

6. Calculation of Implementation Cost

The project cost has been estimated as follows based on the survey and design achievements.

- (1) The estimate of the main work assumes the use of contractors.
- (2) The estimates of unit costs are based on the prices given by the study in Lae and Port Moresby which was carried out in May, 1990 and are adopted for arrival on site including the field expenses, miscellaneous expenses, etc. Also the contingency is taken into account under the condition of that the work execution will commence in the end of 1990.

TABLE OF GENERAL CONSTRUCTION COSTS
THE MODEL INFRASTRUCTURE WORK FOR THE FOREST RESEARCH PROJECT (P. N. G)

NO	DESCRIPTION	Q' TY	U.	LOCAL PORTION (KINA)		REMARK
				U/P	AMOUNT	
1	EXPERIMENTAL & INTENSIVE AREAS 実験・精密苗畑区	1	LOT		128 328	
2	BUILDING WORK 建物	1	"		128 117	
3	EXTERNAL WORK 排水施設 道路, フェンス	1	"		32 962	
4	ELECTRIC AND SANITARY WORK 電気及び給水施設	1	"		19 901	
5	EXPERIMENTAL PLANTATION WORK 試験林	1	"		25 023	
	TOTAL				334 331	

COST BREAKDOWN TABLES

NO	DESCRIPTION	Q'TY	U.	LOCAL PORTION (KINA)		REMARK
				U/P	AMOUNT	
1	EXPERIMENTAL & INTENSIVE AREAS					
	実験・精密苗畑区					
	○ Land Preparation					
	立木整理及び整地					
	Setting-out with batter board					
	for above construction	1	Lot		600	
	測量					
	CUTTING DOWN OF TREE H=15m	18	Nos.	133	2 394	
	立木の伐採					
	Topsoil stripping 200mm deep	255	m ³	20 ⁵⁴	5 237	
	表土剝離					
	Hand excavation	37	m ³	31 ⁶³	1 170	
	床堀					
	Backfilling and compaction	153	m ³	22 ⁵⁹	3 456	
	埋め戻し, ならし, 転圧					
	Sub-Total Land Preparation				12 857	
	立木整理・整地小計					
	○ EXPERIMENTAL AREA					
	実験苗畑区					
	Crushed rock filling and					
	compacted in 100mm layers under					
	raised bed	162	m ³	68 ¹⁸	11 045	
	基礎栗石, 転圧					
	Reinforced concrete in raised					Ready-mixed
	bed, P'c=17.5 MPa	162	m ³	162 ¹⁶	26 269	con. 100mm
	鉄筋コンクリート (苗床)					thickness

NO	DESCRIPTION	Q'TY	U.	LOCAL PORTION (KINA)		REMARK
				U/P	AMOUNT	
1	Formwork to raised bed	35	m ²	55 ⁸⁶	1 955	
	苗床型枠					
	Fabric square mesh					
	200×200×6mm	1,552	m ²	8 ⁹⁹	13 952	
	ワイヤーメッシュ					
	Expansion joint for raised bed					
	100mm height	274	m	1 ⁸⁰	493	
	収縮目地					
	Concrete steel trowel finish	1,620	m ²	4 ⁷⁹	7 614	
	コンクリート金ごて仕上げ					
	Timber shade framing, 2m high	1,568	m ²	9 ⁸³	15 413	
	寒冷紗木枠					
	Two coats timber finish paint	600	m ²	5 ⁸⁵	3 510	
	木枠塗装					
	Sub-Total Experimental Area				80 251	
	実験苗畑区小計					
	○ Intensive area					
	精密苗畑区					
	Crushed rock filling and compacted in 50mm layers					
	under raised bed	21	m ³	68 ¹⁸	1 431	
	切入砂利, 転圧 (基礎)					
	Concrete in raised bed					75mm thick-
	$f'_c=17.5^{MPa}$	47	m ³	162 ¹⁶	7 621	ness ready
	苗床コンクリート					mixed conc.
	Formwork to raised bed	190	m ²	55 ⁸⁶	10 613	
	苗床型枠					

NO	DESCRIPTION	Q'TY	U.	LOCAL PORTION (KINA)		REMARK	
				U/P	AMOUNT		
1	Wire netting for raised bed concrete	518	m ²	3	15	1 631	
	苗床コンクリート補強用金網						
	Concrete steel trowel finish	518	m ²	4	70	2 434	
	コンクリート金ごて仕上げ						
	Gravel filling in 50mm layers for path	418	m ²	3	41	1 425	
	歩道敷砂利						
	Barrier with 0.2mm thick polyethylen film under path	418	m ²	8	39	3 507	
	歩道下敷ポリエチレンシート						
	Steel shade framing	518	m ²	9	24	4 786	0.8m high
	寒冷紗用鉄枠						
	Two coats paint of steel finish	250	m ²	7	09	1 772	
	鉄枠塗装						
	Sub-Total Intensive Area					35 220	
	精密苗畑区小計						
	Total Exp. & Int. Area (1)					128 328	
	実験・精密苗畑区合計(1)						

NO	DESCRIPTION	Q'TY	U.	LOCAL PORTION (KINA)		REMARK
				U/P	AMOUNT	
2	Building Work (建物他)					
	○Working house, Marterials store and Garage					
	作業舎、資機材倉庫、車庫					
	Setting-out with batter board for building construction	243	m ²	4 ¹¹	998	
	測量					
	Hand excavation	68	m ³	31 ⁶³	2 150	
	床堀					
	Backfilling and compaction	42	m ³	22 ⁵⁹	949	
	埋め戻し、転圧					
	Crushed rock filling and compacted in 100mm layer under ground slab	28	m ³	68 ¹⁸	1 909	
	基礎栗石、転圧					
	Moisture barrier with 0.2mm thick polyethylen film on crushed rock fill	216	m ²	8 ³⁹	1 812	
	防湿ポリエチレンシート (床下)					
	Unreinforced concrete in blinding layer, 50mm thick	3	m ³	140 ⁵⁰	421	
	捨てコン					
	Reinforced concrete in foundation, F' c=20 ^{MPa}	23	m ³	190 ⁵²	4 382	
	鉄筋コンクリート (基礎)					

