VERTEBRATE LABORATORY, NET HOUSES FOUNDATION WORKS
   1. Vertebrate Laboratory — A= 13.00 x 7.50
   2. Net houses — A= 14.34 x 7.24, 2 places
6. OTHER RELATED STRUCTURES
   1. Replacement of existing operation road/asphalt pavement / B=3.0 m — L= 157 m
   2. Access road and gate — 2 places
   3. Replacement of existing fence — 1 L.S.

DIRECTORATE GENERAL OF FOOD CROP AGRICULTURE
THE INFRASTRUCTURE IMPROVEMENT WORKS FOR
THE FOOD CROP PROTECTION PROJECT 12nd Phase of ATA-162)

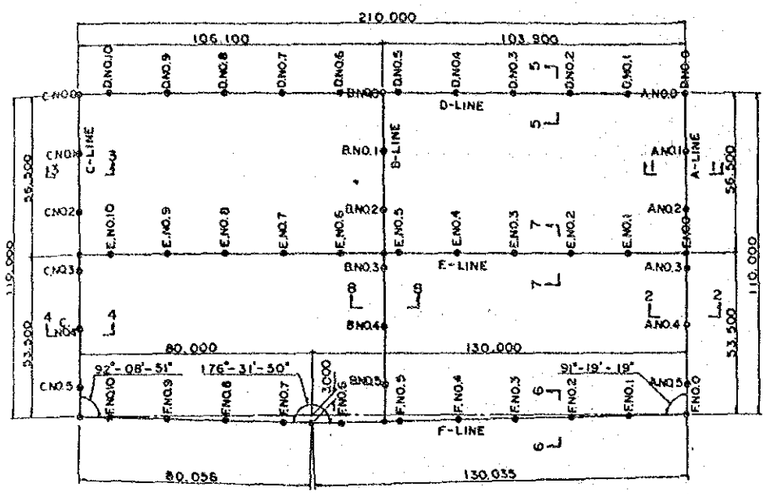
JATISARI FISH FORECASTING CENTER

GENERAL PLAN

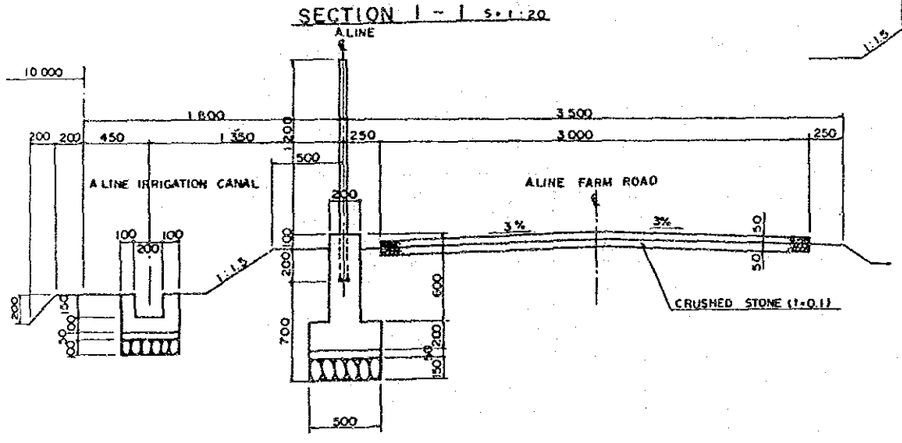
JAPAN INTERNATIONAL COOPERATION AGENCY
TOKYO

DWG. NO. J-1

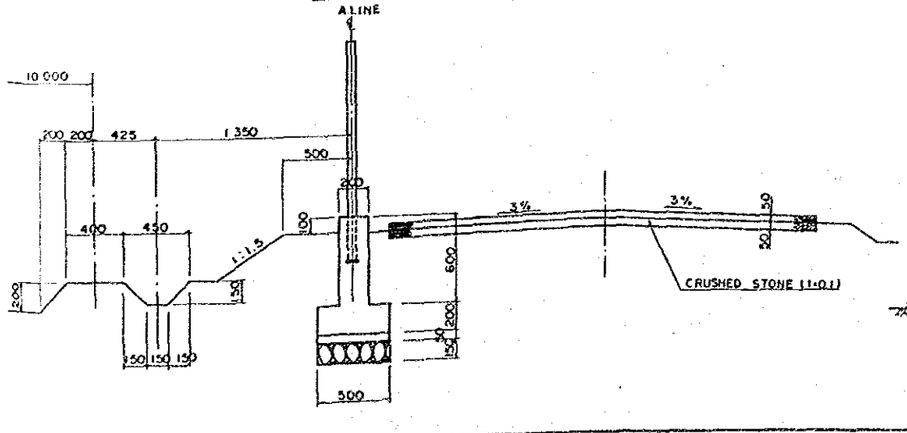
FORMATION PLAN S=1:1000



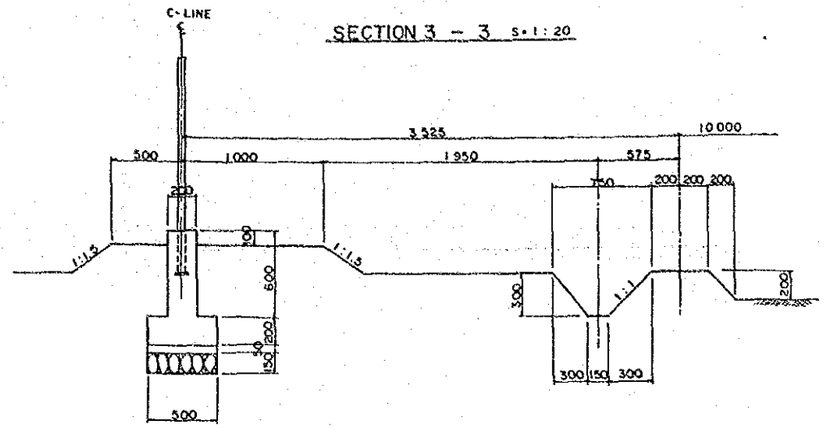
SECTION 1 - 1 S=1:20



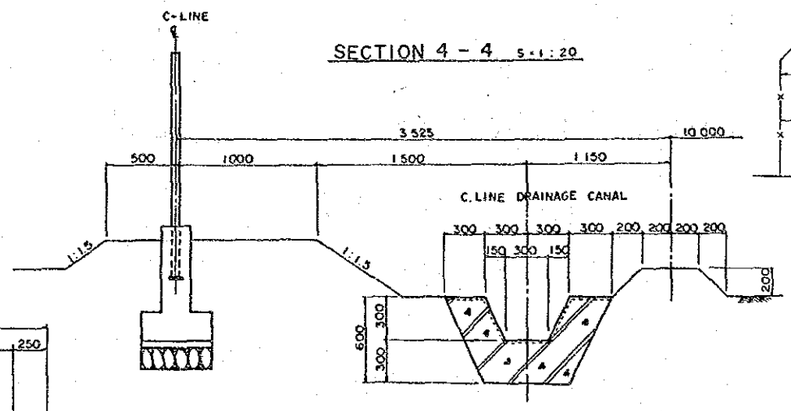
SECTION 2-2 S=1:20



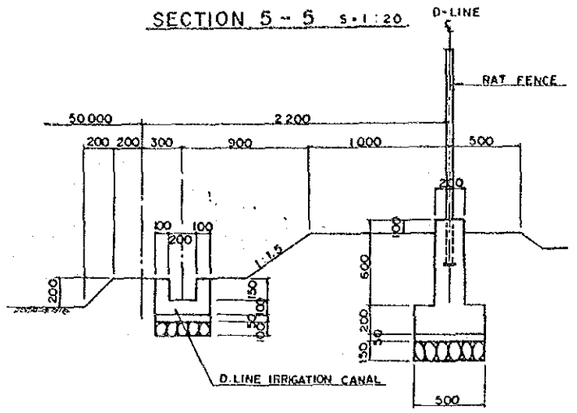
SECTION 3 - 3 S=1:20



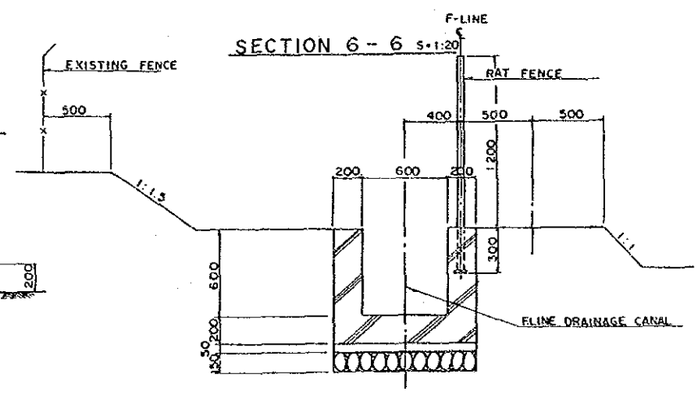
SECTION 4 - 4 S=1:20



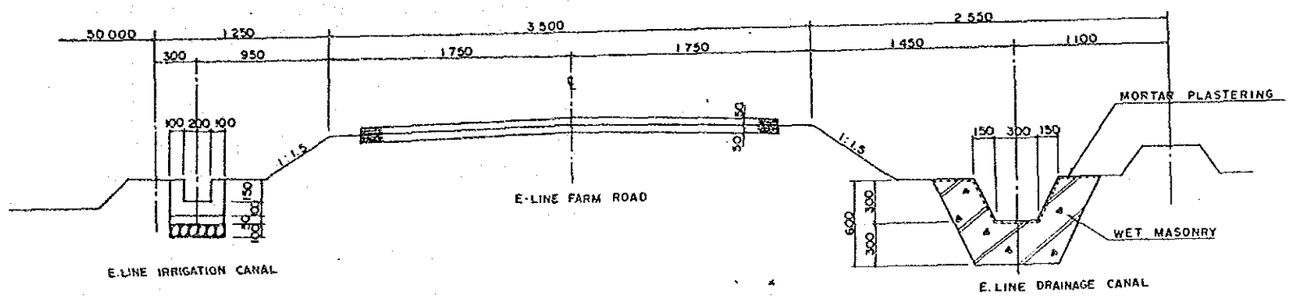
SECTION 5 - 5 S=1:20



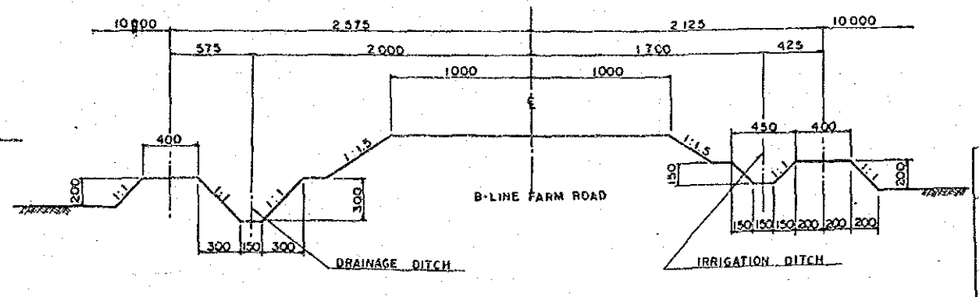
SECTION 6 - 6 S=1:20



SECTION 7 - 7 S=1:20



SECTION 8 - 8 S=1:20



DIRECTORATE GENERAL OF FOOD CROP AGRICULTURE
THE INFRASTRUCTURE IMPROVEMENT WORKS FOR
THE FOOD CROP PROTECTION PROJECT (2nd Phase of ATA-162)

