GOVERNMENT OF THE REPUBLIC OF INDONESIA
MINISTRY OF PUBLIC WORKS
DIRECTORATE GENERAL OF HUMAN SETTLEMENTS

URBAN DRAINAGE PROJECT IN THE CITY OF JAKARTA

TENDER DOCUMENTS FOR

PACKAGE-3 CONTRACT NO.:

GEDE BOR DRAINAGE CHANNEL
SALURAN CENGKARENG DRAINAGE CHANNEL
CIPINANG DRAINAGE CHANNEL

VOLUME III

PART I : GENERAL SPECIFICATIONS
PART II : TECHNICAL SPECIFICATIONS

DECEMBER 1997

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MERUYA DRAINAGE CHANNEL

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DECEMBER 1997

URBAN DRAINAGE PROJECT IN THE CITY OF JAKARTA

TENDER DOCUMENTS FOR CIVIL WORKS

PACKAGE - 3 CONTRACT NO.:

GEDEBOR DRAINAGE CHANNEL
SALURAN CENGKARENG DRAINAGE CHANNEL
MERUYA DRAINAGE CHANNEL

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GENERAL SPECIFICATIONS

G1. DESCRIPTION AND SCOPE

G1.1 Description of the Project

The Urban Drainage Project in the City of Jakarta is to be implemented dividing into three (3) Contract Packages, located about 3 km east from the Soekarno - Hatta International Airport and in the Cengkareng West and Meruya Areas, north - western part of Jakarta in the Republic of Indonesia.

Package-1 consists of the Works located along the Kamal Drainagae Channel, main canal and its branch, about 7.2 km in total length, in the Cengkareng West Area.

Package-2 consists of the Works located along the Tanjungan Drainage Channel, about 2.5 km in total length, and along the PIK Junction Drainage Channel, about 0.8 km in total length, in the Cengkareng West Area.

Package-3 consists of the Works located along the Gede/Bor Drainage Channel, about 1.2 km in total length, and along the Saluran Cengkareng Drainage Channel, about 4.2 km in total length, in the Cengkareng West Area, and further located along the Meruya Drainage Channel, about 2.3 km in total length, in the Meruya Are.

The implementing agencies of the Project are the Directorate General of Human Settlements (Cipta Karya), the Ministry of Public Works for financial arrangement and Special Region of Capital City Jakarta (Daerah Khusus Ibukota Jakarta = DKI Jakarta) for tendering, management and construction supervision of the Project.

The foreign currency portion of the construction cost will be financed by an international organization with its soft loan and the local currency portion will be covered by the Indonesian national budget.

The basic concept for this Project was established considering rapid urbanization in the Cengkareng West and Meruya Areas represented by house development, drastic variation of the existing drainage networks due to construction of interchange of the Jakarta ring road, and anticipating future land use conditions.

The depression and swampy areas which have been already acquired by private house developer and private enterprise will be utilized as housing yard and industrial yard by creating the land by land reclamation.

Present Cengkareng Highway is aligned in the swampy area in the northern part of the Cengkareng West Area and it has been frequently suffered from submergence in the rainy season. Cause of this submergence is attributable mainly to lower elevation of the highway in about 4 km long stretch in the Cengkaterng West Area. To cope with this situation, it has been planned by the Directorate General of Road Development (Bina Marga) that the existing highway is widened and heightened in the stretch between the Kamal Drainage crossing site and Cengkareng floodway crossing site.

The works intend to contain the frequent floods and habitual inundation and to relieve the urbanized region, farm lands and inhabitants in the Project area from sufferings, losses and damages caused by flooding. The completion of the Works under this Project will lead to better economic conditions and social welfare for the inhabitants of the Project area.

The high tension electric lines and water supply pipe lines are crossing the existing drainage channels. Due to expansion of the drainage channels, treatment of these lines are required. Furthermore, it is obliged to shift the existing telephone poles, concrete structure with gate for drainage facilities of highway, road sign, traffic signal, etc., due to expansion of the existing drainage channels.

Local roads are well distributed in both Cengkareng West and Meruya Areas. However, a lot of narrow roads exist especially in the upstream of the Kamal and Saluran Cengkareng Drainage Channels.

The principal features of the Project are summarised as follows :

Package-1:	Kamal Drainage Channel, Main		
	- Total length of channel	:	4,463 m
	- Slope of channel	:	1:3,200, 1:1,800

	- Bottom width of channel	:	35 m to 30 m
	- Levee, embankment and parapet wall	:	5,322 m
	- Revetment, types I and II	:	2,895 m
	- Sluiceway	:	15 nos.
	- Inspection road	:	2,901 m
	- Bridge	:	9 nos.
	Kamal Drainage Channel, Branch		
	- Total length of channel	:	2,755 m
	- Slope of channel	:	1:1,800
	- Bottom width of channel	:	13 m to 2 m
	- Revetment, types I and II	:	3,967 m
	- Concrete ditch	:	904 m
	- Sluiceway	:	8 nos.
	- Inspection road	:	1,561 m
	- Bridge including culvert	:	19 nos.
Package-2:	Tanjungan Drainage Channel		
	- Total length of channel	:	2,536 m
	- Slope of channel	:	1:5,000
	- Bottom width of channel	:	25 m to 15 m
	- Levee, embankment	:	3,480 m
	- Revetment, types II	:	347 m
	- Concrete wall	:	1,134 m
	- Sluiceway	:	7 nos.
	- Inspection road	:	500 m
	- Bridge	:	5 nos.
	PIK Junction Drainage Channel		
	- Total length of channel	:	765 m
	- Slope of channel	:	1:600
	- Bottom width of channel	:	2.2 m
	- Concrete ditch	:	765 m
	- Sluiceway	:	1 no.
	- Bridge (culvert)	:	4 nos.
Package-3:	Gede/Bor Drainage Channel		
	- Total length of channel	:	1,203 m

- Slope of channel	:	1:1,600
- Bottom width of channel	:	11 m to 10 m
- Outlet structure	:	1 no.
- Revetment, types I and II	:	2,366 m
- Sluiceway	:	5 nos.
- Inspection road	:	265 m
- Bridge	:	10 nos.

Saluran Cengkareng Drainage Channel

- Total length of channel	:	4,231 m
- Slope of channel	:	1:3,000
- Bottom width of channel	:	10 m to 6 m
- Outlet structure	:	1 no.
- Open culvert	:	391 m
- Levee, embankment and parapet wall	:	4,869 m
- Revetment, types I and II	:	2,776 m
- Sluiceway	:	15 nos.
- Inspection road	:	3,928 m
- Bridge	:	13 nos.

Meruya Drainage Channel

- Total length of channel	:	2,269 m
- Slope of channel	:	1:260 to 1:2,000
- Bottom width of channel	:	8.0 m to 1.2 m
- Concrete culvert	:	2,269 m
- Heightening of road	:	876 m
- Bridge (culvert)	:	18 nos.

G1.2 Port Facilities

The Contractor shall fully aquaint himself with the harbour facilities at the port of Tanjung Priok (Jakarta) as well as the size and possible other limitations imposed by the road system, etc.

The Contractor shall take such information into account when making arrangements for handling and transporting the materials, Construction Plant and Equipment.

The Employer will make his best endeavour to assist the Contractor in securing priority in the harbour with respect to customs clearance of the Contractor's equipment, materials and goods.

G1.3 Access to the Site

Access to the Site is available by air, railway and road. The airport is located at about 4 km from Jakarta. The sea port to be utilized for the Project will be Tanjung Priok port in Jakarta. Railway is available up to Kota Jakarta about 3 km from the Site. The existing road network such as national road, provincial road, Kabupaten road and other tracks in and around the Project area are available for the access to the Site.

Anyhow, the Contractor shall prior to submittal of his Tender, make his own investigation of the conditions of the available public and/or private roads and of clearances, restictions, bridge-load limits, and other limitations that affect or may affect transportation and ingress and egress at the Site.

The Contractor shall use every reasonable means to ensure that all loading limits and other limitations on road are observed, and in the event of it being necessary to move any extraordinary load of equipment or pre-construction unit or part of the Works, the Contractor shall before moving such extraordinary load, obtain all necessary permits and approvals from any authorities and comply with all other lawful requirement. The Contractor shall abide by all limitations, laws and regulations relating to the use of public transportation routes.

The Contractor shall take full responsibility for any damage caused by his vehicle and, where necessary, strengthen, widen and improve all existing roads and structures required for access to the Site. The Contractor shall also provide and maintain any additional temporary roads and structures required by him for the purpose of this Contract. On completion of the Contract, and if so instructed by the Engineer, the Contractor shall remove such roads and structures and reinstate the areas where they have been constructed to their original condition to the satisfaction of the Engineer.