NO	DESCRIPTION	Q'TY	U.	LOCAL PORTION (KINA)		REMARK
				U/P	AMOUNT	
2	Reinforced concrete in ground floor slab, $f'c=20MPa$	29	m^3	190 ⁵²	5 525	
	鉄筋コンクリート (床)					
	Reinforced concrete in column, $f'c=20MPa$	7	m^3	206 ⁴⁸	1 445	
	鉄筋コンクリート (柱)					
	Reinforced concrete in beam $f'c=20MPa$	22	m^3	206 ⁴⁸	4 542	
	鉄筋コンクリート (梁)					
	Formwork to foundation	160	m^2	55 ⁸⁶	8 937	
	基礎型枠					
	Formwork to column	86	m^2	73 ⁹³	6 358	
	柱型枠					
	Formwork to beam	185	m^2	82 ⁹⁷	15 349	
	梁型枠					
	Reinforcing steel	8 ¹	Ton	1880 ⁷⁶	15 234	
	鉄筋					
	Hollow concrete block wall, 200mm thick	173	m^2	102 ⁶⁸	17 763	
	コンクリートブロック壁					
	Timber door frame, 150×50mm	13	m	11 ²⁷	146	
	木製扉枠					
	Timber window frame, 150×50mm	10	m	11 ²⁷	112	
	木製窓枠					
	Timber facia board, 200×20mm	97	m	6 ³⁰	611	
	破風板					

NO	DESCRIPTION	Q'TY	U.	LOCAL PORTION (KINA)		REMARK
				U/P	AMOUNT	
2	Timber roof framing including purlin, galvanized corrugate roof	326	m ²	67	50	22 005
	コルゲート鉄板屋根					
	Horizontal gutter, 150×0.6 mm	48	m	17	45	837
	雨どい					
	Eaves gutter, 150×0.6 mm	38	m	17	23	654
	軒どい					
	Asbestos cement board for exterior wall	20	m ²	15	11	302
	石綿セメントボード					
	Concrete steel trowel finish	243	m ²	6	23	1 513
	コンクリート金ごて仕上げ					
	Mortar plaster skirting steel towel 100mm high	70	m	18	23	1 276
	モルタルプラスター副木					
	Size 2,000×2,100×40mm thick hollow core flushdoor (Double leaf door)	1	No.			256
	両開き2枚扉					
	Ditto, but size 1,000 ×2,100×40mm	1	No.			128
	扉					
	Roller shutter, chain operated, 4,700 ×4,500 mm high	2	Nos.	3000		6 000
	鉄製シャッター					

NO	DESCRIPTION	Q'TY	U.	LOCAL PORTION (KINA)		REMARK
				U/P	AMOUNT	
2	Aluminium jalousie window, size 1,000 × 1,200 mm high	2	Nos.	102	64	205
	アルミニウムシャルウインドー					
	Acrylic paint on wooden surface	18	m ²	5	85	105
	木部表面塗装					
	Ditto, on steel surface	118	m ²	5	85	690
	鋼部表面塗装					
	Sub-Total W. house, M. store, Garage					122 614
	作業舎・資機材倉庫・車庫小計					
	○ Water storage					
	貯水施設					
	Crushed rock filling and compacted in 100mm layer under ground slab	2	m ³	68	18	136
	基礎栗石, 転圧					
	Reinforced concrete in base, F' c=20 ^{MPa} including reinforcing steel	4	m ³	198	83	795
	鉄筋コンクリート					
	Steel framing	1	Lot			822
	鉄フレーム					
	Water tank (13,500 ℓ)	1	No.			3 750
	貯水タンク					
	Sub-Total Water Storage					5 503
	貯水施設小計					
	Total Building Work (2)					128 117
	建物合計 (2)					

NO	DESCRIPTION	Q'TY	U.	LOCAL PORTION (KINA)		REMARK
				U/P	AMOUNT	
3	External work					
	排水施設 道路, フェンス					
	○ Open ditch 112 ^M 開渠					
	Crushed rock filling, 100mm thick	7	m ³	68 ¹⁸	477	
	基礎栗石					
	Concrete, F'c=17.5 MPa	11	m ³	162 ¹⁶	1 783	
	コンクリート					
	Formwork	146	m ²	55 ⁸⁶	8 155	
	型枠					
	Precast concrete cover 250×1,000×50mm thick	8	Nos.	7 ⁸⁸	63	
	コンクリートふた					
	○ Concrete pipe Φ300mm	140	m	87 ⁰⁸	12 191	
	コンクリート管					
	○ Sump pit 500×500×700mm height	4	Nos.	900 ⁰⁰	3 600	
	井					
	○ Gravel paving for access road, 150mm thick	468	m ²	10 ²⁴	4 792	
	道路敷砂利					
	Removal of existing fence	45	m	6 ⁰⁰	270	
	既設フェンス撤去					
	○ Galvanized chain mesh fence 2m high	41	m	39 ⁸⁶	1 631	
	フェンス新設					
	Total External Work (3)				32 962	
	排水施設 道路, フェンス合計(3)					

NO	DESCRIPTION	Q'TY	U.	LOCAL PORTION (KINA)		REMARK
				U/P	AMOUNT	
4	Electric and sanitary work					
	電気及び給水施設					
	○ Electric work					
	電気施設					
	Excavation	10	m ³	31 ⁶³	316	
	床堀					
	One × Single core pvc 6 mm ²	300	m	4 ²⁴	1 272	
	電線					
	Distribution board	1	No.		410	
	配電盤					
	Conduit pipe	600	m	21 ⁷⁹	13 074	
	電線管					
	Hand hole 450 × 450 × 1,000 mm	7	Nos.	262 ⁵⁰	1 837	
	ハンドホール					
	Fluorescent, twin tube × 36w	9	Nos.	98 ¹⁶	883	
	蛍光灯					
	Socket, single-10A	4	Nos.	12 ⁵⁰	50	
	コンセント					
	Lighting switch, 1 GANG	4	Nos.	8 ³⁹	33	
	スイッチ					
	Waterproof socket, single-10A	3	Nos.	69 ⁴⁵	208	
	防水コンセント					
	Sub-Total Electrical Work				18 083	
	電気施設小計					
	○ Sanitary work					
	給水施設					
	Excavation	13	m ³	31 ⁶³	411	
	床堀					

NO	DESCRIPTION	Q'TY	U.	LOCAL PORTION (KINA)		REMARK
				U/P	AMOUNT	
4	Galv. steel water pipe, Φ25mm 亜鉛メッキ鋼管	65	m	5.07	329	
	Ditto, Φ32mm 同上	150	m	5.38	807	
	Brass gate valve, Φ32mm 真鍮バルブ	3	Nos.	21.57	64	
	Water faucet 蛇口	5	Nos.	41.40	207	
	Sub-Total Sanitary Work 給水施設小計				1,818	
	Total Elec. & Sanit. Work (4) 電気及び給水施設合計 (4)				19,901	