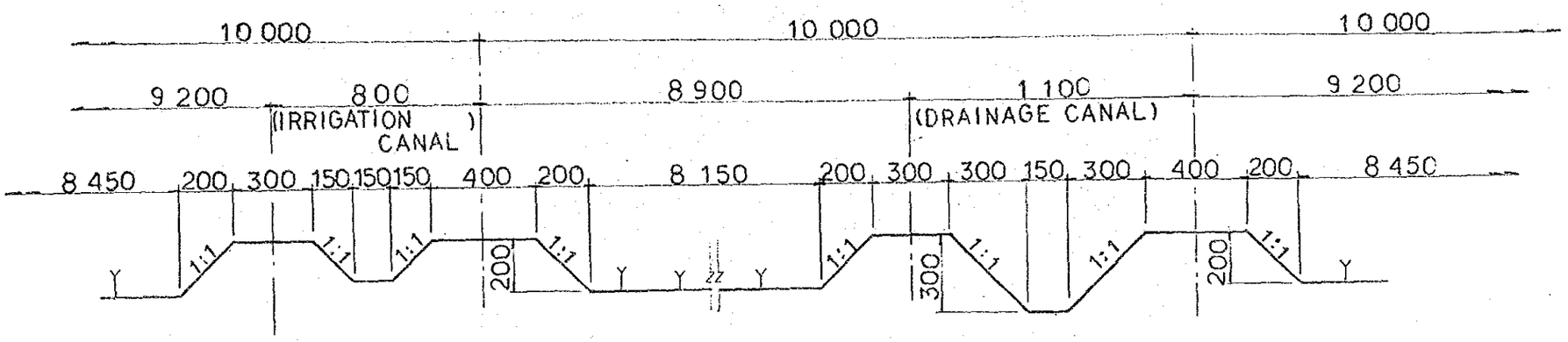
JATISARI PESTS-FORECASTING CENTER

IRRIGATION and DRAINAGE CANAL

JAPAN INTERNATIONAL COOPERATION AGENCY
TOKYO

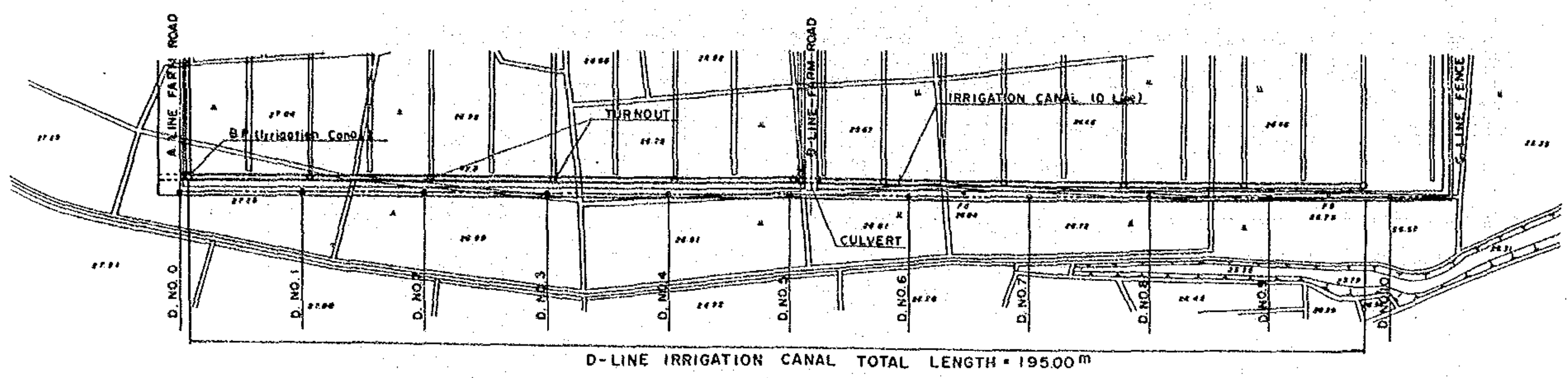
DWG. NO. J-2

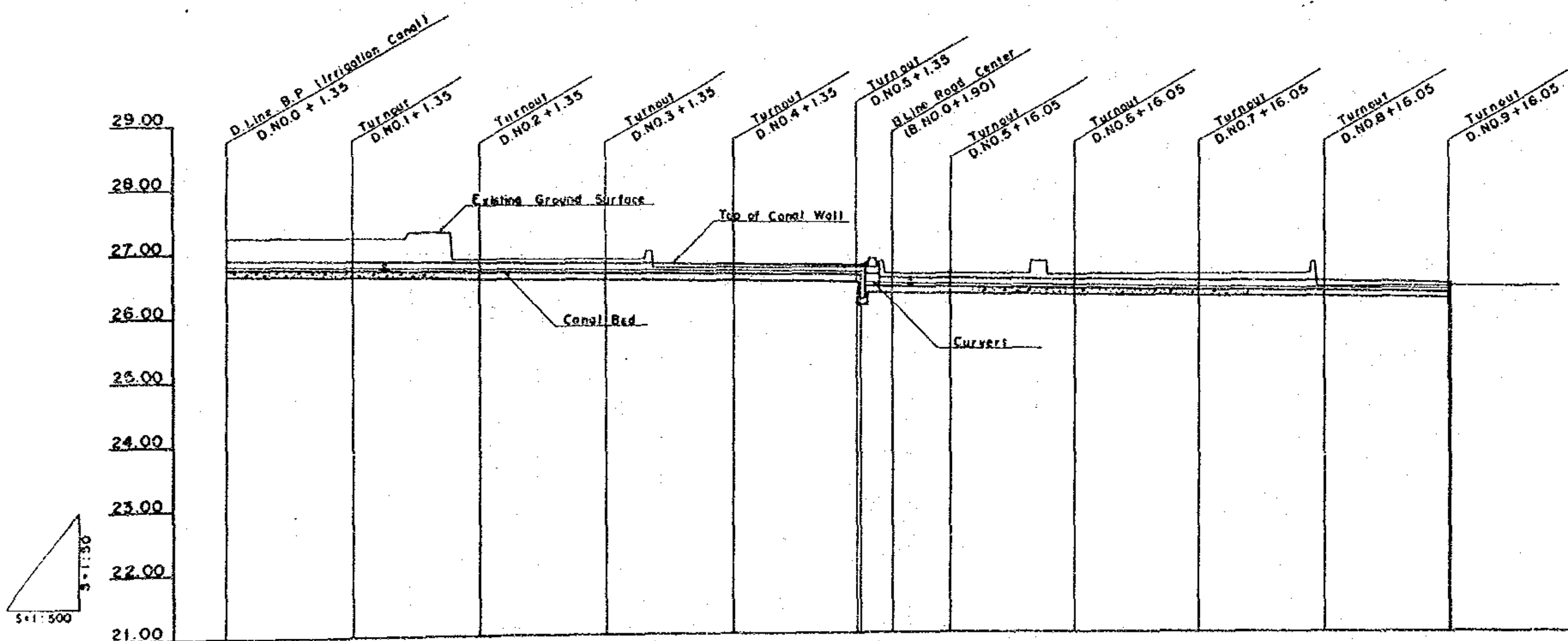
STANDARD TYPE OF LAND CONSOLIDATION S=1:20



DIRECTORATE GENERAL OF FOOD CROP AGRICULTURE THE INFRASTRUCTURE IMPROVEMENT WORKS FOR THE FOOD CROP PROTECTION PROJECT (2nd Phase of ATA-162)	
JATISARI PESTS FORECASTING CENTER STANDARD TYPE OF LAND CONSOLIDATION	
JAPAN INTERNATIONAL COOPERATION AGENCY TOKYO	DWG. NO. J-3

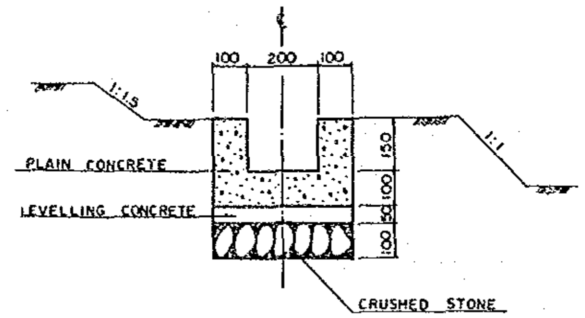
PLAN



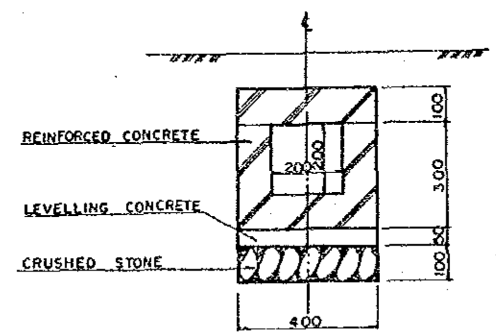


	D.NO.0 +1.35	D.NO.1 +1.35	D.NO.2 +1.35	D.NO.3 +1.35	D.NO.4 +1.35	D.NO.5 +1.35 +1.90	+3.90	D.NO.5 +16.05	D.NO.6 +16.05	D.NO.7 +16.05	D.NO.8 +16.05	D.NO.9 +16.05 +16.35 (E.P)
SLOPE	26.750	1/1000				[illegible]		1/1000				26.370
WATER SURFACE ELEVATION	26.791	26.771	26.751	26.731	26.711	26.691		26.491	26.471	26.451	26.431	26.411
CANAL BED ELEVATION	26.750	26.730	26.710	26.690	26.670	26.650 26.649 26.464	26.463	26.450	26.430	26.410	26.390	26.370
GROUND ELEVATION	27.25	27.25	26.92	26.92	26.78		26.67	26.67	26.56	26.56	26.46	26.46 26.46
ACCUMULATED DISTANCE	0.00	20.00	40.00	60.00	80.00	100.00 100.55	102.55	114.70	134.70	154.70	174.70	194.70 195.00
DISTANCE	0.00	20.00	20.00	20.00	20.00	20.00 0.55	2.00	12.15	20.00	20.00	20.00	20.00 0.30
STATION	D.NO.0 +1.35	D.NO.1 +1.35	D.NO.2 +1.35	D.NO.3 +1.35	D.NO.4 +1.35	D.NO.5 +1.35 +1.90	+3.90	D.NO.5 +16.05	D.NO.6 +16.05	D.NO.7 +16.05	D.NO.8 +16.05	D.NO.9 +16.05 +16.35 (E.P)
CURVE												

TYPICAL CROSS SECTION S=1:10
(IRRIGATION CANAL)