All costs required for such works shall be deemed to be included in the unit rates and lump sum prices for the respective items in the Bill of Quantities unless otherwise specifically indicated in the Tender and included in the Contract.

G1.4 Transportation to Site

A survey of the roads and bridges on the possible routes to the Site shall be carried out by the Contractor prior to submittal of his Tender and shall confirm to what work is necessary to ensure that the roads and bridges are capable of properly carrying his vehicle and loads. The costs required for the work shall be deemed to be included in the unit rates and lump sum prices for the respective items in the Bill of Quantities, unless otherwise specifically provided for in the Tender and provided for in the Contract.

G1.5 Maximum Use of Local Materials

The Contractor shall make his best to use locally available materials to the practically maximum extent.

Aggregate for concrete, materials for road paving and cobble or rubble stones for wet masonry works are locally available. The earth material including soils can be obtained from borrow areas as well as from various types of excavations to be carried out under the Contract.

Cement, steel for reinforcement and structural sections, fuel and oil products can also be obtained locally in Indonesia and transported by the Contractor.

The quality, workmanship and testing of any such material shall at all times comply with the requirements of the Specifications.

G1.6 Other Physical Information

A brief of the other physical conditions, such as meteorological, hydrological, topographical and geological conditions are described in Clause G2 of these General Specifications and made available to the Contractor as supplemental information. The Contractor shall have access to all relevant available information on the physical conditions of the Site including investigation data and exploratory tests already carried out.

G1.7 Scope of the Works

The works to be carried out under the Contract shall, except as otherwise provided in the Contract, comprise the supply of all materials, labour, Construction Plant and

Equipment, and all other items necessary for the execution, completion and maintenance of the Permanent and Temporary Works in strict accordance with the Contract and as directed by the Engineer.

The Works to be carried out by the Contractor under the Contract Packages are generally listed as follows but are not necessarily limited there to :

Package - 3

(1) Preparatory and Temporary Works

The preparatory works shall, except otherwise specified in the Contract, comprise procurement and supply of all materials, manpower, tools, Construction Plant and Equipment, and all other items necessary for execution, completion, commissioning, operation and maintenance of the Temporary Works and Permanent Works in strict compliance with the provisions of the Contract and as directed by the Engineer to the entire satisfaction of the Employer.

It is, therefore, implied that the preparatory works also include, unless otherwise provided in the Contract, mobilization, demobilization and subsequent withdrawal of the above mentioned materials, manpower, tools, Construction Plant and Equipment and all other goods as may be prescribed in the Contract thereof.

The Temporary Works shall, except otherwise provided in the Contract, include but not be limited to construction, erection, installation, arrangements for transportation, operation, repairing and maintenance of all other related works such as and including temporary office buildings and living quarters, Construction Plant and Equipment, haul and access roads, relocation or demolition of the existing public or private properties and facilities, etc.

The Temporary Works shall also include demolition, removal, replacement and withdrawal of the Temporary Works subsequent to the completion and/or termination of the Contract as may be specified in the Contract,

(2) Permanent works

The Permanent Works for this Package to be completed and maintained by the Contractor under the Contract are set forth as follows, but are not limited to :

(a) Gede/Bor Drainage Channel

- Drainage channel improvement : 1,203 m
- Outlet structure : 20 m
- Revetment, type I, left bank : 265 m
- Revetment, type II : 2,101 m
  - Left bank : 918 m
  - Right bank : 1,183 m
- Inspection road, left bank : 265 m
- Sluiceway gate

- Sluiceway gate and stoplog

Sluiceway No.	Clear Span (m)	Clear Height (m)	Q'ty. (set)	Remarks
SGM-1L	0.8	0.8	1	S
SGM-2L	1.0	1.0	2	S
SGM-3L	0.8	0.8	1	S
SGM-1R	0.8	0.8	1	S
SGM-2R	0.8	0.8	1	S

S: Slide gate

- Bridge

Bridge No.	Total Width (m)	Total Length (m)	Remarks
BGM1	9.6	15.84	B
BGM2	9.6	15.84	B
BGM3	2.5	15.84	P
BGM4	6.6	15.84	B
BGM5	4.6	15.84	B
BGM6	4.6	15.84	B
BGM7	4.6	15.84	B
BGM8	6.6	15.84	B
BGM9	6.6	15.84	B
BGM10	3.5	15.84	B

B: Road bridge, P: Pedestrian bridge

(b) Saluran Cengkareng Drainage Channel

- Drainage channel improvement	:	4,231 m
- Outlet structure	:	20 m
- Open culvert with trashrack and fixed net cover	:	391 m
- Levee, embankment	:	3,449 m
Left bank	:	1,912 m
Right bank	:	1,537 m
- Levee, parapet wall	:	1,420 m
Left bank	:	569 m
Right bank	:	851 m
- Revetment, type I	:	977 m
Left bank	:	435 m
Right bank	:	542 m
- Revetment, type II	:	1,799 m
Left bank	:	906 m
Right bank	:	893 m
- Inspection road	:	3,928 m
Left bank	:	2,632 m
Right bank	:	1,296 m

- Sluiceway gate and stoplog

Sluiceway No.	Clear Span (m)	Clear Height (m)	Q'ty. (set)	Remarks
SCM-1L	1.3	1.3	1	S, SL
SCM-2L	1.2	1.2	2	S
SCM-3L	1.0	1.0	1	S
SCM-4L	1.1	1.1	1	S
SCM-5L	1.0	1.0	1	S
SCM-6L	1.1	1.1	1	S
SCM-7L	1.1	1.1	1	S
SCM-8L	0.9	0.9	1	S, SL
SCM-1R	1.2	1.2	1	S, SL
SCM-2R	1.2	1.2	1	S
SCM-3R	1.0	1.0	1	S
SCM-4R	1.0	1.0	1	S
SCM-5R	1.0	1.0	1	S
SCM-6R	1.1	1.1	1	S
SCM-7R	0.8	0.8	1	S

S: Slide gate, SL: Stoplog

- Outlet slide gate

Clear Span (m)	Clear Height (m)	Q'ty. (set)
2.3	2.3	5

- Outlet stoplog and portable hangers

Clear Span (m)	Clear Height (m)	Q'ty. (set)
2.3	2.7	1
2.3	3.4	1

- Bridge

Bridge No.	Total Width (m)	Total Length (m)	Remarks
BCM2	9.6	15.83	B
BCM3	4.6	15.83	B
BCM4	2.5	14.63	P
BCM5	6.6	15.83	B
BCM6	6.6	14.13	B
BCM7	2.5	15.83	P
BCM8	2.5	12.63	P
BCM9	2.5	12.63	P
BCM10	6.6	14.93	B
BCM11	12.2	13.53	B
BCM12	12.2	13.53	B
BCM13	8.2	11.33	B
BNM14	9.6	10.53	B

B: Road bridge, P: Pedestrian bridge

(c) Meruya Drainage Channel

- Drainage channel improvement : 2,269 m
- Concrete open culvert : 1,475 m
- Concrete box culvert : 794 m
- Heightening of existing road : 876 m
- Bridge

Bridge No.	Inner Width (m)	Total Length (m)	Remarks
MBC3L	1.5	10.00	C
MBC3R	1.5	10.00	C
BMM1	7.6	1.83	C
BMM2	9.0	1.83	C
BMM3	9.0	1.83	C
BMM4	9.0	1.83	C
BMM5	9.0	1.83	C
BMM6	9.0	1.83	C
BMM7	7.6	1.83	C
BMM8	7.6	1.83	C
BMM9	7.6	1.58	C
BMM10	7.6	1.58	C
BMM11	7.6	1.58	C
BMM12	10.6	1.58	C
BMM13	7.6	2.53	C
BMM14	7.6	2.53	C
BMM15	7.6	1.53	C
BMM16	7.6	1.53	C

C: Culvert

(3) Period of Construction and Completion of the Works

The above works are required to be completed within a period of one thousand and ninety six (1,096) days from the Engineer's written Notice to Proceed.

The principal features of the Project have been stated for information to the Contractor of each Package as an overall view of the whole Project works and components. The scope of work as aplicable to the Contractor for his Contract Package shall be considered in particular by him. Further details of the works are given in the Technical Specifications and Drawings, which form an integral part of the Contract Documents.

The construction time schedule (guide dates) for the respective Contract Packages are shown on the Drawings for reference.

G1.8 Works by Other Contractors

The Employer will arrange for works necessary for the completion of the Project other than that covered by this Contract. The Contractor shall co-operate with the Employer and the other contractors for the Contract Packages listed in Clause G1, above to ensure the satisfactory completion of the Project as a whole. Particular attention shall be given by the Contractor, as applicable to his Contract, in co-operating with his Sub-contractors, for mechanical works and relocation/reconstruction works of the public utilities.