NO	DESCRIPTION	Q'TY	U.	LOCAL PORTION (KINA)		REMARK
				U/P	AMOUNT	
5	Experimental plantation work 試験林					
	Setting-out 測量	1	Lot		750	
	Land preparation 地拵え	1	Lot		1 200	Area; 2.88ha
	Removal of debris 障害物撤去	1	Lot		700	Area; 1.05ha
	Galvanized barbed wire with steel post, 1.2m high (new)	828 ⁴	m	17 ²⁵	14 289	
	有刺鉄線フェンス (新設)					
	Ditto, but repairing " (補修)	364 ⁹	m	9 ⁰⁰	3 284	
	Ditto, but removal " (撤去)	396 ⁷	m	6 ⁰⁰	2 380	
	Gate, size 4,300×1,700mm high ゲート	2	Nos.	375 ⁰⁰	750	
	Concrete post コンクリート杭	120	Nos.	3 ³⁸	405	
	Felling and stump for path way, 1,000mm wide 歩道伐開	2,130	m	0 ⁵⁰	1 065	
	Sign board, size 2.2×2.3m 案内板	1	No.		200	
	Total Exp. Plantation Work (5) 試験林合計 (5)				25 023	

7. Implementation Period

The Lae region has a monthly rainfall of over 200 mm throughout the year, and plenty rainfall from April to September as shown in Fig.18.

Therefore suitable implementation period of civil engineering and building works is the period from October to following March.

The Bulolo region has the reverse tendency of rainfall pattern to that of the Lae region, but the rainfall is under 200mm. Therefore, the works at Bulolo could be implementable in the same period as at Lae.

The implementation period of this work, however, will be for about 6 months; from October, 1990 to March, 1991.

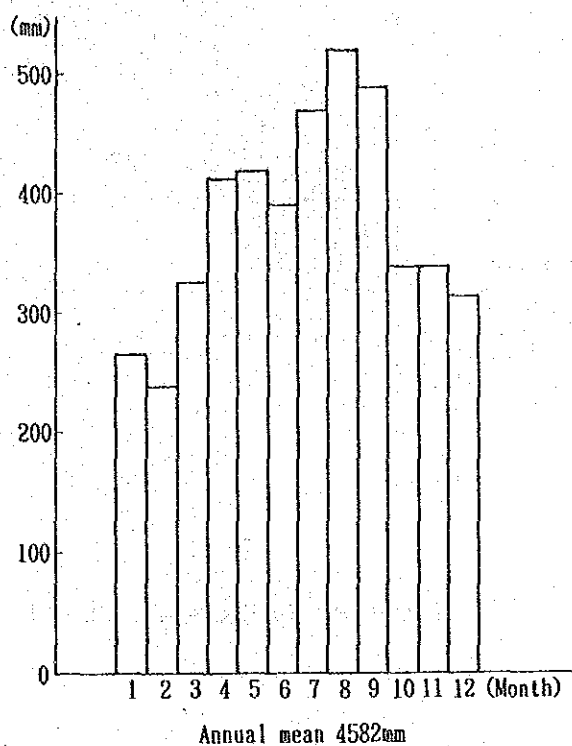
Progress Schedule

PROGRESS SCHEDULE	1990					1991		
	OCT	NOV	DEC	JAN	FEB	MAR		
TENDER & CONTRACT	[Gantt bar: Oct 15 - Oct 25]							
PROVISIONAL WORKS	[Gantt bar: Oct 25 - Nov 5]							
F.R.I. SITE (LAE)	[Gantt bar: Nov 5 - Nov 15]							
EXPERIMENTAL AREA	[Gantt bar: Nov 15 - Nov 25]							
INTENSIVE AREA	[Gantt bar: Nov 25 - Dec 5]							
BUILDING WORKS	[Gantt bar: Dec 5 - Dec 15]							
EXTERNAL WORKS	[Gantt bar: Dec 15 - Dec 25]							
EXPERIMENTAL PLANTATION AREA	[Gantt bar: Dec 25 - Jan 5]							
LAND PREPARATION	[Gantt bar: Jan 5 - Jan 15]							
FENCE WORK	[Gantt bar: Jan 15 - Jan 25]							
EXPERIMENTAL PLOTS DIVISION WORK	[Gantt bar: Jan 25 - Feb 5]							
COMPLETION OF WORK	[Gantt bar: Feb 5 - Feb 15]							

8. Appendix

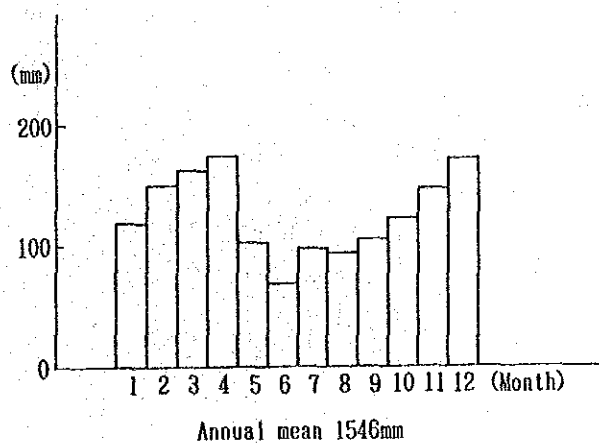
8-1. Meteorological Data

The the rainfall data for Lae and Bulolo are shown in the following figures respectively.



Source: H. C. Brookfield and Doreen Hant A. N. U. 1966

Fig. 18. Rainfall at Lae.



Source: H. C. Brookfield and Doreen Hant A. N. U. 1966

Fig. 19. Rainfall at Bulolo.

8-2. Geological Data

The geological structure of the areas in which the experimental plantation and the proposed experimental natural forest will be located is shown in Fig. 20 and 21