TYPICAL CROSS SECTION S=1:10
(CULVERT)



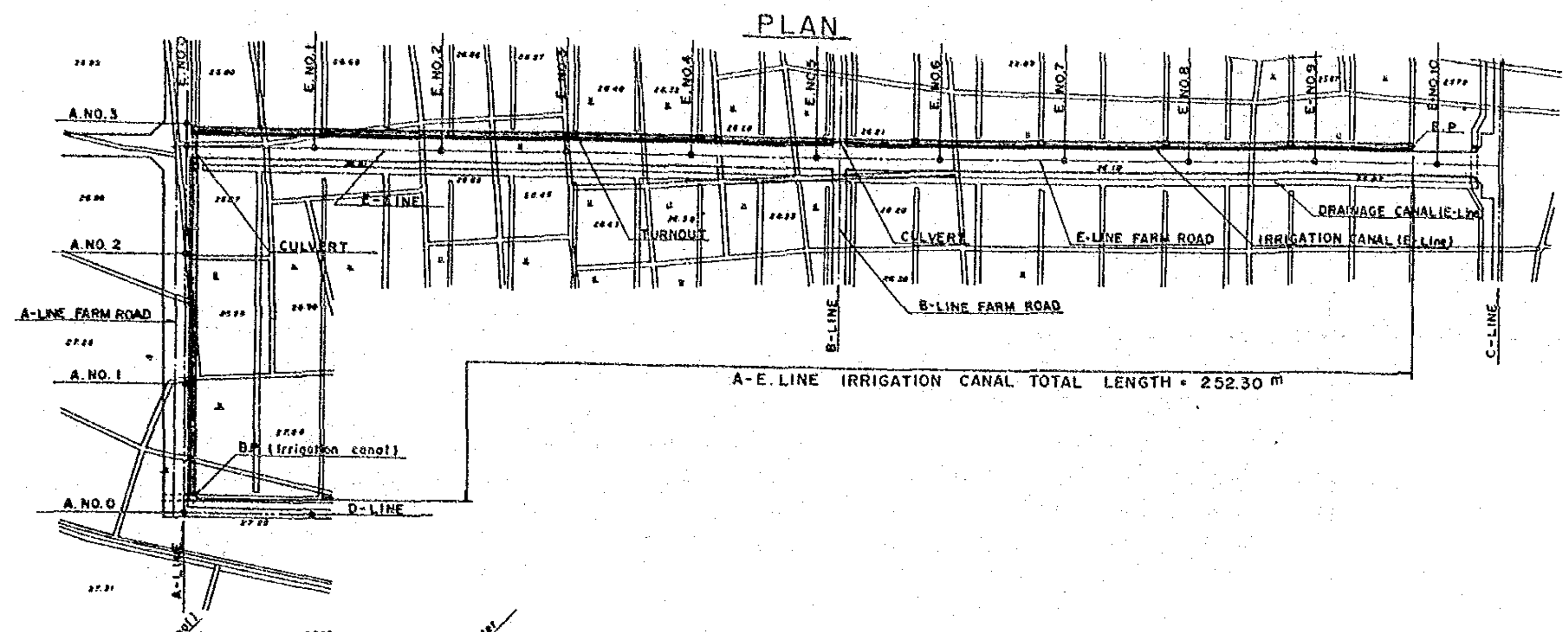
DIRECTORATE GENERAL OF FOOD CROP AGRICULTURE
THE INFRASTRUCTURE IMPROVEMENT WORKS FOR
THE FOOD CROP PROTECTION PROJECT (2nd Phase of ATA-162)

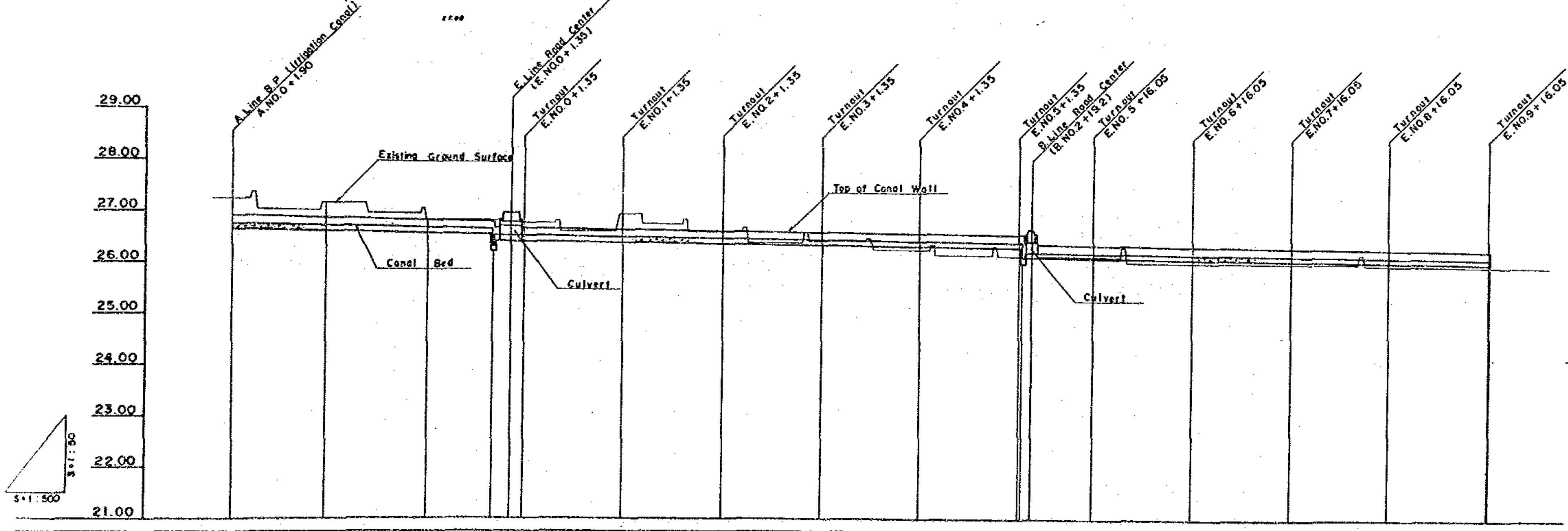
JATISARI PESTS FORECASTING CENTER

D.LINE IRRIGATION CANAL

JAPAN INTERNATIONAL COOPERATION AGENCY
TOKYO

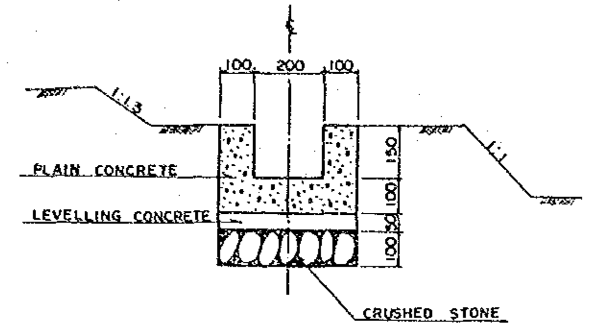
DWG. NO. J-4



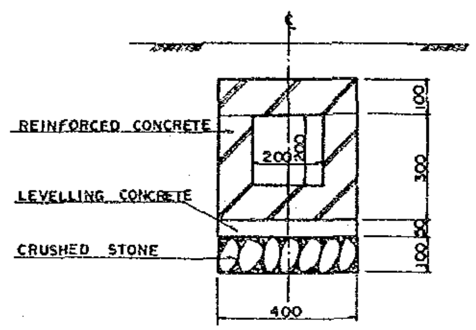


SLOPE	26.750		1/1000	26.699 / 26.556			1/1000			26.449 / …			1/1000		26.170
WATER SURFACE ELEVATION	26.791	26.773	26.753	26.740 / 26.597	26.591	26.571	26.551	26.531	26.511	26.490 / 26.353	26.291	26.271	26.251	26.231	26.211
CANAL BED ELEVATION	26.750	26.732	26.712	26.699 / 26.556	26.550	26.530	26.510	26.490	26.470	26.449 / 26.354?	26.250	26.230	26.210	26.190	26.170
GROUND ELEVATION	27.25	27.20	26.87		26.80	26.81	26.65	26.48	26.32	26.21	26.21	26.10	26.10	26.07	26.07
ACCUMULATED DISTANCE	0.00	18.10	38.10	51.10 / 54.60	57.30	77.30	97.30	117.30	137.30	157.30 / 157.85 / 159.85	172.00	192.00	212.00	232.00	252.00 / 252.30
DISTANCE	0.00	18.10	20.00	13.00 / 3.50	2.70	20.00	20.00	20.00	20.00	20.00 / 0.55 / 2.00	12.15	20.00	20.00	20.00	20.00 / 0.30
STATION	A.NO.0 +1.90	A.NO.1	A.NO.2	A.NO.2 +13.0 / +16.5	E.NO.0 +1.35	E.NO.1 +1.35	E.NO.2 +1.35	E.NO.3 +1.35	E.NO.4 +1.35	E.NO.5 +1.35 / +1.90 / +3.90	E.NO.5 +16.05	E.NO.6 +16.05	E.NO.7 +16.05	E.NO.8 +16.05	E.NO.9 +16.05 / +16.35 (E.P)
CURVE				IA = 90°-00'-00'											

TYPICAL CROSS SECTION S=1:10
(IRRIGATION CANAL)



TYPICAL CROSS SECTION S=1:10
(CULVERT)



DIRECTORATE GENERAL OF FOOD CROP AGRICULTURE
THE INFRASTRUCTURE IMPROVEMENT WORKS FOR
THE FOOD CROP PROTECTION PROJECT (2nd Phase of ATA-162)