G2. PHYSICAL AND OTHER INFORMATION

G2.1 General

Geographic location of the Project area is 106° 43' 30" East longitude and 06° 07' 30" South latitude.

The Project area covers about 4,058 ha in total and composed of two sub-drainage areas, namely, the Cengkareng West Area and the Meruya Area.

Many depression and swampy areas are located in the Cengkareng West Area and all of these areas have already been acquired by private house developers or private enterprise. It is anticipated that these depression and swampy areas will be utilized as house development areas by creating the lands by means of reclamation. At present, a large scale house complex has completed and futher extension is progressing in the Meruya Area.

In addition to the rapid urbanization in th said Project areas, interchange works for the Jakarta ring road have been progressing at the northern part of the Cengkareng West Area and eastern part of the Meruya Area. The existing drainage networks were largely changed due to construction of these interchanges.

The Urban Drainage Project aims at increasing the flow capacity of the Drainage Channels to a protection level of probable 10-year flood for the Cengkareng West Area and that of probable 5-year flood for the Meruya Area by dredging the riverbed and heightening the levees.

G2.2 Meteohydrology

(1) Climate

The climate of the Project area belongs to the tropical monsoon zone with uniformly high temperature, high humidity and heavy rainfall. The south-west to north-west winds prevail from November to April and they bring rainy season while in the period from July to October, the basin is dried up by the south and south-east monsoon.

The monthly mean, maximum and minimum air temperature, relative humidity, wind velocity and monthly rainfall during 1986 to 1996 at the Soekarno-Hatta International

Airport located at the western part of the Project area are listed in Tables 1, 2, 3 and 4. Meteorological conditions in the Project area based on these data are as follows.

(2) Air Temperature

Annual average of air temperature at the said international airport is in the range of 26°C and 27 °C throughout a year. Extremely maximum and extremely minimum are 35.2 °C and 17.4 °C respectively in November and August.

(3) Relative Humidity

Monthly mean relative humidity at the international airport ranges from 75% to 89% throughout a year. Monthly maximum and monthly minimum occur in February and September, respectively.

(4) Surface Wind

Wind speed is generally calm to 10 knots from a.m.1 to a.m.10. The wind speed becomes higher, more than 10 knots at a.m.11 to p.m.3. After p.m.3, the wind speed usually decreasing except in bad weather.

(5) Rainfall

Annual rainfall during the period from 1986 to 1995 at the international airport is around 1,800 mm. The monthly maximum rainfall is 644 mm in January and monthly minimum is 1 mm in October. The highest frequency and lowest frequency of rainy day occur in January and September, respectively.

(6) Flood and Inundation

On an average, approximately 5% of the Project area is affected by flood. The inundation tends to occur in lowland areas and the areas along the rivers and drainage channels. The areas in which the inundation is clustered are the area in Kamal, Tanjungan and the area along the Saluran Cengkareng Drainage Channel. The depth of the inundation ranges from 15 cm to 100 cm depending on the location. The range of duration is 1 to 7 hours. In the Tegal Alur and Kamal along the Kamal Drainage Channel, the range of depth of inundation is 30 cm to 100 cm which is the deepest in the Project area. In Meruya Area, the depth of inundation sometimes reaches 75 cm.

G2.3 Topography

The Cengkareng West Area is located in the north-western part of the city of Jakarta and bounded by highway connecting the international airport and city of Jakarta in west, Mookervaat canal in south, Cengkareng floodway in east and Jakarta bay in north. Drainage area of the Cengkareng West Area is About 40 km^2. The Cengkareng West Area is characterized by remarkably low land elevation in a rang of EL.0 m to EL. 5m, existence of several large scale depression and swampy areas. Due to these topographic characteristics, habitual inundation takes place in several low land areas. In the northern part of this area, the highway is located by heightening the road. In its northern part, a large scale fish pond is extending to the Jakarta bay. Five primary drainage channels are located in this area and majority of drainage water is discharged to the Jakarta bay through the largest Kamal Drainage Channel and Tanjungan Drainage Channel. The remaining three Drainage Channels are located to direction of southwards and eastwards.

The Meruya Area is located in the southern part of highway connecting Jakarta and Merak harbour and bounded by existing drainage canal in the west, higher elevated area in the south, and higher elevated street in the east. Drainage area of the Meruya drainage system is about 1.5 km^2 and all of this area has been utilized as residential area. This drainage area is located on the elevation of 8 to 9 m, but complicatedly undulated. Center part of this area is elevated and low land areas are located in its both sides. Due to these topograhic characteristic, habitual inundation occurs in these depression areas in every rainy seasons.

Location maps of the bench marks and GPS control points in the Project areas are shown in Figures 1, 2 and 3. Elevations of the bench marks in the Project areas are listed in Tables 5 and 6, and coordinates of GPS points are also listed in Table 7.

G2.4 Geology

The Project area is located in the north-western outskirts of the city of Jakarta, near the coast of the Java sea, and covered by Holocene and Pleistocene deposits. The area is situated in the coastal plain, with several meters of ground height above the mean sea level.

The sub-surface of the Jakarta plain consists of 250 m thick, Quaternary soils. Clays represent more than 70% of the soil cover. Thin sand layers are intercalated but laterally

they are not continuous. The sands are fine grained and silty. The ground water is distributed over several thin and discontinuous layers and a clear distinction of aquifers is difficult. In general, the ground water level lies 2 m below the ground surface. The soils are softer in the coastal area and more consistent from highway to the south and in the Meruya Area. Very soft and soft, clayey and silty soils having SPT-value of 0 to 3 blows, cover in the lower Kamal and Tanjungan Areas, till the level of the highway. Their thickness is 9 to 11 m. Underneath, the soils are more consistend and SPT-values are gradually increase to 20 and 30 blows, for an investigation depth of 35 m. South of the highway, towards the Daan Mogot road, mixed or clayey soft soils, where the SPT-value is less than 10 blows, extend from the ground surface to 5 or 7 m in depth. Underneath, 1.5 to 7 m thick, cemented sands having SPT-value of more than 50 blows, are found. This bed is not continuous over the entire area. The sands are underlain by stiff to hard clays having SPT-values of 15 to 30 blows.

The Meruya Area is covered with red soils. These are mixed type of soils, containing equal amounts of clay, silt and sand, locally with gravel. Such soils are generally stiff to hard. From the sounding data, a hard layer, possibly cemented sands, underlies the soil cover, at an average depth of 5 m.

Most of the soils analyzed in the laboratory are high plastic CH clays. The liquid limits are higher than 100%, the natural water content is 50 to 60% on an average and the degree of saturation is close to 100%. The wet unit weights are close to the saturated unit weights, that is 1.654 t/m^3. The soils referred to as "sandy" are composed of 67% of fines on an average, belong to the MH class of soils and have natural unit weights of 1.775 t/m^3.

The mean values of shearing strength characteristics of the saturated clayey soils are 0.6 kg/cm^2 for the cohesion and 6^0 for the internal angle of friction. The shearing strength parameters of the sandy soils, 54 to 65% of fines, are 0.45 kg/ cm^2 for the cohesion and 25^0 for the internal angle of friction.

The consolidation characteristic of the clayey soils show that most soils can be considered overconsolidated, with consolidation yield stresses ranging from 0.6 to 3 kg/cm^2. The consolidation index values are generally higher than 0.4 indicating highly compressible soils.

The nature of the soils reflects a mixed marine and continental origin, typical for tidal flat deposits. During high tide, the sea water covers the entire flat area and submerges

the creeks. After the withdrawal of the sea water a thin film of fine sediments is left. Organic matter and shell fragments are common in such deposits.

Besides, the settlement after the construction, the Project area and the entire Jakarta plain are affected by subsidence, due to self-weight consolidation in the deeper soil beds (40 to 250 m). This process is triggered by groundwater pumping from the deeper confined aquifer, and its impact on the sub-surface is far more important and the countermeasures imply long term decisions, on regional scale. At present there are 300 m long deep wells in the Cengkareng Area, where groundwater is pumped for industrial purposes. It has been reported that the maximum land subsidence rate in the Project area is about 8cm/year.

The drilling points are located in the Cengkareng West Area as shown in Fig. 4. The results of the drill logs are shown in Fig.6. to Fig.11.

A large amount of Dutch cone soundings have been made along the planned channels as shown in Fig. 5, and the results are shown in Fig. 12 to Fig. 13.

The physical characteristics of soils from all of the locations and all depth are fine, highly plastic soils, clayey, saturated and often overconsolidated as presented in Tables 8, 9 and 10. The grainsize curves are shown in Fig. 14 and Fig. 15.