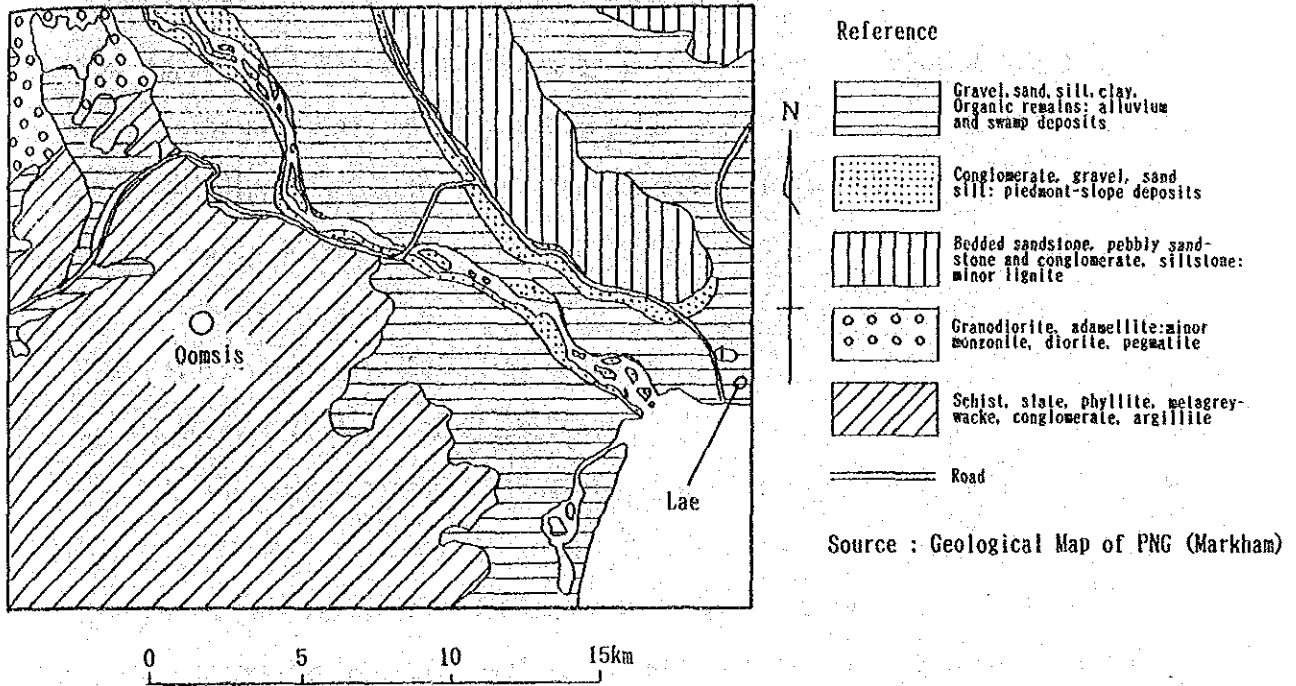


Fig. 20. Geology of the Omsis & Lae area.

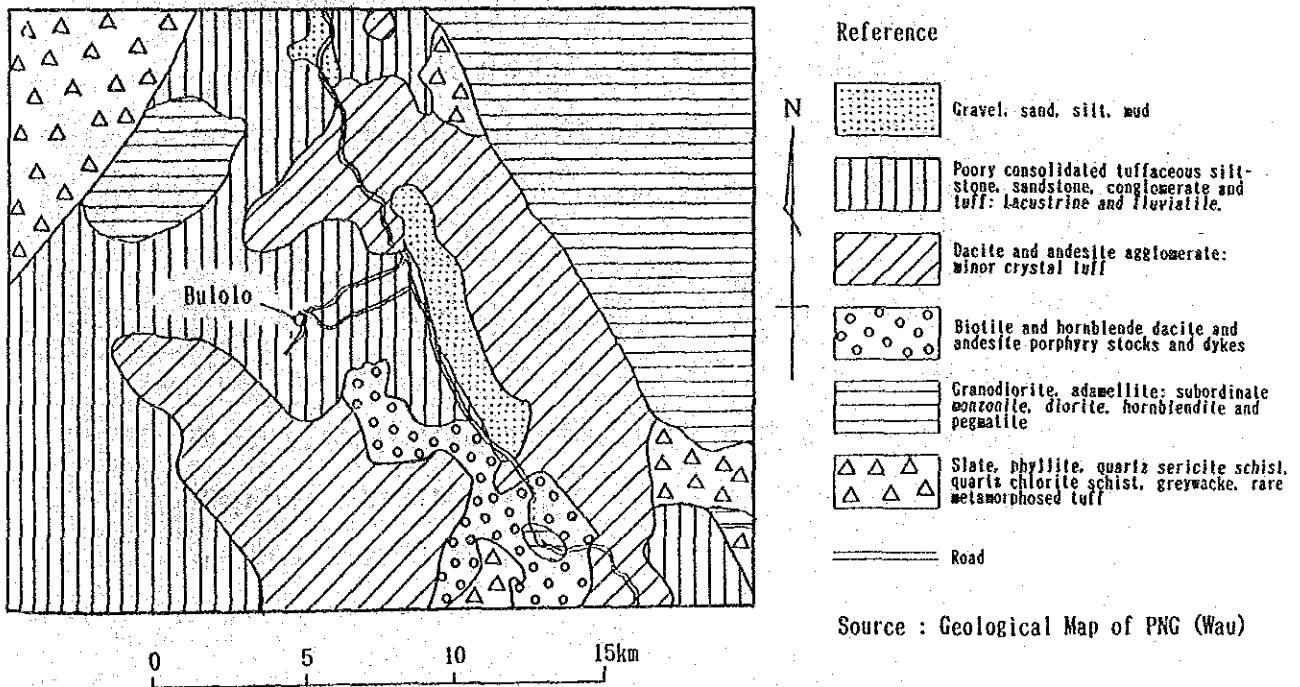


Fig. 21. Geology of the Bulolo area.

8-3. Prices of Construction Materials

Prices of construction materials which will be used in this work are shown in Table-5. However these prices are as of May, 1990, and may be changed in the near future.

8-4. Approval of Construction Work by Morobe Provincial Building Board

The principle of this work should get the approval of Morobe Provincial Building Board prior to the construction of the work.

Three copies of drawings are necessary to apply for the approval.

8-5. Points to Note in Selecting Contractors

(1) Special Features of Planned Work

- a. The work includes felling of a natural forest, construction of a road, nursery facilities, a working house, a materials store, and a garage.
- b. By the nature of the planned work, it includes various kinds of operations of small scales. Therefore, the following works should be carried out with extreme care, in particular:
 - (a) The secure of the planned structure and gradient of the concrete slab which forms raised beds.
 - (b) Water pipes fitting for the irrigation system.
 - (c) The secure of the planned gradient of drainage system.
 - (d) The secure of the planned shape and size of plots in the experimental plantation.
 - (e) The firm installation of posts which hold fences.
- c. There are working places 114 km apart, one at Lae and one at Bulolo. Moreover, the contents and conditions of work are different in each. Therefore, the procurement of materials and the progression of work should be controlled carefully.

Table-5. Price List of Construction Materials.