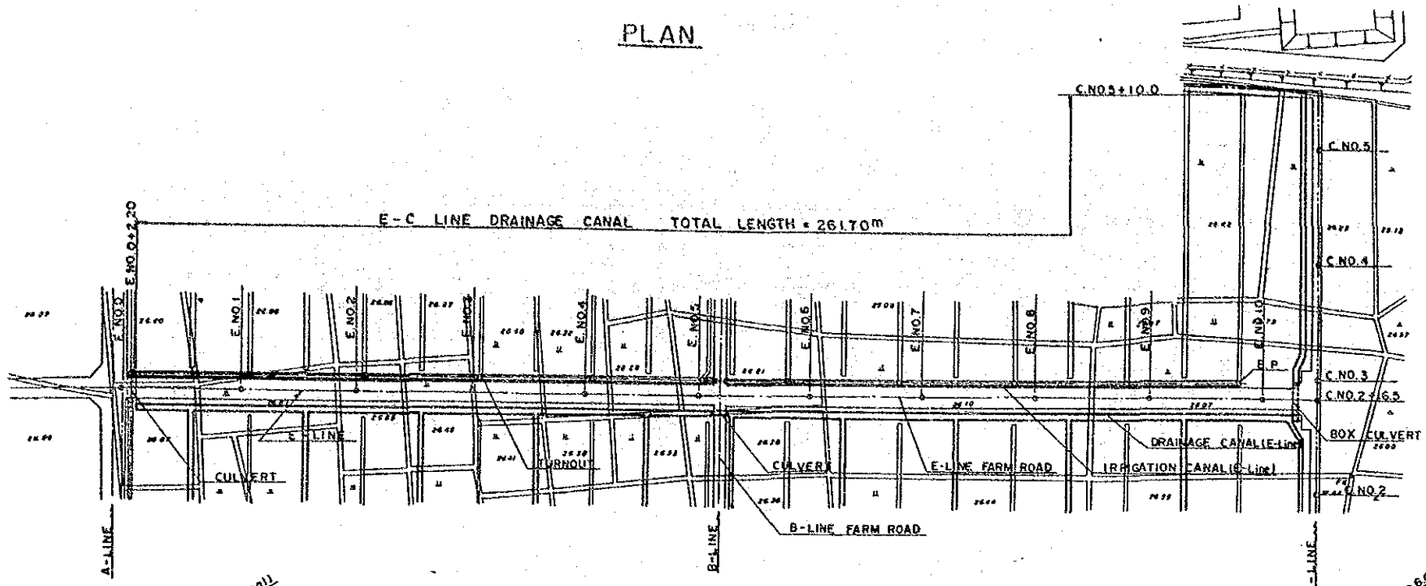
JATISARI PESTS FORECASTING CENTER

A-E LINE IRRIGATION CANAL

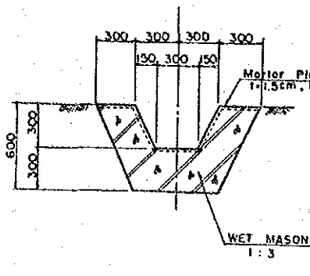
JAPAN INTERNATIONAL COOPERATION AGENCY
TOKYO

DWG. NO. J-5

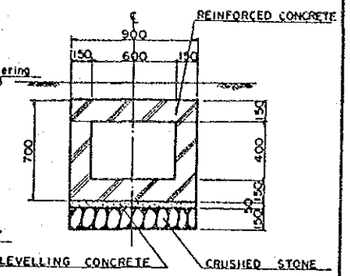
PLAN



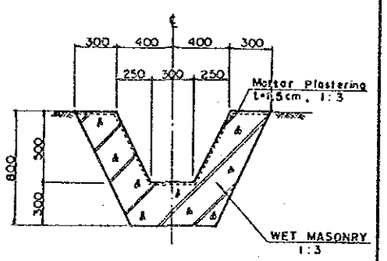
TYPICAL SECTION S=1:20 (DRAINAGE CANAL)



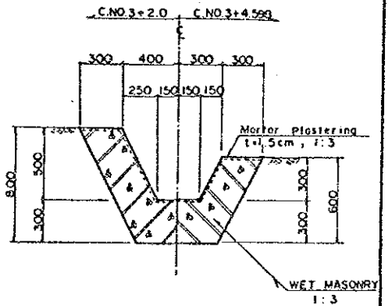
TYPICAL SECTION S=1:20 (BOX CULVERT)

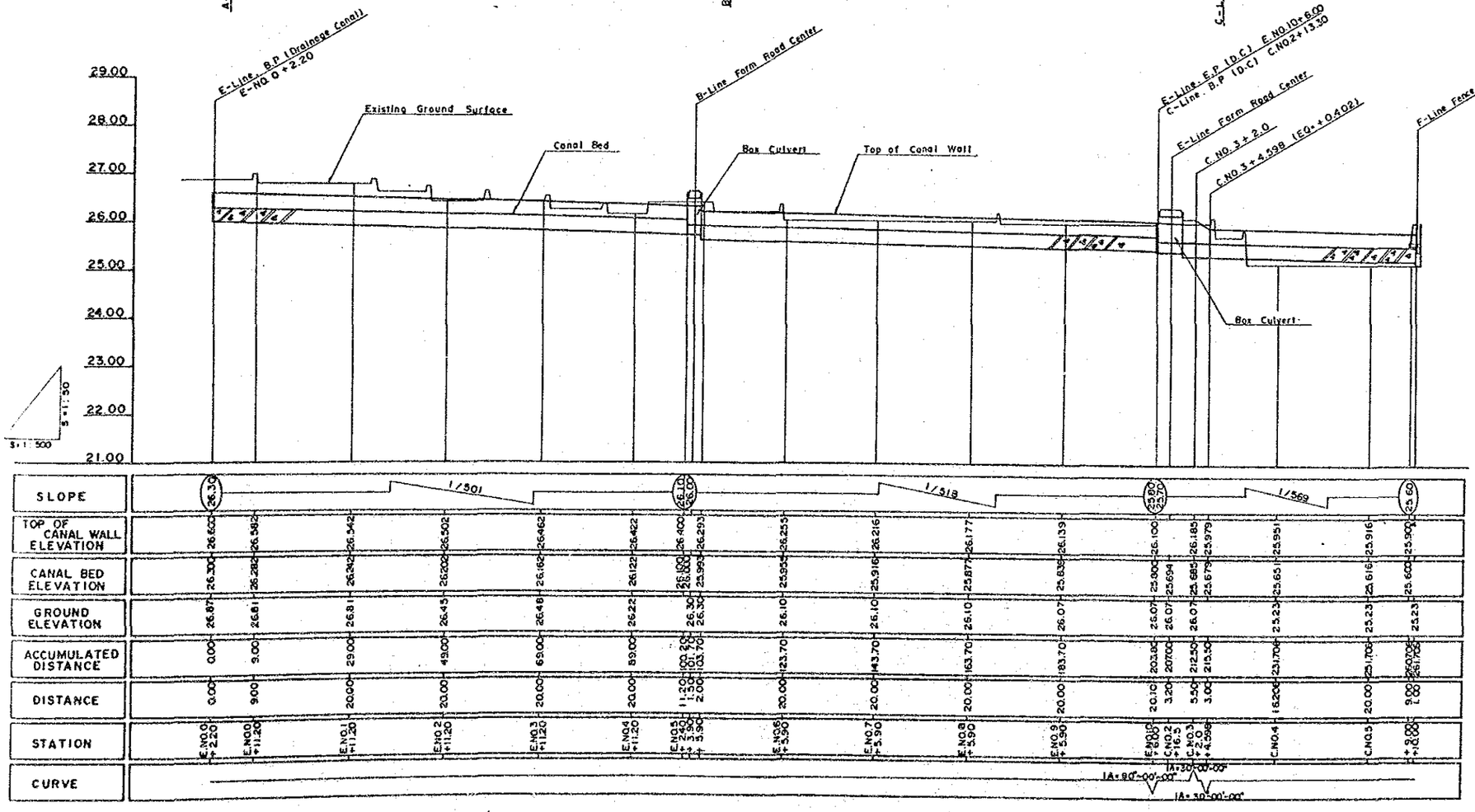


CROSS SECTION S=1:20 (C.NO.2+19.1 ~ C.NO.3+2.0)



CROSS SECTION S=1:20 (C.NO.3+2.0 ~ C.NO.3+4.598)





DIRECTORATE GENERAL OF FOOD CROP AGRICULTURE
THE INFRASTRUCTURE IMPROVEMENT WORKS FOR
THE FOOD CROP PROTECTION PROJECT (2nd Phase of ATA-162)

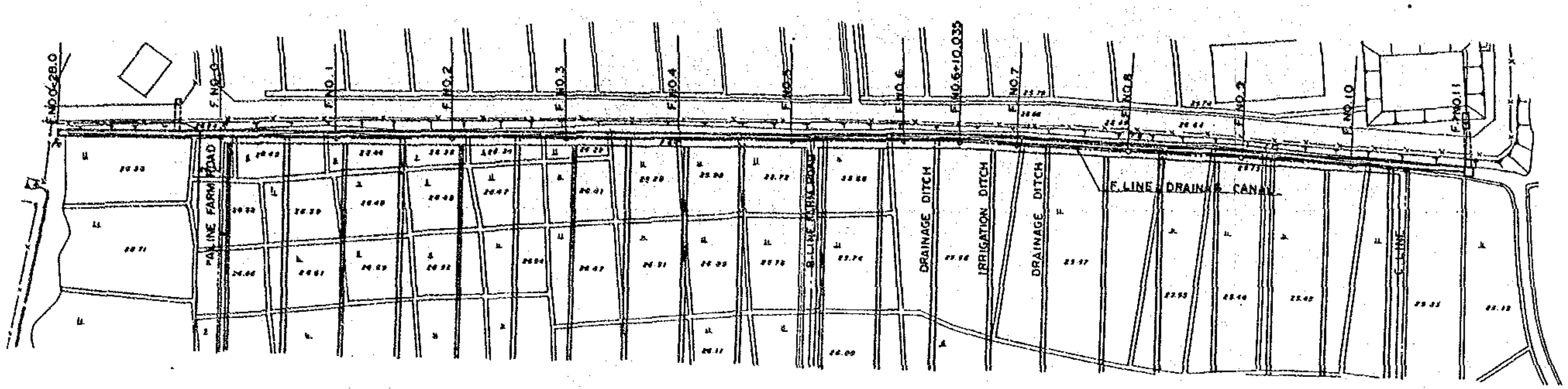
JATISARI PESTS FORECASTING CENTER

E-C. LINE DRAINAGE CANAL

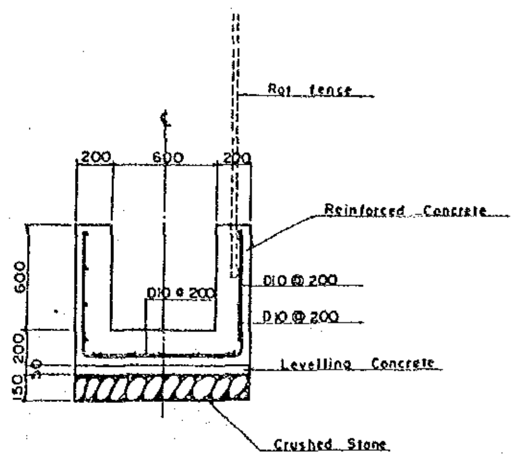
JAPAN INTERNATIONAL COOPERATION AGENCY
TOKYO

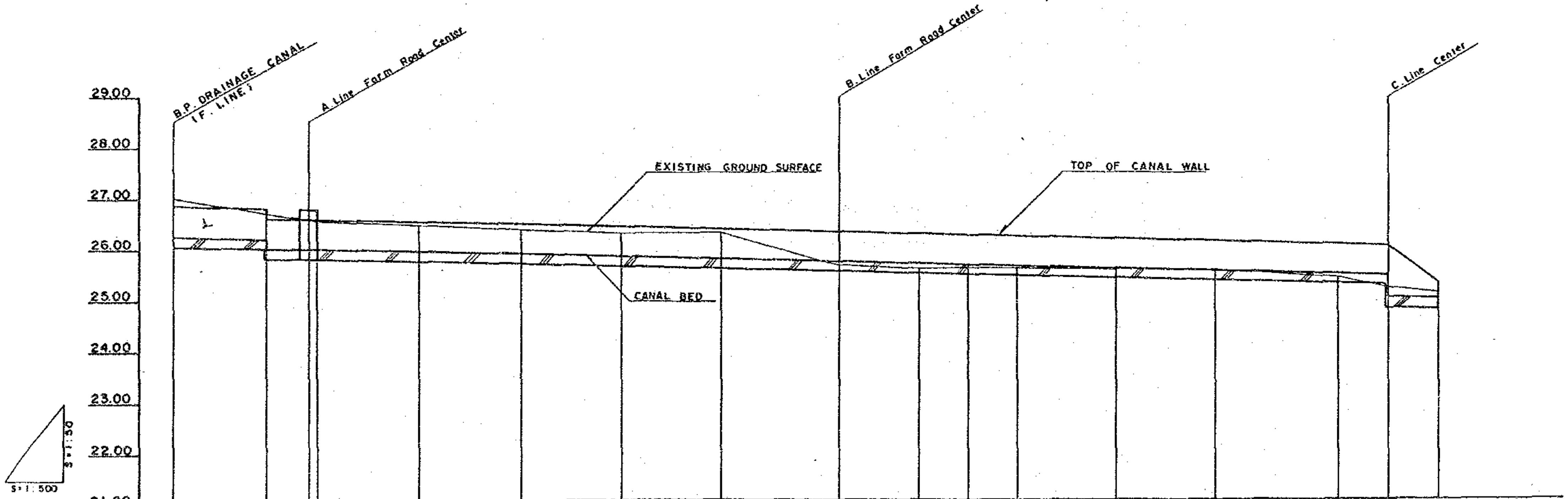
DWG. NO. J-6

PLAN



TYPICAL SECTION S = 1 : 20
(Main Drainage Canal)