The red soil is found in situ in the Meruya Area. It consists of sand, silt and clay mixtures, gravely, low plastic and with low compressibility. Only at few locations, the original surface soils are still in place.

During the channel excavations, a large amount of the recovered material may be utilized for embankment purposes (protection levee). However, embankment material usually used in this area comes from borrow sites located in Tangerang (Parung Panjang), about 20 km apart from the Site. In general, the use of the red soils is preferable to the original soils in the Project area.

Fresh and oceanic water was sampled at the locations shown in Fig. 16. The results of these analysis are shown in Tables 11 and 12, respectively.

G2.5 Existing Drainage System

(1) Package - 1 : Kamal Drainage Channel

The Kamal drainage area is located in the north-western part of the Cengkareng West Area and it is bounded by Cengkareng highway in the west, main irrigation channel in the south and Jakarta ring road in the east. Drainage area of the Kamal drainage system is about 20.8 km^2 which occupies about 53% of the Cengkareng West Area. About 75% of the drainage area is occupied by residential area. In center and southern parts of this area, one swampy area and four depression areas are located.

The Kamal Drainage Channels have about 11,900 m in total length comprising about 9,700 m long channel constructed and maintained by DKI Jakarta and 2,200 m long channel constructed by private sectors. Lined channel with wet masonry is 9,700 m and unlined channel is 2,200 m. The channel is about 15 m wide and 2.5 to 3 m deep at the highway crossing and 10 m wide and 1.5 m deep at the junction portion of the channel extending from eastern direction. The channel bed slope is 1 : 3,000 in about 2.3 km from channel mouth and 1 : 1,700 in its upstream channel stretch.

No channel related structures such as gates and weirs have been provided along the drainage channels. Thirty one (31) bridges and one (1) culvert cross the drainage channels. Majority of the bridges are single span and about 3 to 8 m in length. Among the related structures, the cross drain crossing the Cengkareng highway is the largest structure with two (2) lanes of 10.8 m in total width.

(2) Package - 2 : Tanjungan Drainage Channel, and
PIK Junction Drainage Channel

(a) Tanjungan Drainage Area

The Tanjungan drainage area is located in the northern part of the Cengkareng West Area and bounded by the Kamal Drainage Channel in the west and south, and outer ring road and its interchange in the east. In the centre part and eastern part of this drainage area, three depression areas are located. These depression areas have been already acquired by a private sector for house development. The downstream part of the Cengkareng highway forms fishpond. Industrial areas are located along the highway.

Drainage area of the Tanjungan drainage system is about 6.9 km^2 . About 44% of this drainage area is occupied by residential and industrial areas. The Tanjungan Drainage Channel has about 1,700 m long lined channel with wet masonry and concrete, and 200 m long unlined channel. The channel is about 5 m wide and 0.8 m deep at the highway crossing. The channel bed slope is so gentle as being about 1 : 5,000 in all channel stretch. Due to this gentle channel bed slope, drainage water is stagnating even in the dry season.

A cross drain with about 3.4 m wide and 1.5 m high has been provided under the highway. However, since road surface elevation of the Cengkareng highway is almost the same as tidal level due to subsidence of the highway, the cross drain crossing the highway functions as siphon at present. Due to this situation, remarkably small drainage water is discharged to downstream through the cross drain. The drainage water released through this cross drain flows into fish pond in its downstream and poured to Jakarta bay through about 900 m long canal provided in the upstream of channel mouth.

At present, the subsidence of the highway has been progressing in the road stretch between the Kamal culvert portion and Cengkareng flooodway bridge in the Cengkareng west drainage area and its extent is the most serious near the Tanjungan culvert crossing portion. Due to inundation caused by subsidence of the highway, access to the international airport has been sometimes disturbed in rainy season.

No channel related structures have been provide along this channel. Five (5) bridges and one (1) cross drain cross the Tanjungan Drainage Channels.

(b) PIK Junction Drainage Area

The Site is located in the north-eastern part of the Cengkareang West Area and surrounded by an interchange of the ring road in the west, existing street with slightly higher elevation in the south and Cengkareng floodway in the east. The downstream stretch from the Cengkareng highway forms mainly fish pond and golf yard.

This drainage area is about 2.7 km^2 and almost occupied by the residential and industrial areas. The existing drainage system has been drastically changed and interrupted by construction of the interchange of the Jakarta ring road. At present, five (5) pipe culverts with 0.8 m in diameter are provided crossing the existing Cengkareng highway.

Length of the new PIK Junction Drainage Channel, concrete ditch, will be about 800 m up to the said highway.

No related structures will be provided but four (4) culverts will be constructed crossing the PIK Junction Drainage Channel.

(3) Package - 3 : Gede/Bor Drainage Channel,
Saluran Cengkareng Drainage Channel,
and Meruya Drainage Channel

(a) Gede/Bor and Saluran Cengkareng Drainage Areas

These drainage areas are located in the southern part of the Cengkareng West Area and bounded by higher elevated area in the west, boundary area in the south, main irrigation canal in the north and Cengkareng floodway in the east. Drainage area of the Gede/Bor Channel is about 2.41 km^2 and that of the Saluran Cengkareng Channel is about 3.08 km^2, and both areas have been entirely utilized for residential area.

The existing Gede Drainage Channel, 3.4 km long in total, comprises 1.5 km constructed by DKI Jakarta and 1.9 km constructed by a private sector. The latter, having about 8 m wide and 2 m deep, is lined and drains into the Bor Drainage Channel. Flow direction of the Bor Drainage Channel is divided into two, namely the southern direction to the Mookervaat canal and the eastern direction to the Saluran Cengkareng Drainage Channel. The existing Bor Drainage Channel, having bed slope of about 1: 1,100, is about 1.5 km in total length to the Mookervaat canal.

The Salurang Cengkareng Drainage Channel, having bed slope of about 1 : 3,000, is about 4.2 km in total length and drains into the Cengkareng floodway. Out of 4.2 km of the channel, 3.4 km is lined and the remainder is unlined. Its dimension is 5 to 8 m wide and 1.5 m deep at the upstream end, and about 10 m wide and 1.8 m deep at the confluence of the Cengkareng floodway. A sluiceway with 2 sets of spindle gates, 2.4 m wide x 2.6 m high, has been provided at the outlet of the Saluran Cengkareng Drainage Channel. Fourteen (14) bridges cross this Drainage Channel.

(b) Meruya Area

The Site is located at the southern part of highway connecting from Jakarta to the Merak harbour; and bounded by existing drainage in the west, higher elevated area in the

south, and higher elevated street in the east. The drainage area is about 1.27 km^2 and has entirely been utilized for the residential area.

The Meruya Drainage Channel is secondary level and comprises about 600 m long concrete lined ditch and another 600 m long unlined ditch. The channel is about 1 to 2 m wide and 1 m deep.

In the rainy season, habitual inundation with long duration takes place in the depression areas due to undulation of the ground surface and inadequate drainage canal alignment. Besides, the interchange of the highway is now under construction in the north-eastern part of this basin. Due to construction of the said interchange, the drainage effect will be disturbed considerably. Five (5) bridges and three (3) culverts cross the existing Meruya Drainage Channel.

G3. DRAWINGS AND DOCUMENTS

G3.1 Drawings to be Furnished by the Engineer

(1) Contract Drawings

The Tender Drawings entitled the Urban Drainage Project, consequently becoming the Contract Drawings are for tendering purposes only. Provided that after the Contract Agreement was concluded, the Contractor may use the Contract Drawings as defined above as a basis for placing preliminary orders for materials and equipment, as well as for preparing the Construction Drawings. The Contract Drawings shall not be used directly as a basis for fabrication and/or construction works.

The Engineer may, from time to time, issue to the Contractor further supplementary drawings or supersede by further Drawings as necessary for the purpose of the proper and adequate execution of the Works.

G3.2 Drawings to be Furnished by the Contractor

All of the various types of drawings prepared by the Contractor shall be made in a form approved by the Engineer and shall be submitted in advance so that the Engineer can review and/ or approve them without any delay to the field work. These types of drawings include but are not limited to the following; however, it shall be noted that a title given to a drawing is only to provide a general description and can be changed as the Engineer deems necessary. All costs of Drawings to be prepared and furnished by the Contractor shall be included in the applicable unit prices and lump sum prices in the relevant Items in the Bill of Quantities.

(1) Construction Drawings

After Award of the Contract, the Construction Drawings shall be prepared by the Contractor based on the Contract Drawings which may be supplemented or superseded by further drawings as necessary for the purpose of the proper and adequate execution of the Works.