Prices are of May 1990

Item	Specification	Unit	Price (Kina)		
			Lae Dept. of Works	Lae Market	POM Market
Concrete Work					
Ferro-concrete work		m ³	250.00		
Concrete block	140 mm×190 mm×390 mm, 2 holes	100 pieces			97.00
Concrete post	100 mm×100 mm×1000mm, no reinforcement	60 pieces			*360.00
Ready mixed concrete	200 kg/ cm ³	m ³	93.50		*105.00
Portland cement	50kg/bag, made in Malaysia	bag		9.00	
River sand		m ³	14.08		
Gravel	7 to 10 mm	m ³	17.60		
Gravel	30mm	m ³	12.32		
Gravel	general	m ³			28.00-30.00
Elastite	3 mm×0.85m	m		5.00	
Deformed steel-bar	φ 12mm×10m (9.10 kg)	piece	7.60	10.29	
Deformed steel-bar	φ 16mm×10m (16.18kg)	piece	8.40	18.39	
Deformed steel-bar	φ 20mm×10m (25.28kg)	piece	9.40	28.86	
Bar arrangement work		ton			900.00
Reinforcing fabric square mesh	2.4m×6m, 62mm span, (38.00 kg)	sheet		42.31	
Reinforcing fabric square mesh	4m×8m F72	sheet	42.00		
Fence Work					
Fence work		m ²	47.00		
Heavy galvanized chainmesh	1800mm×15m (44.00kg), 50 mm×2.5 mm wire	roll		79.56	
Heavy galvanized chainmesh	for raised beds, 1200mm×15m (25.00kg), 65mm×2.5mm wire	roll		41.44	
Corner steel post	50mm(14.00kg)	piece		30.58	
Intermediate steel post	40mm(10.00kg)	piece		21.73	
Star steel fence post	eyletted, 1800mm(3.6kg)	10 pieces		44.89	

Table-5. Price List of Construction Materials. (Continued)

Item	Specification	Unit	Price (Kina)		
			Lae Dept. of Works	Lae Market	PCM Market
Tie wire	1. 25mm×50m/kg, galvanized	kg		2.60	
Barbed wire	2 mm×400m roll (32kg), heavy galvanized	roll		60.29	
Piping Work					
Galvanized steel pipe	20mm×6.5m	piece		15.00	
Galvanized steel pipe	25mm×6.5m	piece		21.00	21.75
Galvanized steel pipe	32mm×6.5m	piece			28.00
Galvanized steel pipe	50mm×6.5m	piece			43.70
Galvanized steel pipe	100 mm×6.5m	piece			109.11
PVC pressure pipe	25mm×5.85m	piece		6.90	
PVC pressure pipe	50mm×5.85m	piece		19.00	
Forcet	outer ϕ 20mm	piece		10.80	
Roof and Water storage					
Roofing work	Galvanized corrugated steel plate, wooden frame	m ²			18.00
Galvanized corrugated steel plate	760 mm×26 gauge	m			4.85
Roofing nail	130 pieces/ kg, galvanized	25kg		78.50	55.00
Heat insulator	1.37m ×54m	piece			71.50
Galvanized U-gutter	125 mm×1800mm×26 gauge	piece		3.70	
Galvanized U-gutter	125 mm×2400mm×26 gauge	piece		5.00	
Galvanized cylinder	ϕ 100 mm×1800mm×26 gauge	piece		4.40	
Water tank	Galvanized corrugated steel plate, 3000 gal.	piece		506.00	
Timber					
General sawn timber		m ³	275.00		
Undressed & untreated sawn timber		m ³			360.00
Dressed & treated sawn timber		m ³			399.00

Table-5 . Price List of Construction Work. (Continued)

Item	Specification	Unit	Price (Kina)		
			Lae Dept. of Works	Lae Market	PCM Market
Standard sawn timber		m ³			325.00
Polyethylen Sheet					
General Use	1.55m x 50m	piece		75.00	
General Use	3.00 m x 50m	piece		87.36	
General Use	(5m x 100m, 6m x 100m)			no stock	
Agricultural use	2.42m x 50m	piece		102.00	
Electric Materials					
Electric wire	two-core	m		0.98	
Electric wire	lighting	m		0.99	
Electric wire	power point	m		1.14	
Switchboard	single phase, four breakers with enclosure	set		47.21	
Water proof power outlet	single phase	piece		10.26	
Fluorescent lamp	two-tube set	set		18.66	
Power outlet	two-plug set	set		8.78	
Underground conduit	φ20mm	m		2.75	
Underground conduit	φ25mm	m		4.14	
Switch		piece		3.18	
Earth stake & clip		set		8.86	
Fuel					
Petrol		ℓ		0.516	
Diesel oil		ℓ		0.371	
Lubricating oil		ℓ		3.30	
Machine Lease					
Bulldozer	D-4	hour		49.00	

Table-5. Price List of Construction Materials. (Continued)

Item	Specification	Unit	Price (Kina)		
			Lae Dept. of Works	Lae Market	POM Market
Bulldozer	D-6	hour	71.00		
Back hoe		hour	66.00		
Road roller		hour	33.00		
Shovel loader		hour	49.00		
Sprinkler					
Aluminium pipe	φ50mm	m		12.00	
Sprinkler	PREMIER DOUBLE JET, 250 kPa, Dia. 28.8m	piece		15.00	
Riser		piece		12.00	
End stop		piece		15.00	
Hose tail		m		7.50	
Other Materials					
Nail		0.5kg		0.80	
Weid mesh	Galvanized security sheets, 3m×2.3m×5 mm(36 kg)	set		55.04	
Chain operated roller shutter	Galvanized steel, manual, 3m×5m	2 set			* 5850.85
Wage					
Manual labourer		2-weeks	105.00	110.00	
Skilled labourer		2-weeks	145.00		

Note 1: * estimated price after one year.

2: * as of May 21, 1990, effective for one month.

Remarks 1. The planned sprinkler system will need 50m of aluminium pipe, 10 sprinkler nozzles, 10 risers, 3 end stops, and 9.2m of horse tail. The total cost of the sprinkler system is estimated to be Kina 984.00.

An agency which trades sprinkler equipments at Lae is South Pacific Machinery, P.O. Box 1904 Lae, Tel: 421966, Fax: 675425529.

Remarks 2. Shades can be purchased at Lae, most of them are imported. If the shades were not available at Lae, these will be ordered from Australia. As of May 1990, specifications of shades sold at Lae are as follows:

Shading (%)	Size	Price (Kina)	Trading Shop
50	1.83m x 50m	89.00	Harcros Trading
70	1.84m x 1 m (unit)	5.32	Steamship Hardware
50, 70, 80, 90	1.80m x 50m	no stock	Transfield NGI
"	1.83m x 50m	"	"
"	3.66m x 50m	"	"
50	3.66m x 50m	225.00	South Pacific Machinery
unknown	0.915m x 50m	unknown	"

Transfield NGI manufactures shade joints and materials for the protection of holes that are located the corner of shades.

Some Australian shade makers are as follows:

- a. Sarlon Industries Pty. LTD.
- b. Rheem Australia Limited.

(2) Examination of Selecting Procedure for Contractors

The construction of this work will be ordered and supervised by the JICA PNG Office which is located at Port Moresby, very far from the working places, and the Japanese supervisor may not be dispatched permanently.

Therefore a reliable and experienced Japanese contractor will have to be employed. In that case, it will be possible for the Japanese contractor to make a subcontract with local contractors. Also it may be possible to entrust supervision of the work with a Japanese contractor and construction work with local contractors.