STATION	SLOPE	TOP OF WALL ELEVATION	CANAL BED ELEVATION	GROUND ELEVATION	ACCUMULATED DISTANCE	DISTANCE	CURVE
F.NO.0 -28.0	(26.230) 1/362	26.850	26.230	27.00	0.00	0.00	
F.NO.0 -9.9	(26.200 / 26.000) 1/400	26.800 / 26.600	26.200 / 26.000		18.10	18.10	
F.NO.0		26.575	25.975	26.53	28.00	9.90	
F.NO.1		26.525	25.925	26.44	48.00	20.00	
F.NO.2		25.475	25.875	26.36	68.00	20.00	
F.NO.3		25.425	25.825	26.29	88.00	20.00	
F.NO.4		26.375	25.775	26.29	108.00	20.00	
F.NO.5		25.325	25.725	25.73	128.00	20.00	
+3.928		26.315	25.715	25.65	131.928	3.928	
F.NO.6		26.275	25.675	25.58	148.00	16.072	
+10.035		26.250	25.650	25.58	158.035	10.035	3°~28'~10'
F.NO.7		26.225	25.625	25.58	168.00	9.965	
F.NO.8		26.175	25.575	25.47	188.00	20.00	
F.NO.9		26.125	25.525	25.44	208.00	20.00	
F.NO.10		26.075	25.475	25.42	228.00	20.00	
+10.10	(25.400 / 25.000) 1/400	26.050 / 26.050	25.450 / 25.000	25.20	238.00	10.10	1°~30'~00'
F.NO.11	(24.975)	25.300	24.975	25.10	248.00	9.90	

DIRECTORATE GENERAL OF FOOD CROP AGRICULTURE
THE INFRASTRUCTURE IMPROVEMENT WORKS FOR
THE FOOD CROP PROTECTION PROJECT (2nd Phase of ATA-162)

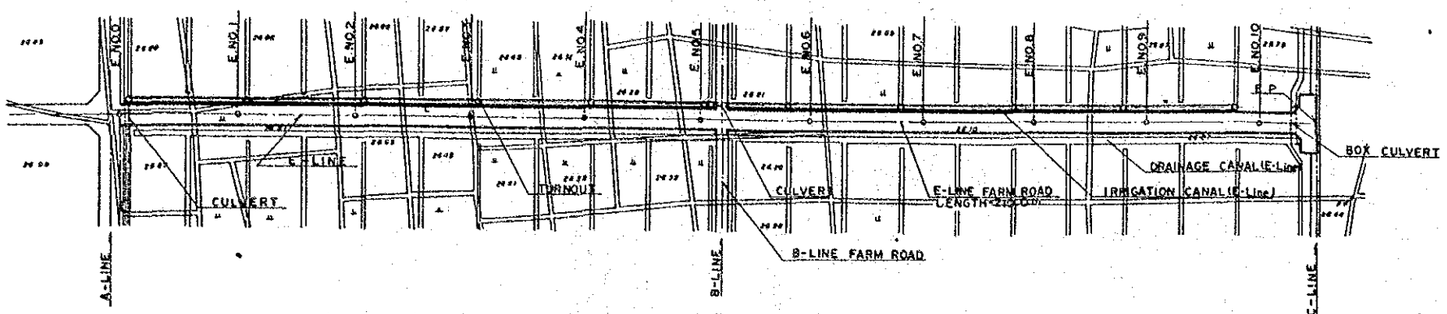
JATISARI PESTS FORECASTING CENTER

MAIN DRAINAGE CANAL (F. LINE)

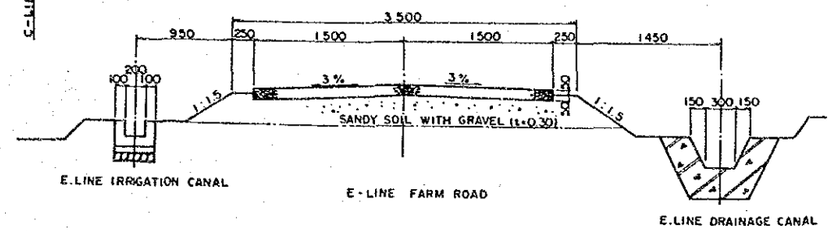
JAPAN INTERNATIONAL COOPERATION AGENCY
TOKYO

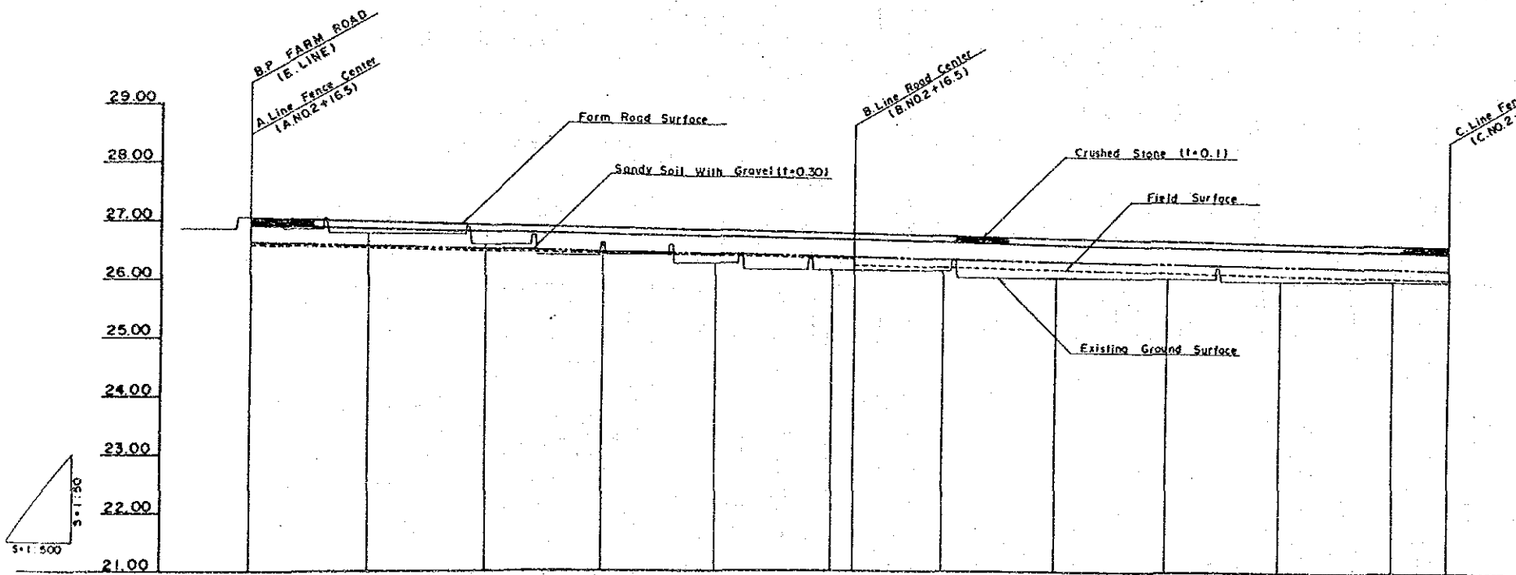
DWG. NO. J-7

PLAN



TYPICAL SECTION





SLOPE	27.03	1/350											26.45
FARM ROAD ELEVATION	27.03	26.99	26.93	26.87	26.82	26.76	26.75	26.71	26.65	26.59	26.54	26.48	26.45
THICKNESS OF SANDY SOIL	0.30	0.30	0.30	0.30	0.30	0.30		0.30	0.30	0.30	0.30	0.30	0.30
GROUND ELEVATION	27.07	26.81	26.65	26.65	26.32	26.21	26.21	25.21	26.10	26.10	26.07	26.07	26.07
ACCUMULATED DISTANCE	0.00	20.00	40.00	60.00	80.00	100.00	103.90	120.00	140.00	160.00	180.00	200.00	210.00
DISTANCE	0.00	20.00	20.00	20.00	20.00	20.00	3.90	16.10	20.00	20.00	20.00	20.00	10.00
STATION	E.NO.0	E.NO.1	E.NO.2	E.NO.3	E.NO.4	E.NO.5	+3.90	E.NO.6	E.NO.7	E.NO.8	E.NO.9	E.NO.10	+10.00
CURVE													