On the receipt of the Contract Drawings, the Contractor shall check them carefully and inform the Engineer in writing of any discrepancies, errors or omissions so that full

instructions will be furnished by the Engineer for preparation of the Construction Drawings by the Contractor. The Contractor shall be required to perform the work in accordance with such Drawings at the applicable unit or lump sum prices stated in the Bill of Quantities for such work or works of a similar nature.

Although the Drawings are prepared to scales, the works shall be based upon dimensions shown on the Drawings and not on dimensions scaled from the Drawings. The Drawings when read in conjunction with the Specifications and instructions that may be issued by the Engineer from time to time, will show sufficient dimensions, specific details and typical details to define the various features of the Works, but the details necessary for the construction of any part of the works may have to be deduced from several drawings.

Within not less than thirty (30) calender days calculated from the date of commencement of the Permanent Works to be constructed on the latest construction programme, the Contractor shall submit to the Engineer for his approval such Construction Drawings prepared for all items of the Permanent Works in accordance with Clause 9 (1) of the Special Conditions of Contract.

(2) Working Drawings

The Contractor shall, prior to carrying out the Permanent and Temporary Works, submit to the Engineer for his approval such working drawings as may be made for the method and sequence of construction. The Contractor shall order no material for the Permanent Works stated in the Contract before the Engineer's approval.

Working drawings for metal works shall consist of shop, erection and other drawings, showing details, dimensions, sizes and other information necessary for the complete fabrication and erection of the metal works.

Working drawings for concrete works shall consist of such additional detailed drawings as may be required for the execution of the Work and may include false work, bracing, centering and formwork and temporary access and layout diagrams. Such drawings shall show concrete outline, bending/cutting schedules and layout of reinforcement steel bars, types of material to be used, grades, stations, exact dimensions and any other details which may be required.

(3) Manufacturing Drawings

The Contractor shall, within two handred (200) calender days from the date of the Engineer's written Notice to Proceed and at least sixty (60) days before the first arrival at the Site, submit for the approval of the Engineer the detailed calculation sheet and the detailed fabrication drawings of the mechanical works and information related to the civil and building works, if any, such as foundations, anchor bolts, embedded metal works, size and shape of blockouts, cut-out and recesses in concrete walls and floor, field tolerances, details of mounting and all field joints to facilitate preparation of final design of the structure which the gates and the likes are to be installed.

(4) Installation Drawings

For equipment such as gates, hoist, valves, pipes for waterway provided by his Sub-contructor, the Contractor shall submit for approval of the Engineer drawings showing suitable foundations, embedments, access for carriage of the equipment to the Site where they are to be erected and stage concreting for final embedment. The equipment supply shall furnish detailed installation drawings to the Contractor for this purpose and supply the metal parts for embedment.

(5) Layout Drawings for the Temporary Works

Within thirty (30) calender days calculated from the date of the Engineer's written Notice to Proceed, the Contractor shall submit to the Engineer for his review and comments three (3) sets of drawings which show the layout of the Temporary Works. These drawings shall show the locations and other pertinent details of the principal components of the Construction Plant and Equipment, offices, storage buildings, housing facilities, storage area, temporary road, etc., which the Contractor proposes to construct at the Site or other authorized areas. In addition, the drawings shall show the unloading facilities for the materials and equipment which the Contractor proposes to bring to the Site, and the capacity of each major plant.

(6) As-built Drawings

Throughout the period of construction, the Contractor shall prepare As-built Drawings for the various items of works which have been completed. Such drawings shall show any authorized change which may have been made in the Construction Drawings, to the extent that they correctly portray the true "as-built" condition of each item of the

Permanent Works. The format of the As-built Drawings shall be as approved by the Engineer.

As-built Drawings shall be subject to an inspection at the Site by the Engineer's Representative, and if found unsatisfactory and not up-to-date, shall be re-checked within six (6) working days later. As each of the Permanent Works delineated on the Construction Drawings is completed, pertinent As-built Drawings, after approval by the Engineer, shall be mutually signed by the Engineer and the Contractor or their representative.

Within thirty (30) days after the receipt of the Completion Certificate, the Contractor shall furnish to both the Employer and the Engineer one (1) set of all As-built Drawings which have been clearly revised and brought up to date to show the permanent construction actually made in such manner that, a set of drawings and documents for the Employer shall be of high quality reproducible material from which clear copies can be made whereas a set of drawings for the Engineer shall be microfilm. Also, one (1) set each of blue-print copies of approved As-built Drawings shall be submitted to the Employer and the Engineer.

G3.3 Pamphlets, Diagrams and Similar Data for Equipment and Materials

The Contractor shall submit to the Engineer for approval three (3) sets of applicable catalogs, pamphlets, manufacturer's specifications, diagrams, drawings or other descriptive data for all materials and equipment to be furnished under the Contract, and those which the Contractor proposes to use, within ninety (90) calendar days after the issue of the Engineer's written Notice to Proceed or as called for in the Specifications.

The approval by the Engineer of such descriptive data shall not relieve the Contractor of any of his responsibilities under the Contract.

G3.4 Test Procedure Instructions

The Contractor shall submit to the Engineer for his approval, during or immediately following the submission of manufacturing drawings, test procedure instructions describing any test which may be required during manufacture. Such instructions shall define the sequence of tests, preparation of equipment, operation procedures be followed and the detailed procedures for conducting the tests. Further details listed in

the Specifications which pertain to test procedure instructions and types of tests to be performed shall be followed.

G3.5 Instruction Manuals for Installation, Operation and Maintenance

The Contractor shall submit to the Engineer for approval nine (9) sets of the instruction manuals concerning correct manner for installing permanent items as early as possible before such items are shipped to the Site and those instruction manuals for the operation and maintenance of the installed items within thirty (30) calendar days after arrival at the Site.

The instruction manuals shall describe in detail the erection or installation procedures to be followed and the use of all erection equipment, measurement devices or other items. The procedures for assembling, adjusting, operating and dismantling of each component system, machine or equipment shall be clearly described and illustrated. The maintenance to be performed for these items shall be described in detail including recommended frequency of inspections and lubrications.

The instruction manuals shall include easily readable diagrammatic drawings of the equipment to facilitate understanding descriptive information. The Contractor shall, in preparing the instruction manuals, take into account the lack of experience and non familiarity of the operating and maintenance personnel.

In this regard, the Contractor will fully cooperate with and assist the Engineer in establishing an operation and maintenance (O & M) program including on-the-job training for all permanently installed items.

The instruction manuals shall include a complete list of all applicable drawings, spare parts lists, and a parts list for each component of any of the items. The parts list shall include the manufacturer's code, serial numbers and other instructions and shall be detailed as far as possible for all the equipment supplied.

Further details specified in the Specifications which pertain to instruction manuals shall be followed.

G3.6 Submission and Review / Approval of Contractora's Drawings, Manufacturing Drawings and Documents

The Contractor shall, as required in the Contract, submit his drawings and documents to the Engineer for review or approval at least thirty (30) calendar days prior to the execution of the work concerned with the said drawings and documents. Manufacturing drawings for the items which may be fabricated outside Indonesia shall be submitted within one hundred and twenty (120) days from the date of the issue of the Engineer's written Notice to Proceed for the approval of the Engineer.

The procedure for the submission, review and/or approval of drawings and documents shall be understood to be as follows, provided that the Engineer shall reserve the right to make any changes to such procedure during the course of the works as and when the Engineer deems necessary. When the Contractor is ready to have the Engineer's review and/or approval for certain drawings and documents, he shall submit three (3) copies of clearly readable blue print copies or photocopies of the drawings and documents.

The format of such drawings and documents shall be approved by the Engineer. Within thirty (30) days after receiving blue print copies or photocopies of the drawings and documents from the Contractor, the Engineer will return one copy marked with one of the following classifications, depending upon whether the drawings and documents are to be "approved" or "reviewed":

Classifications of Drawings and Documents for Review/Approval :

(a) "APPROVED"
(b) "APPROVED EXCEPT AS NOTED 'RESUBMITTAL NOT REQUIRED' "
(c) "RESUBMIT AFTER CORRECTION"
(d) "NOT APPROVED"

Upon receipt of drawings and documents which have been marked as shown in (a) or (b) above, the Contractor will be authorized to proceed with the work covered by such drawings and documents, making correction if indicated thereon by the Engineer. The copies of all approved drawings shall be maintained at the Contractor's site office.

When returned drawings and documents have been marked as shown in (c) above, the Contractor shall make necessary corrections and/or revisions to the drawings and documents in a timely manner and shall resubmit three (3) copies of the revised drawings and documents to the Engineer. When the returned drawings and documents have been resubmitted for approval, the Engineer will try to complete the review and/or

approval of the drawings and documents within fifteen (15) working days ; however, this will depend on the number and complexity of the corrections / revisions which have to be checked. This procedure will continue until the drawings and documents have eventually been marked as shown in (a) or (b) above, at which time they will become a part of the Contract Documents.