Some of well known local contractors will be mentioned below.

a. At Lae

(a) A. G. K. PACIFIC (N. G) PTY. LIMITED

P. O. Box 626 Lae

Established in 1967, executed 13 civil engineering works and 30 construction works from 1985. Mainly water supply and sewerage works as civil engineering works and schools, offices, housings, airport buildings, and garages as construction works. More than half of executed works belong to public works.

(b) LAE BUILDERS & CONTRACTORS PTY. LTD.

P. O. Box 1730, Montoro St. Lae

A contractor of design and execution of construction works, offices at Lae and Madang. Mainly commercial, industrial, and housing constructions.

(c) NBIL-MOROBE PTY. LTD.

Cnr. Mula & Abel Tasman Sts. Lae.

(d) THIESS WATKINS (PNG) LTD.

Saraga Street, 6-Mile port Moresby

Head office at Port Moresby and branch office at Lae. A member of THE THIESS WATKINS WHITE GROUP OF CO'S. A contractor of design and

execution of construction works and execution of civil engineering works.

b. At Port Moresby

(a) FLECHER MOROBE CONSTRUCTION PTY. LTD.

P.O. Box 848, Saraga Street 6-Mile Port Moresby

A New Zealand general contractor, one of major contractors in PNG.

(b) BARCLAY BROS. (PNG) PTY. LTD.

3 Gabaka Street, Gordons, P.O. Box 1180 Boroko, Port Moresby

An Austrarian contractor of civil engineering and construction works execution.

(c) KINAKON PNG PTY. LTD.

Sogeri Rd 12-Mile Port Moresby

An Australian contractor of civil engineering and construction works

(d) HEBOU CONSTRUCTIONS (P.N.G.) PTY. LTD.

Saraga Street 6-Mile, P.O. Box 6207 Boroko

A contractor of civil engineering works, mainly land preparation works.

8-6. Work Contract (Draft)

CONTRACT

For Construction of _____

This contract is executed on the ____ day of _____ at the JICA Papua New Guinea Office between _____

Japan International Cooperation Agency, Papua New Guinea Office as authorized representative of the Japan International Cooperation Agency, hereinafter called "the JICA", and Mr. _____ of _____

TEL. _____ Represented by _____ Nationality _____
_____ Title _____ hereinafter called "the Contractor".

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

ARTICLE 1 PURPOSE OF THE CONTRACT AND CONTRACT COST

The JICA agrees to employ the Contractor and the Contractor agrees to perform the Works for the construction of Model Infrastructure on Forest Research Project Located at Lae and Bululo, Morobe Province for the total amount of Kina. _____ (_____)

hereinafter called "contract Cost".

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

- Terms and conditions of this contract
- Specifications
- Bill of Quantities
- Drawings

Article 2 PERFORMANCE BOND

As a security for the faithful performance of the Works under this Contract, the Contractor has on the execution of this Contract deposited a performance bond with the JICA _____ Kina (_____) in a Bank Guarantee issued by the _____ bearing the number _____ and date _____ which represents five (5) percent of the Contract Price. The name of the issuing bank and the form of the bank guarantee are to be approved by the JICA.

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

Should the Contractor be 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 3 PAYMENT

The JICA agrees to effect payments for the Works to the Contractor in the following manner;-

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

b. Interim Payment to be effected according to the progress of the Works satisfactorily executed by the Contractor and accepted by the supervisor. Kina _____ (_____) which corresponds to Thirty (30) percent of the Contract Price shall be requested for payment at the middle of the construction term. In case that value of the executed construction works estimated by the supervisor 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 supervisor.

The remainder of Kina _____ (_____) which corresponds to Forty (40) percent of the Contract Price, or the remaining amount of 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) days after the respective acceptance of the Works by the supervisor.

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

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

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 _____ (completion date)

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

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

Article 5 PENALTY

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

5.1 In case of the termination by the default of commencement for the Works, the Contractor shall pay a penalty of (_____ Kina) per day counting from the commencement date until the new Contract is completely executed with a new Contractor for this Works.

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

5.2 In case the JICA thinks that the Contractor will not be able to complete the Works within the completion time and thereby terminates this Contract, the Contractor shall pay a penalty of

(Kina) per day counting the number of days in the same manner as prescribed in 5.1 above. However, the JICA may reduce such number of days according to the ratio between the completed Works and the total Works as may be decided by the supervisor.

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

Article 6 COMPENSATION

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

Article 7 THE JICA'S RIGHT FOR DEFAULT

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

Article 8 CONTRACTOR'S RESPONSIBILITY ON TERMINATION OF THIS CONTRACT

After the Contract has been terminated in accordance with the foregoing Article 4, the JICA shall have the right to employ another Contractor (hereinafter called the "New Contractor") to carry on the remaining parts of the Works, and the payment for the Contractor which fails to complete the work shall be made out of the necessary Contract Price for the remaining Works. Should the remaining amount after payment of the advance and interim payment from the Contract Price, be

insufficient to effect payment to the new Contractor, the difference between such remaining amount and actual cost estimated by the JICA for the satisfactory completion Works carried out by the JICA, and the Contractor shall pay such difference to the JICA within ten (10) days from the date of request by the JICA, failing which interest at the rate of eighteen (18) percent per annum shall be charged thereon.

Article 9 SUPERVISOR

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

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

Article 10 PROHIBITION FOR THE EQUIPMENT REMOVAL

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

Article 11 RECTIFICATION OF THE DEFECTIVE CONSTRUCTION

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

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

Article 12 DISCREPANCIES AMONG THE CONTRACT DOCUMENTS

Of, prior to or during the course of the Works, any discrepancies found in the drawing and/or the Specifications etc. attached to this Contract, the Contractor shall follow the ruling given by the supervisor at no additional cost to the JICA.

Article 13 CONSTRUCTION METHOD AND TEMPORARY WORKS

The construction method including implementation schedule and plan of the temporary works such as installation of temporary facilities, offices, warehouse, construction roads, electric wiring, etc. shall be submitted by the Contractor and approved by the supervisor at least ten (10) days in advance of the commencement of the Works.

Should the cost the above temporary works be estimated in the unit cost of each work items of Bill of Quantities in this Contract, and the Contractor is not entitled to claim any amount of charges for the temporary works.

Article 14 MODIFICATION OF PLAN

If the Supervisor 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 supervisor 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. In the case of additional works which are not quoted by unit price in the bill of quantities of this Contract, the supervisor will make estimation thereof and the JICA will pay to the Contractor for such additional works accordingly. But if the Contractor does not agree to such estimation, the Contractor is then entitled to negotiate with the JICA. Also the extension of the completion time due to the modification shall be given by the JICA who

shall have the sole right to decide the number of days of such extension.