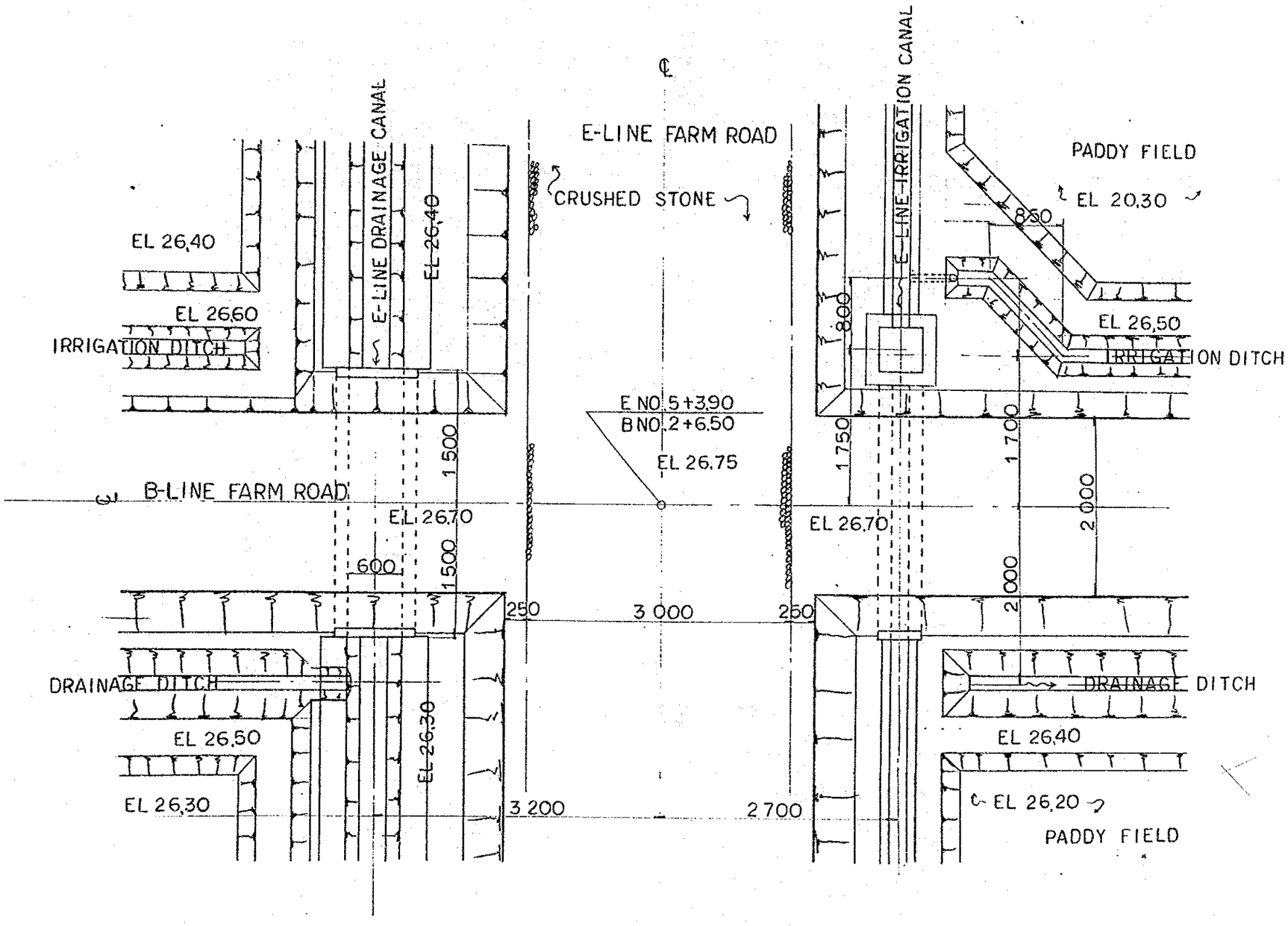
DIRECTORATE GENERAL OF FOOD CROP AGRICULTURE
THE INFRASTRUCTURE IMPROVEMENT WORKS FOR
THE FOOD CROP PROTECTION PROJECT (2nd Phase of ATA-162)

JATISARI PESTS FORECASTING CENTER

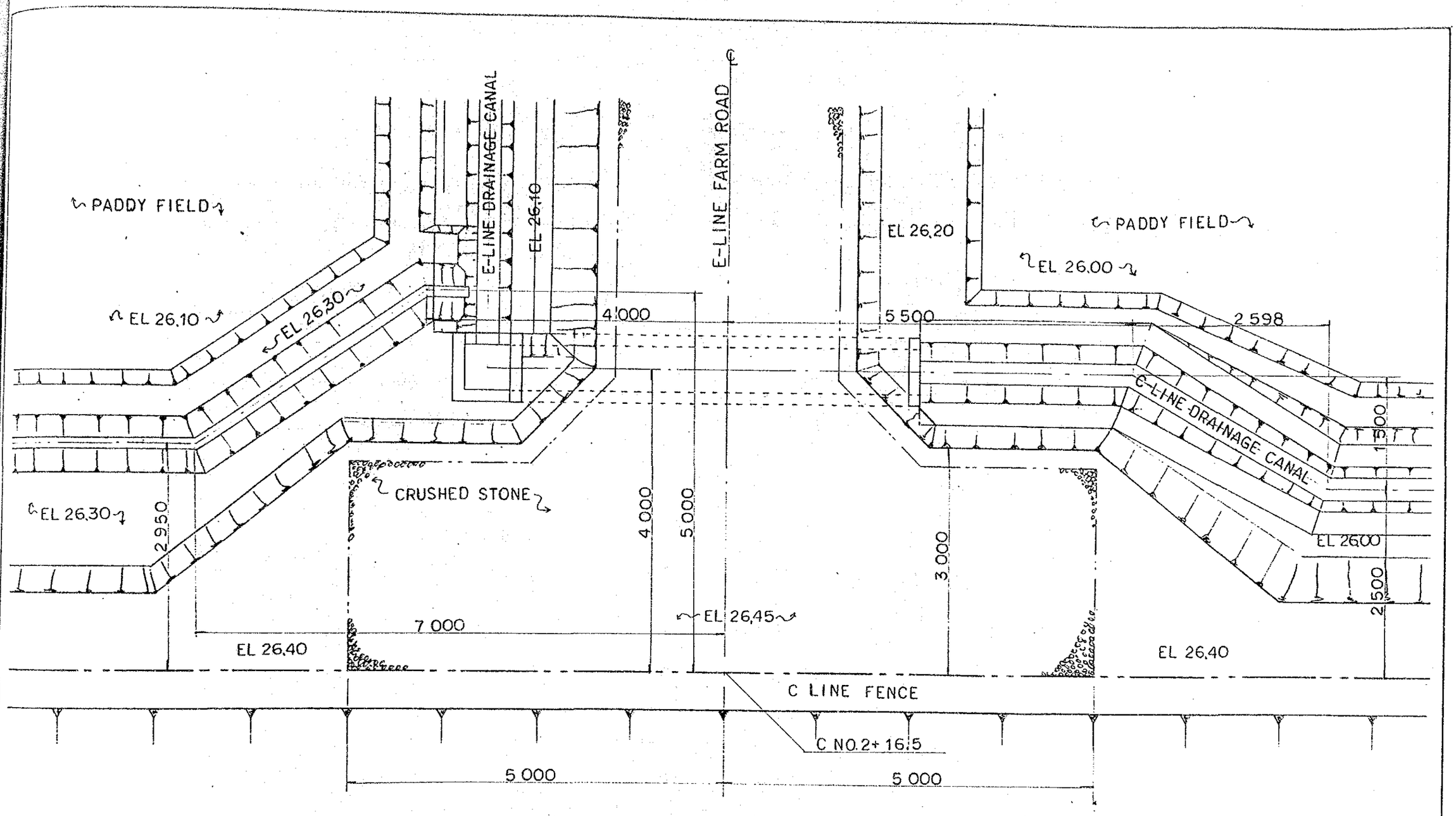
E. LINE FARM ROAD

JAPAN INTERNATIONAL COOPERATION AGENCY
TOKYO

DWG. NO. J-8



DIRECTORATE GENERAL OF FOOD CROP AGRICULTURE THE INFRASTRUCTURE IMPROVEMENT WORKS FOR THE FOOD CROP PROTECTION PROJECT (2nd Phase of ATA-162)	
JATISARI PESTS FORECASTING CENTER	
PLAN OF FARM ROAD (1)	
JAPAN INTERNATIONAL COOPERATION AGENCY TOKYO	DWG. NO. J-9



DIRECTORATE GENERAL OF FOOD CROP AGRICULTURE
THE INFRASTRUCTURE IMPROVEMENT WORKS FOR
THE FOOD CROP PROTECTION PROJECT (2nd Phase of ATA-162)

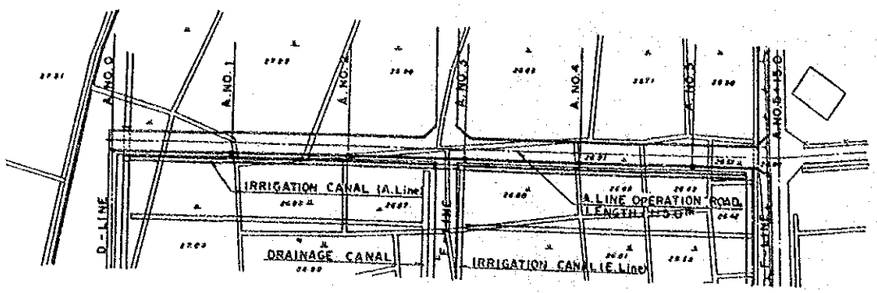
JATISARI PESTS FORECASTING CENTER

PLAN OF FARM ROAD (2)