None of the Permanent Works can be started until applicable drawings and documents have been approved by the Engineer. Prior to the start of work, a joint inspection will be made by the Engineer and the Contractor to ensure that approved drawings and documents have been fully complied with. Any discrepancies or deficiencies, if discovered, shall be corrected by the Contractor before execution.

If it is necessary to make revisions of drawings and/or documents after it has been reviewed and/or approved, the Contractor shall resubmit it to the Engineer in the same manner specified hereinbefore.

The Engineer reserves the right to instruct the Contractor to add details and make changes or modifications to the drawings and/or documents which are necessary to conform with the provisions and intent of the Specifications, and the Contractor shall do so without any extra cost. Any work done prior to the Engineer's approval of the drawings and/or documents shall be at the Contractor's risk. Approval by the Engineer of the manufacturing drawings and/or documents shall not relieve the Contractor from his obligations under the Contract.

G4 CONSTRUCTION PROGRAMME, SCHEDULES AND PROGRESS CONTROL

G4.1 Commencement, Carrying Out and Completion of the Works

The Contractor shall commence the works under the Contract in accordance with Clause 41 of the General Conditions of Contract and shall complete the Works within the period as specified in Sub-clause 1.7 hereinbefore from the issue of the Engineers written Notice to Proceed.

G4.2 Construction Programme

(l) General

The Contractor shall submit a detailed construction programme or revision of the same including a CPM network as well as a time bar-chart construction schedule to the Engineer for his approval, in accordance with Clause 14 (Programme to be Furnished) of Vol. II, Part I - General the Conditions of Contract. The Engineer's estimate of the construction time schedule shown on the Tender Drawings is to be used only for consideration by the Contractor and does not relieve the Contractor from preparing and submitting his own time bar-chart construction schedule.

The construction programme including CPM network and time bar-chart construction schedule shall be prepared subject to the following conditions :

(a) Construction schedule shall clearly set out completion dates for specific pre-requisites upon which further co-ordinated construction/ erection activities shall depend. Dovetailing of works done by other contractors for the utility works and equipment supplies shall be noted in particular, as applicable to the Contract Package.

(b) All Works are to be completed within the time as provided in Clause 43 of the Conditions of Contract, to the extent that a Completion Certificate can be issued in accordance with Clause 48 of the Conditions of Contract.

(2) CPM Network and Time Bar-chart Construction Schedule

Activities shown on the CPM network and time bar-chart construction schedule shall consist not only of the actual construction operations but also will include time allowances for the preparation and approval of drawings and samples, procurement and shipping of materials and equipment, installation of special and critical items, possible delays caused by flood and/or inclement weather, religious holidays, etc. The critical path shall be clearly marked on the CPM network. The selection of activities to be shown on the CPM network and time bar-chart construction schedule shall be submitted within sixty (60) calendar days after the issue of the Letter of Acceptance.

Whenever the Contractor proposes to change the Contractual Construction Programme, the Contractor shall immediately notify the Engineer in writing or the approval of revision. If such a changes in the Contractual Construction Programme affects the progress of the Work, the Employer and the Engineer shall not be responsible for any consequence, if the Engineer has approved of such the Drawings, which are attributable to that changes.

Notwithstanding the provisions as prescribed in Clause 44 of Vol. II, Part I - General Conditions of Contract, the Contractor shall have no right to claim to such delay of work progress caused by delayed or postponed submission of the Construction Drawings.

(3) Updating of the Construction Schedule and CPM Network

Both the time bar-chart construction schedule and CPM network shall be closely monitored and kept current. In addition, they shall be formally updated by the Contractor once every three (3) months, or as directed by the Engineer, and submitted to the Engineer for his review and comments.

If the Contractor's work is delayed to the extent that the critical path falls behind schedule, the Contractor shall submit to the Engineer for approval of revision of the Contractual Construction Programme, in possible earliest time or within fourteen (14) calendar days from the Engineer's request in writing, a detailed report outlining all corrective actions which must be taken to get the critical path back on schedule.

When requested by the Engineer, the Contractor shall promptly furnish details of the Contarctual Construction Programme for particular sections of the Permanent Works.

G4.3 Progress Report

The Contractor shall, before the tenth (10) day of each month, submit five (5) copies of a monthly progress report in a format acceptable to the Engineer detailing the progress of the work accomplished during the preceding month. The report shall contain but is not limited to the following:

(1) A general description of the work performed during the reporting period on each main activity to include any notable problems which were encountered.

(2) The total overall percentage of Project work completed as well as the total overall percentage of Project work scheduled by the CPM network as of the end of the reporting period, with appropriate description to explain any differences.

(3) The quantity and percentage of each main work activity completed as well as the total percentage of each main work activity scheduled during the month, with appropriate description to explain any differences.

(4) A list of all activities scheduled to be in progress or actually in progress during the reporting period to include the Contractor's actual or forecast start date versus scheduled start date, and the actual or forecast completion date versus scheduled completion date for each activity, with appropriate remarks in writing to explain any differences.

(5) A list of activities scheduled to be started within the next 2 months, with expected starting and completion dates. If the expected starting and/or completion dates are different than those shown on the CPM schedule, an explanation shall be given.

(6) A list of local manpower (man-days by trade classification) employed during the reporting period.

(7) A list of expatriate personnel (man-days by position) employed during the reporting period.

(8) An equipment report as stipulated in Clause G8.3 (3) hereinunder. Also a list of equipment which arrived at the port and are in the process of being cleared through customs.

(9) Photographs and movie of the type called for in Clause G4.4 hereinunder.

(10) Total quantities of concrete poured, earthworks excavated and embanked, etc. during the reporting period. This will include, but is not limited to, the following:

(a) Total quantities of various types of concrete poured for each activity.

(b) Total quantities of various classifications of excavation and embankment.

(11) Main items of the Temporary Works performed during the reporting period.

(12) A statement detailing the status of progress on the overall project, and how to regain any lost time or set-backs which may have occurred.

(13) A general description of the weather, and the listing of rainfall in mm, maximum and minimum temperatures and the river level in meters for each day throughout the month.

(14) A listing of deadlined (inoperable) equipment, action being taken to get it back in operation and the estimated completion date of the repairs.

(15) A statement about labour relations including shifts and hours of work executed and an explanation of any actual or potential problems.

(16) A statement concerning the effectiveness of the safety programmes and a listing of each accident involving the hospitalization and/or death of any person. Also a list of any accidents in which equipment was damaged to the extent it became inoperable, and any fire which occurred.

(17) A statement concerning the effectiveness of the security programmes and a listing of any major thefts.

(18) A listing of the amount and date of each payment received as of the reporting period and the amount of any monthly invoice which has been submitted but not yet paid.

(19) A list of claims (if any) submitted during the reporting period to include claim amounts and extension of time claimed.

(20) A statement concerning the consumption record of major materials including electric power during the reporting period and accumulated quantities thereof. (major items)

(21) A statement concerning forseeable problem areas and recommendations about how they should be resolved.

(22) A list of documents received from or submitted to the Employer and the Engineer during the reporting period.

G4.4 Progress Photos and Movie

The Contractor shall, throughout the Contract period and in due consultation with the Engineer, furnish to the Engineer both colour photographs as well as movie which clearly show the progress being made. Such photographs and movie shall be taken at the start, during and at the completion of each major component of the Works and at any other times and places as directed by the Engineer, so as to clearly depict all the important events taking place at the Site in a sequential and chronological order. The Contractor shall submit to the Engineer two (2) prints each of colour photographs, the size of a postcard (9 cm x 12 cm), along with the monthly progress report specified in Clause G4.3, hereinbefore.

A brief description of the subject and date taken will be listed for each photograph. If additional prints are required by the Engineer or the Employer, the Contractor shall furnish them.

The cost of such photographs and movie records shall not be paid separately and shall be deemed to be included in the respective unit rates for the various items in the Bill of Quantities. The negatives of the photographs and video cassette shall be the property of the Employer and no print from these negatives shall be supplied to any person unless so authorised by the Employer.

Upon completion of the Work, the Contractor shall submit all of the negatives to the Employer in a booklet form with the negatives arranged chronologically and marked for identification. The Contractor shall also submit two (2) sets of color photographs adequately edited and in a booklet form showing the entire sequence of the Work from start to finish.

The Contractor shall also submit two (2) copies of the colour movie records, one each with commentary in English and Bahasa Indonesia, of three (3) hours duration on colour VHS compatible video cassettes arranged, in due consultation with the Engineer, chronologically and edited adequately showing the entire sequence of works from the start of construction activities to the completion, testing and commissioning of the Project components.