Article 15 ACCEPTANCE OF THE WORKS

When the entire Works have been completed, the Contractor shall submit the invoice in written form indicating the Work actually completed to the supervisor. If there are compliance with drawings or Technical Specifications, the JICA shall accept the Works as the final acceptance of satisfactory completion Works within ten (10) days after the receipt of the written form and it shall be deemed that the final acceptance has been made on such date of the receipt of the written form.

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

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

Article 16 CONSTRUCTION ENGINEER

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

Article 17 REPLACEMENT OF LABOUR, ENGINEER AND FOREMAN

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

Article 18 SUB-CONTRACTOR

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

Article 19 FORCE MAJEURE

If either party temporary unable by reason of force majeure or the law regulation of the Papua New Guinea to meet any of its obligations under the Agreement, and if such party gives to the other party written notice of the event within seven (7) days after its occurrence, such obligations of the party as it is unable to perform by reason of the event shall be suspended as long as the inability continues.

The term "Force Majeure" as employed herein shall mean Act of God, strikes, lock-outs, or other industrial disturbances, acts of the public enemy, wars, blockades, earthquakes, storm, lightning, floods, washouts, civil disturbances, explosions, and any other similar events beyond the control of either party and which by the exercise of due diligence neither party is able to overcome.

Article 20 NOTICE

All Notices required by this Contract shall be effective only at the time of receipt thereof, and only when received by the parties concerned at following address;-

The JICA

Papua New Guinea Office
G.F. Pacific View Apartment
Lot 1, Section 84, Matirogo
N.C.D.
P.O.Box 6639, Boroko

The Contractor

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

Article 21 DISPUTE

In the event of any dispute arising from the interpretation and performance of the terms of this contract, both parties agree to make the best attempt with sincerity and in good faith to negotiate and amicably settle such dispute. When failed to do so, the parties agree to refer such dispute to arbitration under Papua New Guinea Commercial Arbitration Rules and Regulation, Port Moresby, by 2 arbitrators, each of which is to be appointed by each party. The decision of the arbitrators shall be final and binding upon both parties, to appoint its arbitration within seven (7) days or should be arbitrators fail, within fifteen (15) days after their appointment, to agree upon the decision of the dispute or on decision is reached on the appointment of an umpire, then the dispute shall be brought before the court in Papua New Guinea for decision under the laws and procedures of the Papua New Guinea.

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

Matters that are not mentioned in this Contract but are related directory or indirectory to any aspect(s) of the construction, which is the topic of this Contract, shall be dealt with in accordance with the items of Australian Standard, General Conditions of Contract.

8-7. General Specification

General Specification

1. Scope of the application of this specification

- a. The specifications described below are applied by the priority over other specifications on each construction item.
- b. The specifications of each construction item describe the general specification of the construction.

If there was some scarce abbreviation in the drawing or some other additional works which should be done due to the technical common sense on the structure, appearance and function comparing with the drawing, the contractor should implement in the work within the contract price according to the order of the supervisor.

- c. If there are better materials and methods to present the content of drawings, the contractor may do the better way of construction within his responsibility after submitting the designs, plans and proposals to the supervisor to get the acceptance of the supervisor.

2. Doubt about the plan and its alternation

The contractor should ask the supervisor immediately when he find out any of the cases mentioned below:

- a. Mismatching between drawings and description
- b. Unclear explanation or the occurrence of some doubt on drawing and/or description
- c. Mismatching between drawing and/or description on the site condition concerned
- d. Occurrence of unexpected situations which prevent the contractor from fulfilling the assigned condition of the drawings and descriptions.

3. If there are some needs on the slight alternations described below, the alternation should be done with the order of the supervisor.

a. Slight alternation for fixing or matching:

size of the materials

specification

construction method

setting location

b. Slight alternation of quantities of the materials

In this case, the amount of contract price will not be changed.

4. Alternation of the plan

In case of requisition from the supervisor to alternate the plan partially or to construct the additional items and/or quantities, the contractor should submit the relative document of the materials and the cost description to the supervisor. The alternative construction should be implemented after the acceptance of the document and reception of the order from the supervisor with the document.

5. Procedure for the government organizations concerned

If legal documents are necessary to implement the construction work, the contractor should prepare the documents by his own expense and should go through the procedure without delay.

6. Delivery of the constructed facilities

When the construction work was finished, the contractor should deliver the constructed facilities together with the compiled document to the orderer with the presence of the supervisor according to the order of the supervisor.

7. Certificate

- a. In case, if the defect of the constructed facilities was found out, the contractor should survey the cause of the defect together with the supervisor.

And if the defect is caused by the materials or methods of the construction, the contractor should repair it soon, according to the contract, following with the permission of the orderer and the supervisor.

- b. If the defect was caused by the materials or the methods which are already permitted by the supervisor and/or are already passed the inspection, the contractor can not escape from the defect security responsibility.

8. After delivery inspection

- a. The after delivery inspection of the constructed facilities shall be done after 1 year.
- b. The inspections mentioned above shall be done by the supervisor accompanied with the contractor.
- c. If the defect caused by the materials and/or the methods was found out, the contractor, in principle, will repair the defect by his own expense soon.
- d. If there was an argument on the responsibility of the repairment, the discussion should be held to determine the method of the repairment and the cost of the payment.

9. Scope of the construction and the expense which shall be included in the construction cost

- a. The scope of the construction work shall be determined by drawings and specific description. But if there were no description on the related drawings and/or specific description, the construction work, raw materials and the manufactured materials which are necessary to finish the work should be included in the construction work.

b. The construction work and/or the expense mentioned below are included in the construction cost except that there exist in the special description.

1. Expenses of the experimentation and inspection of the construction work, the raw materials and the manufactured materials.
2. The scaffoldings, the transportation facilities and the construction work for its reinforcement, tentative electricity supply, tentative water supply, drainage, material storage and tentative workshop.
3. Destruction of tentative construction which suffer the construction work.
4. Construction and clearance of entrance and pass way for the transportation of construction machinery and materials.
5. Display plate for the construction work.

10. The representative of the contractor

- a. If the contractor needs to appoint a representative person for the construction work, according to the contract and the laws of the construction concerned, the contractor has to apply the matter to the orderer and the supervisor to get an approval with the personal history of the representative person. The contractor should select the person who has much experience for the construction work. Superior technology, fine character and the qualification of the construction work is required.
- b. If the orderer or the supervisor recognized that the representative person is not appropriate for the work and requested to change the person with clear reason, the contractor should change the representative person.
- c. The representative should deal with all of the construction work and paper work at the construction site in his responsibility.