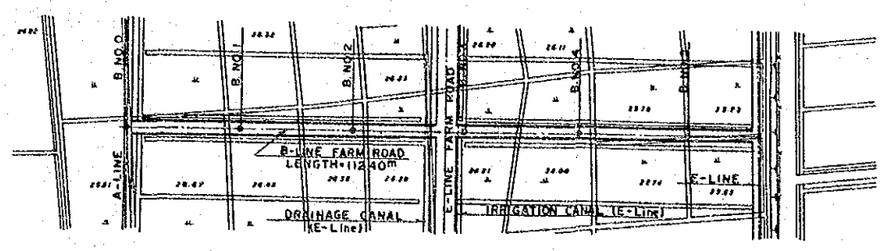
JAPAN INTERNATIONAL COOPERATION AGENCY
TOKYO

DWG. NO.
J-10

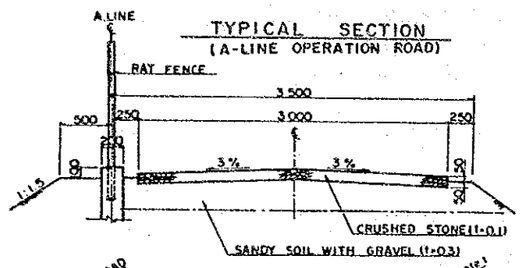
PLAN



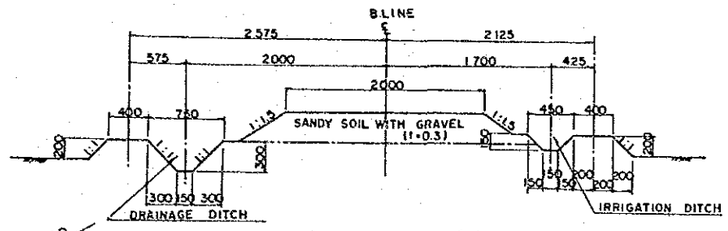
PLAN

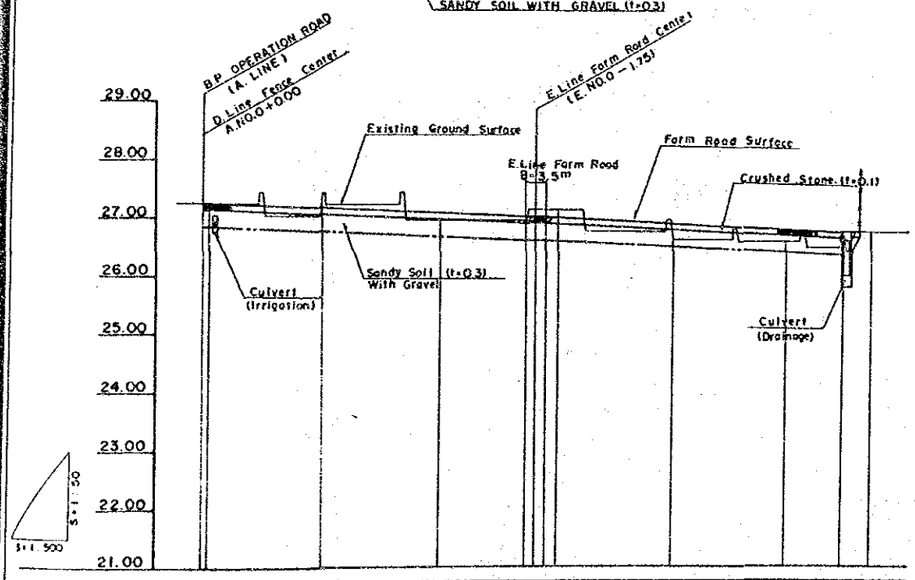


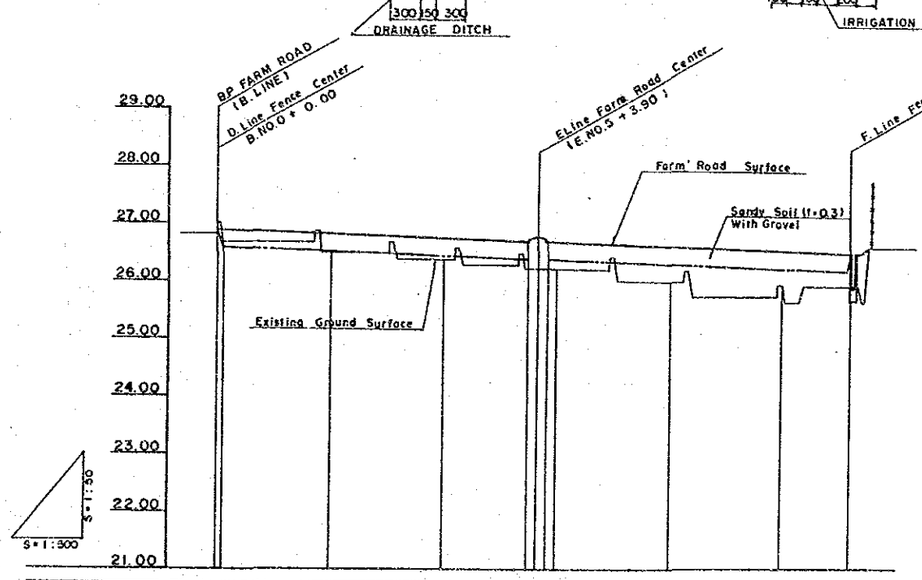
TYPICAL SECTION
(A-LINE OPERATION ROAD)



TYPICAL SECTION
(B-LINE FARM ROAD)







SLOPE	1/269			1/207			
FARM ROAD ELEVATION	27.250 27.250	27.179	27.105	27.050 27.050	27.050 27.042	26.945	26.848	26.800	26.800
THICKNESS OF SANDY SOIL	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	
GROUND ELEVATION	27.25	27.25	26.99	27.20	27.20	26.66	26.62	26.74	26.80
ACCUMULATED DISTANCE	0.00 1.00	20.00	40.00	54.75 56.50 58.25 60.00		80.00	100.00	110.00	115.00
DISTANCE	0.00 1.00	19.00	20.00	14.75 1.75 1.75 1.75		20.00	20.00	10.00	5.00
STATION	A NO.0 +1.00	A NO.1	A NO.2	+14.75 +16.50 +18.25 A NO.3		A NO.4	A NO.5	+10.0	+15.0
CURVE									

SLOPE	1/265			1/268		
FARM ROAD ELEVATION	26.900 26.900	26.829	26.753	26.698 26.698 26.691	26.610	26.542	26.500
THICKNESS OF SANDY SOIL	0.30	0.30	0.30	0.30	0.30	0.30	
GROUND ELEVATION	26.81	26.48	26.38	26.21	26.00	25.94	
ACCUMULATED DISTANCE	0.00 1.00	20.00	40.00	54.75 56.50 58.25 60.00	80.00	100.00	111.40 112.40
DISTANCE	0.00 1.00	19.00	20.00	14.75 1.75 1.75 1.75	20.00	20.00	11.40 1.00
STATION	B NO.0 +1.00	B NO.1	B NO.2	+14.75 +16.50 +18.25 B NO.3	B NO.4	B NO.5	+11.4 +12.4
CURVE							

DIRECTORATE GENERAL OF FOOD CROP AGRICULTURE
THE INFRASTRUCTURE IMPROVEMENT WORKS FOR THE FOOD CROP PROTECTION PROJECT (2nd Phase of ATA-162)

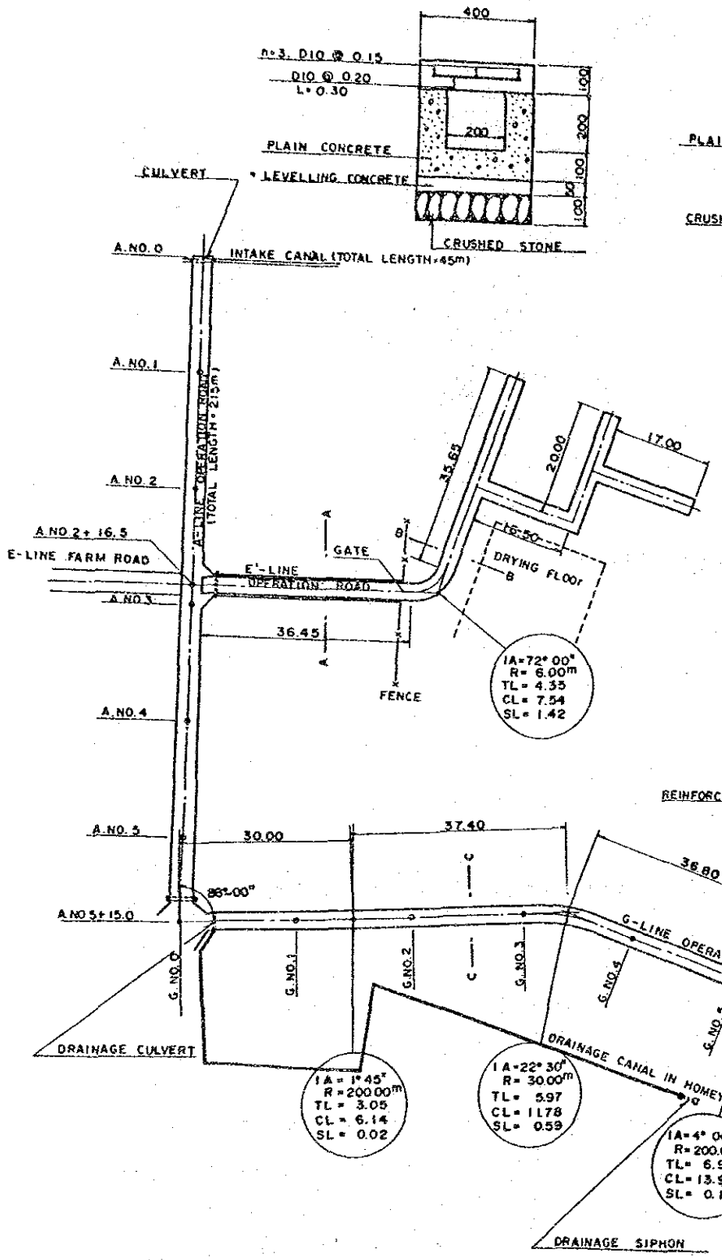
JATISARI PESTS FORECASTING CENTER

A. LINE OPERATION ROAD
B. LINE FARM ROAD

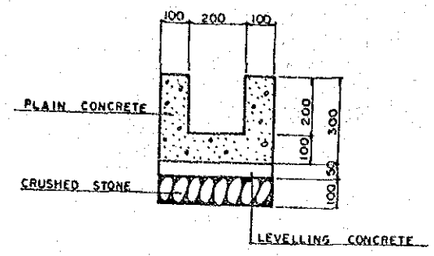
JAPAN INTERNATIONAL COOPERATION AGENCY
TOKYO

DWG. NO. J-11

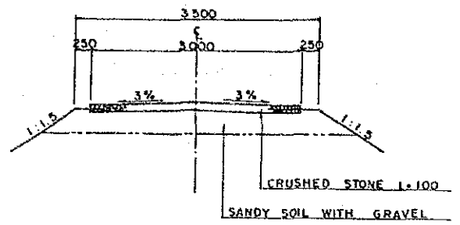
TYPICAL SECTION S=1:10
(CULVERT OF INTAKE CANAL)



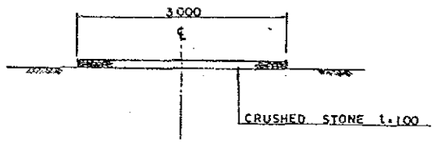
TYPICAL SECTION S=1:10
(INTAKE CANAL)



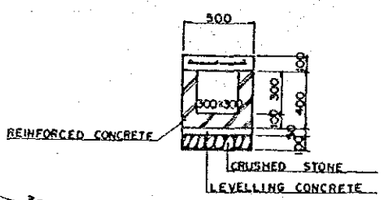
TYPICAL SECTION S=1:40
(A - A SECTION)



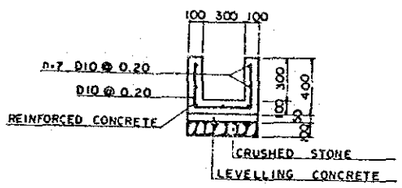
TYPICAL SECTION S=1:40
(B - B SECTION)



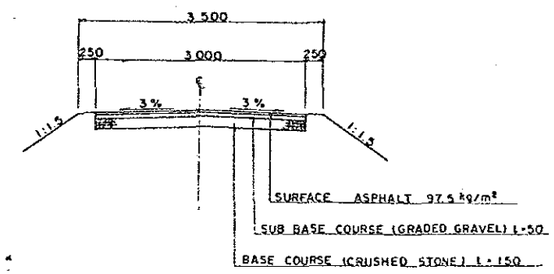
TYPICAL SECTION S=1:20
(DRAINAGE CULVERT for G-LINE)



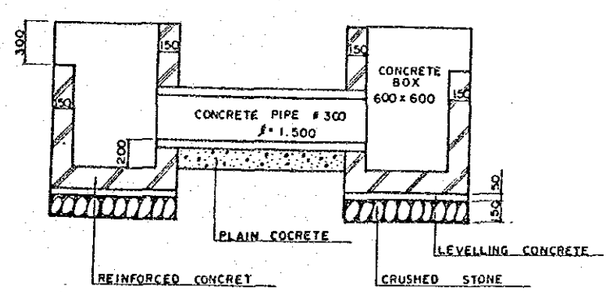
TYPICAL SECTION S=1:20
(DRAINAGE CANAL IN HOME YARD)