G4.5 Daily, Weekly and Monthly Work Schedules

(1) Daily Work Schedule

The Contractor shall at the end of each day submit four (4) copies of a written daily schedule, in a form approved by the Engineer, for the main work items which are to be performed during the successive day. The schedule shall contain appropriate comments in regard to the work which is to be performed on each major activity such as placing of fill materials, excavation, construction of structures, concreting, installation of manufactured items, and such works required by the Engineer in which the locations, structures, quantities, working time, etc., shall be described.

(2) Weekly Work Schedule

The Contractor shall at the end of each week submit four (4) copies of a written weekly schedule listing the main work items which are to be accomplished during the successive week. The schedule shall be in a format approved by the Engineer and is to contain appropriate comments in regard to the work which is to be performed on major items such as earthwork, concreting, drainage, roadway work, mechanical work, as well as other items including procurement of materials, maintenance of equipment, clearance of incoming materials and equipment through customs, preparation of drawings, etc. One page of the schedule shall list each day of the week and show in the appropriate place each concrete pour which is planned to be made during the week.

(3) Monthly Work Schedule

The Contractor shall prepare a monthly bar chart type of schedule at the end of each month to show the work which is proposed to be accomplished during the successive month. This schedule shall show, by means of bars, the days within the month which each main activity will be worked on and shall indicate on which day each proposed concrete pour is to be made. The schedule shall be submitted to the Engineer by the first day of each month for his review and comments.

G4.6 Joint Meetings to Discuss Progress

A regular meeting between the key personnel of the Engineer and the Contractor shall be held once a week at a time agreed to by both parties, but preferably on a Friday. The purpose of these meeting will be to discuss the progress being made, the work proposed for the forthcoming week and any problems having a direct bearing on the immediate to near-term work activities. The Employer has the right to attend such meeting or may hold separate meetings whenever necessary. The minutes of the meetings shall be prepared by the Contractor in English and attached in the weekly schedule as specified in Sub-clause G4.5 hereinbefore.

G4.7 Method of Performing the Works

As far as it is consistent with the interest of the Works and the results to be attained, the order and methods of executing the Works will be left to the discretion of the Contractor, with whom ordinarily the responsibility of such order and methods shall rest, provided that the Engineer shall at any time have the right to prescribe and control such order and methods with a view to the safety, rapidity and economy of construction of the Works, and to ensure harmony and cooperation with other contractors.

Before commencing the Works or any portion thereof, the Contractor shall furnish the Engineer with full information as to his plans and methods for carrying out the Works or any portion thereof.

G4.8 Completion Report

The Contractor shall submit ten (10) copies of completion report within ninety (90) days after the completion date as specified in Clause G1.7 hereinbefore to the Engineer during the Defect Liability Period to cover the whole of works under this Contract

including, but shall not be limited to, construction method, actual construction progress, construction facilities, materials, staff and labour employment records, accidents, problems and solutions, drawings, etc. as directed by the Engineer.

The cost thereof shall be included in the overhead expenses of the Contractor stated in the Bill of Quantities. In the completion report, the photographs as specified in Clause G4.4 shall be attached and shall contain remarks giving explanation of the object completely

G5. SETTING - OUT OF THE WORKS

G5.1 Bench Marks

The Contractor shall, before construction commences, establish an adequate system of survey control points and bench marks which are clearly marked, adequately referenced and properly recorded. The Contractor shall make the control points and bench marks available to the Engineer together with the relevant records.

The Engineer will establish reference survey points and reference bench marks in the Work Area or on the Site. The Contractor shall carry out a check survey thereon and satisfy himself as to their accuracies before using any of those for setting-out the Works. The Employer shall not bear any responsibility for the accuracy of any reference points and bench marks. Should the Contractor find any discrepancy between the original surveys and the Engineer's surveys, he shall draw the Engineer's attention to them in writing.

The Contractor may establish additional temporary bench marks for his own convenience but each temporary bench mark so established shall be of a design and in a location approved by the Engineer, and shall be accurate in relation to the bench marks established by the Engineer.

The Contractor shall protect the reference points and level bench marks and in the event of any damage shall survey and reestablish the points.

River alignment and locations of river structurs of revetment, bridges and sluiceway facilities, etc. shall be set up on the basis of the nearest base point mark or control point.

G5.2 Detailed Survey

The Contractor shall cooperate with the Engineer in checking the setting-out and in performing surveys and measurements for record and payment purposes. The Contractor shall render all necessary assistance to the Engineer and shall provide as required by the Engineer, sufficient quantities of pegs, poles, straight edges, stagings, moulds, templates, profiles and all other requisite items for checking the Contractor's setting-out and the measurement of the Works.

The cost of all labour and materials required by the Engineer for the above purpose shall be borne by the Contractor. No separate payment will be made for the cost of any such setting-out and quantity measurement works including those to be made with the Engineer's staff, and no extension of time shall be allowed for any delay which may occur thereby.

The ground surface lines and contour line shown on the Drawings will be deemed to be correct under the Contract. If, however, the Contractor is in doubt of the correctness of such ground surface lines and contour lines, the Contractor shall, at least thirty (30) days before start of the works at the place, notify the Engineer in writing of his intent to perform resurvey of such ground levels. The Contractor shall perform resurvey of such ground surface in the presence of the Engineer's Representative, and the cross sections obtained at that time will be used in computing the quantity of earthworks if approved by the Engineer. The Engineer shall have the right to change or modify ground surface lines or contours by re-surveying by himself, before the original ground surface is changed by the Contractor.

G5.3 Topographic Survey

The Contractor shall, before construction commences, perform detailed topographic survey of the respective bridge sites including alignments of approach roads and/or inspection roads for preparation of his construction drawings in accordance with the Drawings or as directed by the Engineer.

Payment for the topographic survey shall be made at Provisional Sum in the General Item No. 0/16 of the Bill of Quantities in accordance with the provisions stipulated in Clause 58, Provisional Sums, Vol. II, Part I - General Conditions of Contract.

G6. STANDARDS, INPECTION AND PACKING OF ITEMS

G6.1 Standards and Unit of Measurement

Materials and methods of test shall be furnished and tested in accordance with appropriate Indonesian Standard or if there be no appropriate Indonesian Standard, such materials and method of test shall be done in accordance with appropriate JIS, AASHTO or ASTM stated below :

For concrete and bridge works

(a) JIS (Japan Industrial Standards)
(b) SNI (Standar Nasional Indonesia)
(c) SII (Standar Industri Indonesia)
(d) PBI (Peraturan Beton Bertulang Indonesia) 1971, N.I.-2

For metal works, road works and others

(a) JIS (Japan Industrial Standards)
(b) SNI (Standar Nasional Indonesia)
(c) SII (Standar Industri Indonesia)
(d) AASHTO (The American Association of State Highway and Transportation Officials)
(e) PUIL (Peraturan Umum Instalasi Listrik Indonesia)

Further details listed in the Technical Specifications which pertain to standards shall be complied with.

The Contractor may however propose to the Engineer during the period of the Contract a standard other than that specified in the Contract, provided that he shall submit an English translation of the proposed standard and all other information in accordance with the Contract and shall submit, at the request of the Engineer, written proof that his proposed standard is equivalent in all significant respects to the standard specified in the Contract. Such submittals shall be timely and failure to do so or purchase of any other equivalent materials and equipment prior to approval by the Engineer shall be at the Contractor's risk.

In all correspondence, technical schedules, specifications and drawings in or under the Contract, the metric system for measurement shall exclusively be employed except as otherwise specifically provided. On drawings or printed pamphlets where other

systems for measurement have been used, the equivalent metric measurement shall be marked next to it in brackets.

G6.2 Inspection of Materials and Equipment

The Contractor shall make a diligent effort to procure the specified materials, but when the materials specified are unavailable, for reasons beyond the control of the Contractor, appropriate substitutions may be used with prior written approval of the Engineer.

All materials and equipment to be furnished under the Contract will be subject to inspection, examination and tests by the Engineer at any time and in any state of completion, both off-site and on-site. Only materials and equipment which have been approved by the Engineer shall be used. The Employer will expect the Contractor to use the materials made in Indonesia as much as possible. The Contractor shall promptly furnish without additional charge, all facilities, labour and materials reasonably needed for performing all inspection and tests which may be required by the Engineer. Acceptance of materials and equipment or waiving of inspection thereof shall in no way relieve the Contractor of any of the responsibility for furnishing materials and equipment meeting the requirements of the Contract.