11. The safety and sanitation

- a. According to the laws and regulations of the construction work concerned, the safety and sanitation management in the construction site should be implemented by the contractor with his own responsibility.
- b. The construction site should always be arranged and cleaned.
- c. If there is dangerous thing in the site, careful inspection should be done to prevent the accident, fire and robbery.
- d. The neighbouring structure should be prevented from damage. If there is any damage caused by the construction work, the contractor should recover them by his own expenses.

12. The cleaning and the recovery from the damage

- a. When the construction work is finished, the contractor should take off the tentative structure and should clean the facilities and its surroundings.
- b. If the 3rd party has got the damage caused by the construction work the contractor should recover and/or compensate for this by his own expenses.
- c. If the facilities or any parts of it were used for the construction work with the permission of the supervisor, the contractor should recover it according with the condition of the drawings and description.

13. Working plan

- a. Before the beginning of each construction items, the contractor should draw the construction plan and/or manufacturing plan and the contractor should get the permission from the supervisor on it.

14. The Work Schedule

- a. The work schedule should be planned by the contractor and it should be permitted by the supervisor before the beginning of the construction work.
- b. The total work schedule should be drawn with the method of bar chart or network schedule chart which include all of the construction items.
- c. Detailed work schedules should be drawn for each construction items.

15. Progress control

The contractor should be careful on the progress of the construction. If there is any order from the supervisor, the contractor should survey the point and rearrange the schedule to keep the appointed date of delivery.

16. Presence of the supervisor

The contractor should request the presence of the supervisor in the cases mentioned below:

1. Ordered construction items in the plan
2. If there are impossible or difficult items to inspect the construction work after the completion.

17. The care

The part of the constructed facilities, materials expected to use or part of present facilities which are possible to be polluted or damaged should be cared by some appropriate methods.

18. The obstacles

The obstacles which cause difficulties against the construction work should be disposed with the consultation and the permission of supervisor.

19. The sub-constructor

In case if the special technical operator or the cooperative operator are required the sub-contractor, the contractor should submit the list of them and should get the acceptance from the supervisor.

20. The sample

If it is assigned by the specification, description or by the order of the supervisor, the samples of the materials and the manufactural materials should be shown to the supervisor and should be got the permission for using on its texture, finishing grade, colores etc.

21. Progress report of the construction work

The contractor should submit monthly report which contains on the progress of the construction work, date and contents of field meeting between the contractor and supervisor, order from the supervisor, date and quantity of the transported materials together with the progressed quantity chart, progress drawings and the photographs described below.

22. Important document at the end of the construction work

The application documents for the government organization concerned, permitted document from them, the document which should be reserved by the orderer etc. should be compiled with its catalogue by the contractor and it should be reported to the orderer through the supervisor when the construction work is finished.

23. Submission of drawings

After the final inspection, drawings which are drawn for the construction should be rearranged according to the order of the supervisor and should be submitted to the supervisor.

24. Submission of real work schedule

The total work schedule and work schedule of each construction item should be revised according to the real progress of the construction work and should be submitted to the supervisor by the contractor.

25. The photographs

According to the description or the order of the supervisor, the contractor should take the photographs of the construction items under the construction and after the completion and submit them to the supervisor.

26. The keys

The keys should be checked the adaptation to each lock with the presence of the contractor. If they are adaptable, the numbered tag should be attached to the keys. The allocation drawing of the key and the catalogue should be submitted to the supervisor. The number of the key should be three in each lock.

8-8. Minutes of Discussions

THE MINUTES OF DISCUSSIONS ON
THE FOREST RESEARCH PROJECT IN PAPUA NEW GUINEA

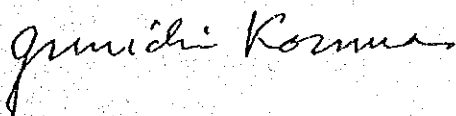
The Japanese Consultation Team (hereinafter referred to as "the Team") organized by the Japan International Cooperation Agency and headed by Mr. Jun-ichi KONUMA, visited Papua New Guinea from April 9 to April 21 for the purpose of reviewing past activities and working out the details of implementation plan of the above-mentioned Project.

During its stay in Papua New Guinea, the Team has carried out a field survey and held a series of discussions with the authorities concerned of the Government of Papua New Guinea.

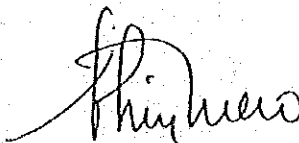
As the result of the survey and discussions, the Team and the Papua New Guinea authorities concerned agreed to recommend to their respective Governments the matters referred to in the document attached hereto.

Port Moresby, Papua New Guinea

April 20, 1990



Mr. Jun-ichi Konuma
Leader,
Consultation Team,
Japan International Cooperation
Agency, JAPAN



Mr. Christopher Mero
Assistant Director,
Office of International Development
Assistance,
Department of Finance & Planning,
Papua New Guinea

Witnessed by



Mr. Michael Komtagarea
Secretary,
Department of Forests,
Papua New Guinea

THE ATTACHED DOCUMENT

1. Research activities

Item	Japan Fiscal Year	1st 1989	2nd 1990	3rd 1991	4th 1992	5th 1993
I Forest Research						
1 Nursery practice, planting and tending						
1) Improvement and enrichment of forest stands						
2) Tree breeding and progeny testing						
3) Mycorrhiza inoculation and Acacia Rhizobium introduction						
2 Seed technology of major species						
Seed technology of main plantation and natural forest species						
3 Soil classification and soil fertility						
Genesis and characteristics of forest soil in PNG						
4 Forest entomology and insect control method						
Impact of insects on main tree species						
5 Forest pathology						
Root and heart rot of commercial tree species						

Item	Japan Fiscal Year	1st 1989	2nd 1990	3rd 1991	4th 1992	5th 1993
II Forest Products Research						
1 Wood preservation						
1) Treatability studies of lesser used species						
2) Performance of CCA pressure treated timbers in marine environment and inspection of waterfront structures						
2 Chemical properties of major and lesser-known species						
1) Fundamental procedure for wood chemistry						
2) Wood extractives						
3 Physical and mechanical properties of tree species						
1) Physical properties of lesser used species						
2) Mechanical properties of lesser used species						
4 Wood seasoning and sawmilling techniques						
1) Assessments of sawmilling practices and their efficiency						
2) Assessments of seasoning practices and their efficiency						
3) Wood machining properties						

2. The Papua New Guinea side strongly requested the research on natural forest dynamics.

In response, the Team resolved to consider the request as a topic of examination and to convey the fact of the request to the Japanese Government.

3. The Papua New Guinea side will secure land for nursery on the premises of Forest Research Institute, Lae, and for experimental forests at Bulolo Forest Research Station by June 30, 1990.

(JR)

R