TYPICAL SECTION S=1:40
(C - C SECTION)



DRAINAGE SIPHON S=1:30



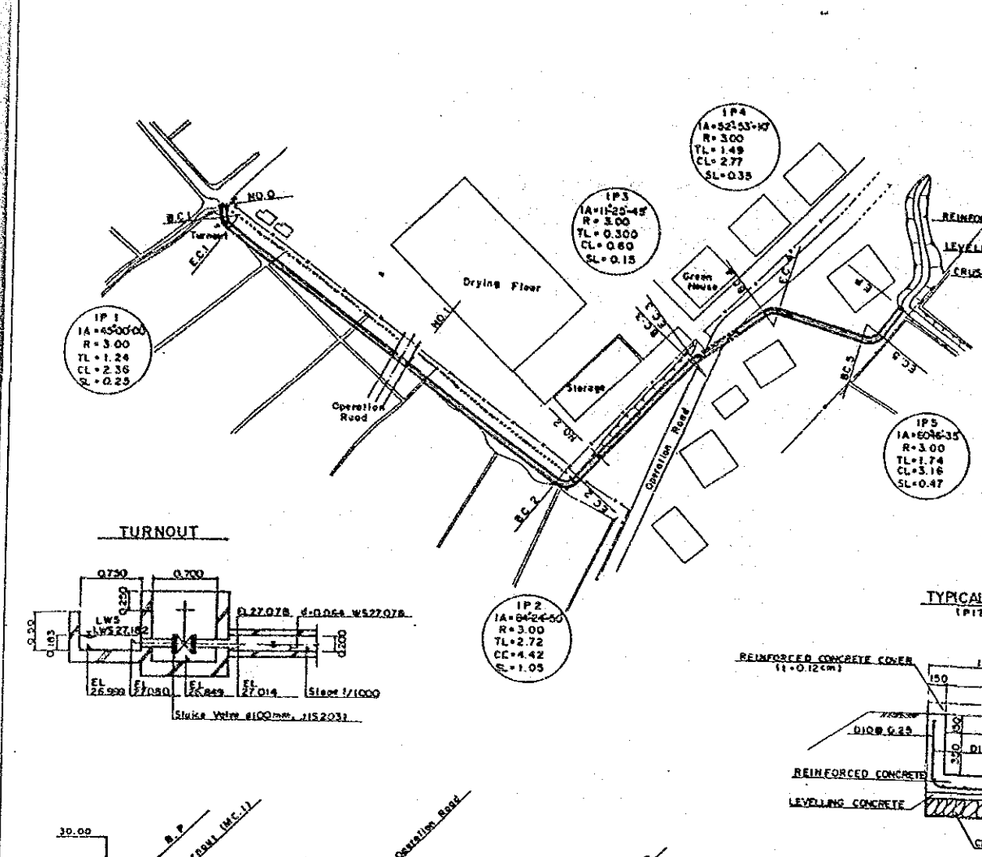
DIRECTORATE GENERAL OF FOOD CROP AGRICULTURE
THE INFRASTRUCTURE IMPROVEMENT WORKS FOR
THE FOOD CROP PROTECTION PROJECT (2nd Phase of ATA-162)

JATISARI PESTS FORECASTING CENTER

OPERATION ROAD and DRAINAGE CANAL IN HOME YARD

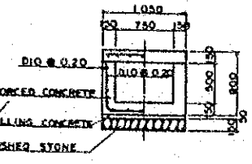
JAPAN INTERNATIONAL COOPERATION AGENCY
TOKYO

DWG. NO. J-12

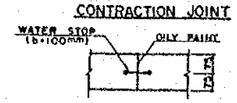


TURNOUT

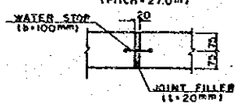
TYICAL SECTION (UNDER OPERATION ROAD)



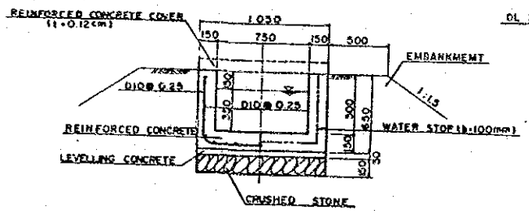
CONTRACTION JOINT

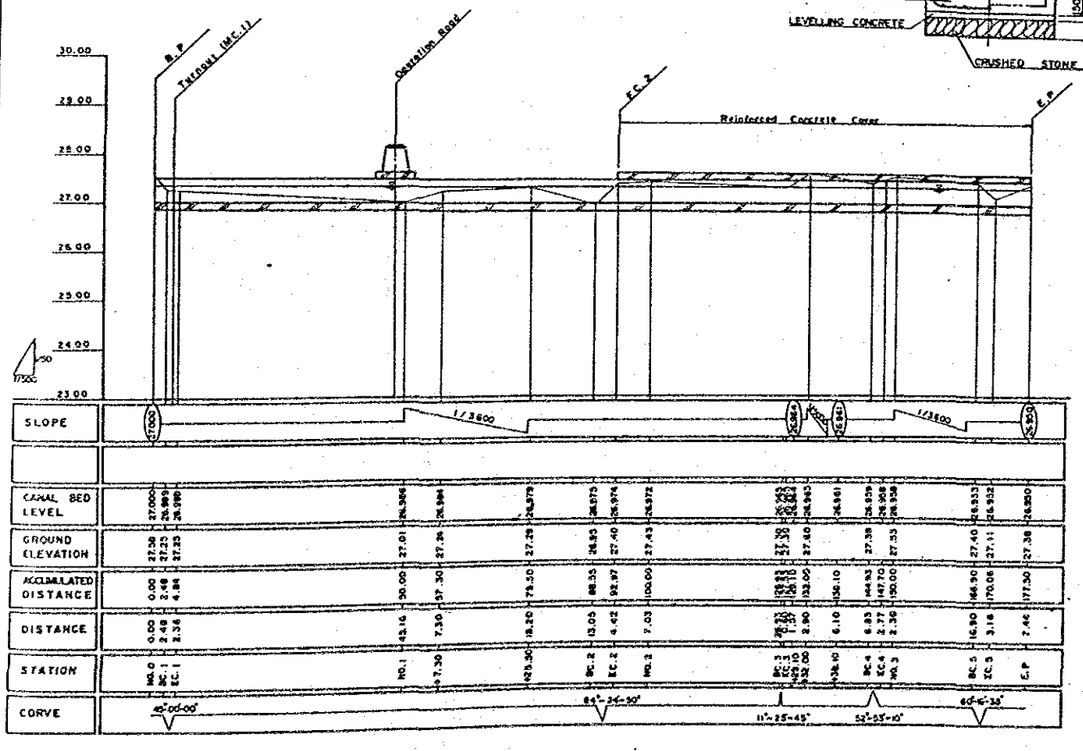


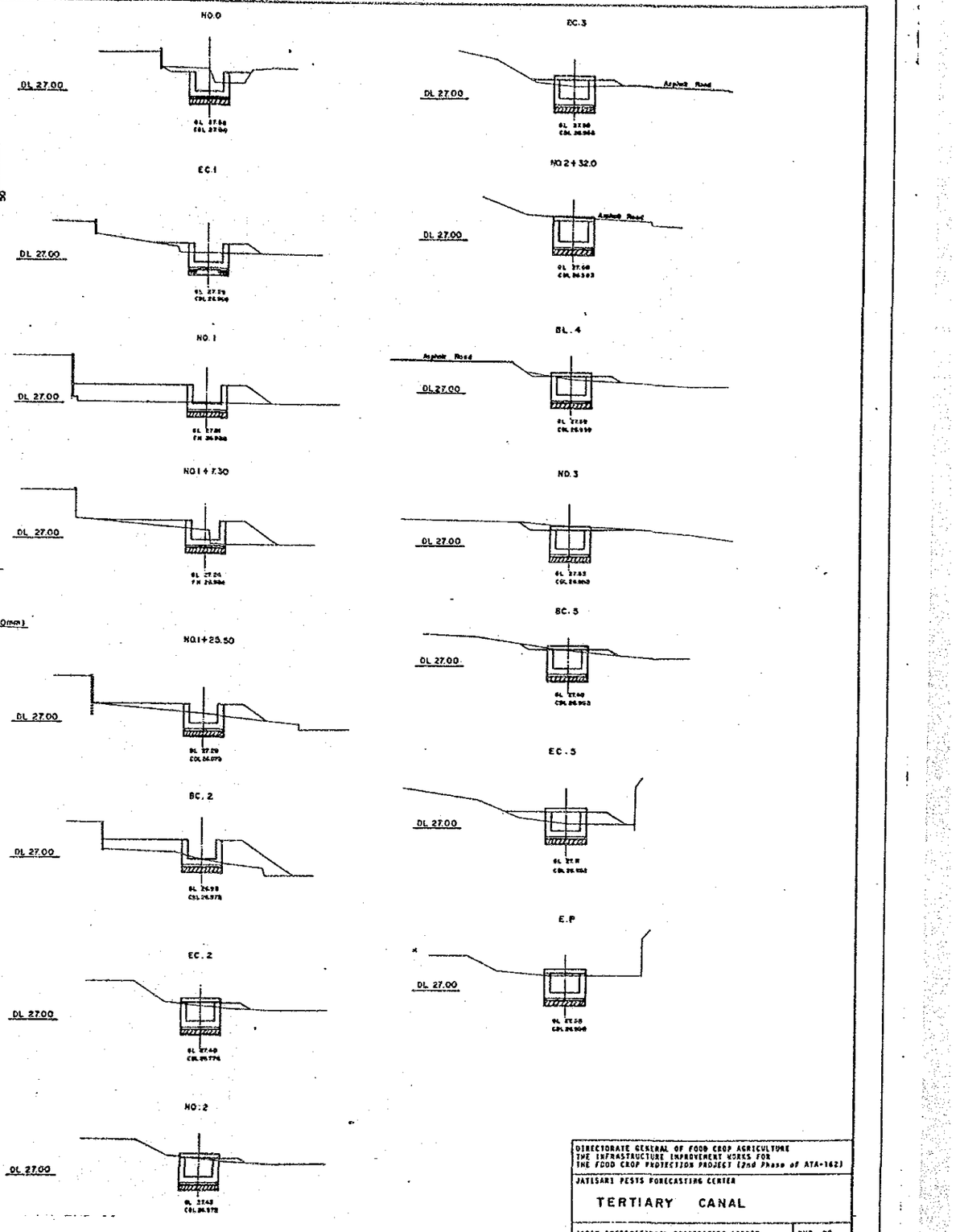
EXPANSION JOINT (PITCH=27.0m)



TYPICAL SECTION (PITCH=9.00m)







DIRECTORATE GENERAL OF FOOD CROP AGRICULTURE
THE INFRASTRUCTURE IMPROVEMENT WORKS FOR
THE FOOD CROP PROTECTION PROJECT (2nd Phase of ATA-162)

JATISARI PESTS FORECASTING CENTER

TERTIARY CANAL

JAPAN INTERNATIONAL COOPERATION AGENCY
TOKYO

DWG. NO. J-13