G6.3 Packing of Materials and Equipment

All materials and equipment shall be properly packed for transport to the Site so that they are protected against the climatic conditions to which they may be subjected in transit and in storage at the Site. Each crate of packages shall contain a packing list in a water-proof envelope. All cases, packages, etc. shall be marked carefully on the outside to indicate the name of consignee entitled ".....(the Contractor's name), c/o ....., ...(Address)..... ," the total weight and dimensions, to show the center of gravity and the correct position for the slings used to lift the crate of package.

G6.4 Stock of Materials

The Contractor shall be required to keep at all times the stock of construction materials and equipment sufficient for his construction activities. Failure to do so shall be at the Contractor's risk. Any claims or requests for the time extension of the Works due to

difficulties in procuring materials and equipment which may be beyond the Contractor's control will not be considered by the Engineer.

G7. SECURITY, SAFETY AND HEALTH CONTROL

G7.1 General

All security, safety and health controls necessary for the execution of the Works such as, but not limited to, sanitary arrangements, land clearing of the Site, fuel, temporary fencing, safety precautions, fire prevention and public morality shall be established and maintained by the Contractor at his own expense. The Contractor shall make himself responsible for all management works of security, safety and health controls and shall provide the personnel, equipment and written programmes necessary to accomplish such works.

All written programmes required for security, safety, etc. as discussed below shall be submitted to the Engineer for approval within thirty (30) calendar days after commencement of the Works. Approval of such programmes shall not relieve the Contractor in any way from his responsibilities in this regard. No separate payment shall be made for complying with the provisions of this Clause and all costs related thereto shall be deemed to be included in the rates for the various items in the Bill of Quantities.

G7.2 Security Control System

The Contractor shall establish a security control system and its organization for the Works and submit a written programme regarding this to the Engineer for his approval. The security control system shall be based on the laws and regulations in force.

The Engineer shall have the right to instruct the Contractor in the operation of the approved security programme and system from time to time, if it is deemed necessary in the opinion of the Engineer.

G7.3 Sanitary Arrangement and Clearance of Site

The Contractor shall keep the Site in a clean and sanitary condition and shall provide and maintain sanitary conveniences for the use of persons employed in the Works to the extent and in the manner and at such places as approved by the Engineer and by any local or other authorities concerned, and all persons connected with the Works shall be obliged to use these conveniences.

The Contractor shall post notices and such other precautions as may be necessary to keep the Site clean. The Contractor shall carry out any cleaning whatsoever as may be directed by the Engineer to maintain such sanitary conditions.

No tree felling shall be permitted outside the Site which is prescribed in Clause G8.2, hereinafter, and which will be provided for the Works. Contractor shall not take any space or place for clearing without the written approval of the Engineer and such space or place for clearing shall be kept to the minimum.

G7.4 Storage and Handling of Fuels

The Contractor shall make all arrangements necessary to transport, store and handle fuels in a safe manner for protecting the public in accordance with the laws and security regulations in force relating to transporting, relocating, handling, disposing, filling and storing. In this regard, he shall submit a written programme to the Engineer for approval for the safe handling and storage of fuel.

The Contractor shall obtain all necessary licenses and permissions and shall pay all fees and charges in respect of the same as may be necessary for the purpose of moving fuels from place to place and storing the same, and shall carry out all applications to obtain the approvals from the concerned authorities of the Government of Indonesia.

Above-ground storage tanks for gasoline and liquified petroleum gas storage tanks shall not be located within the limits of the campsite or closer than 100 meters to any building in the Site. Moreover, the locations of the said tanks shall be approved by the Engineer.

G7.5 Precautions for Safety and Security

The Contractor shall take all necessary precautions against risks of loss of life or of injury to any person employed on the Works or to employees of the Employer and the Engineer or to visitors or to persons having good and sufficient reasons to be about the Works, and to this end he shall properly safeguard the Works to the satisfaction of the Engineer.

Where and when it is deemed necessary, the Contractor shall furnish lighting, fences, signs and sentry, and other safety facilities and service.

The Contractor shall furthermore take all necessary precautions against damage to the property of the Employer or of others located at or adjacent to the Site. The Contractor shall at all times comply with any accident prevention regulations and any safety regulations of any local or national authorities.

The Contractor shall submit a detailed safety programme for dredging work for the Engineer's approval, before starting the work. Upon being approved, this programme will be strictly adhered to.

The Contractor shall appoint a Safety Officer and the necessary number of assistants who will hold periodical safety meetings with his own personnel and those of his Sub-contractors. The Contractor shall report in writing within twenty four (24) hours to the Engineer all accidents involving the death of or serious injury to any person on the Site resulting from the Contractor's operations.

The Contractor's attention is drawn to that incomplete structures forming part of the Works are in danger of floatation probable to occur during flood or inundation. The Contractor shall secure such incomplete structures with adequate safeguard against floatation, as detailed out in Clause G7.8 hereinafter.

G7.6 Fire Prevention

The Contractor shall comply with the laws and regulations respecting fires and with the instructions of the Engineer with respect to the prevention of fires. No fire shall be lit in the dry season without permission in writing obtained from the Engineer.

The Contractor shall at his cost supply, maintain and operate an efficient fire fighting service for the protection of the Works, the Contractor's residential quarters, labour camps and other areas so designated by the Engineer. The Contractor shall be responsible for maintaining a trained and qualified fire fighting crew on the Site at all times as well as installing and maintaining an efficient fire alarm system. He shall also submit a fire prevention and fire fighting programme for the Engineer's approval.

The Contractor shall take every precaution to prevent fire from occurring on or about the Site and shall provide what the Engineer considers to be suitable and adequate fire fighting equipment, for ready use in all structures, buildings or the Works under construction, including his residential quarters, labour camps and ancillary buildings.

The Contractor shall maintain all fire fighting equipment in good working condition until the Works are accepted by the Employer.

The Contractor shall diligently fight any fire which occurs on the Site, wherever the fire may originate. In this regard, he shall employ all requisite equipment and manpower up to the limit of his equipment and manpower employed at the Site, including the equipment and manpower of his Sub-contractors.

G7.7 Lighting

The Contractor shall provide sufficient lighting to ensure that security and safe working conditions are to be established, that the Works can be constructed in complete compliance with the Contract, and that a complete inspection of all Works in progress can be made by the Engineer.

Unless otherwise directed by the Engineer, the minimum illumination on ground or working places to be provided for the various operations or work areas shall be as follows :

Operation or Area	Illumination (Lux) Minimum Value
Earthworks	35
Concrete placing	50
Haul roads and bridges where hazardous conditions exist	20
Workshops and auxiliary buildings	200

Illumination for areas of operation not listed above shall be as instructed by the Engineer.

All mobile equipment or plant used during night operation shall be equipped with sufficient lights and/or reflectors to ensure safe working conditions.

At least fourteen (14) days prior to start of the night operation the Contractor shall submit his proposals for lighting systems in the areas where he proposes to work at night to the Engineer for approval. The Contractor shall modify the proposals, if required by the Engineer, and shall not begin such operations in such places as the case may be, until the proposals for lighting systems have been approved by the Engineer.

Approval of the Contractor's proposals for lighting shall not relieve the Contractor of any of his liabilities or obligations under the Contract.

G7.8 Sign

The Contractor shall provide all necessary signs for the Works. These shall include but not be limited to the following :

(a) Standard road traffic signs
(b) Warning signs
(c) Danger signs
(d) Control signs
(e) Safety signs
(f) Direction signs
(g) Name of Project and structure details

Wording on all signs shall be in English and Indonesian. The size, color, lettering and locations of all signs shall be subject to approval of the Engineer. The Contractor shall maintain all signs so placed as well as those placed by the Employer.

If the Engineer considers that the system of signs provided by the Contractor is inadequate to ensure safety, or unsatisfactory in other respects, the Contractor shall add to, amend, or otherwise change the system to the satisfaction of the Engineer.

The Contractor shall pay particular care on the traffic control of the public roads on which the Contractor's equipment or vehicle may frequently pass. The Contractor shall post flagmen at key places on such roads in addition to the signs. Roads closed to traffic shall be barricaded and posted with adequate warning signals. Suitable red lights shall be kept on from sunset to sunrise.

G7.9 Safety Instructions

The Contractor shall supply and issue to all of his employees and those of his Sub-contractors a printed booklet of the size approved by the Engineer in English and Indonesian languages used by his employees at the Site for instructions on safety based on good practice. Within sixty (60) days after the issuance of the Engineer's written Notice to Proceed, sample copies of the booklet shall be submitted to the Engineer for his approval before printing and, if necessary, amendments shall be made to the booklet

to full satisfaction of the Engineer. The Contractor shall issue the booklet immediately after printing as required herein and ensure that all employees are fully conversant with the instructions. Safety instructions shall deal with all safety measures including but not limited to the following:

(a) Protective clothing, helmet and footwear.
(b) Use of lifting equipment.
(c) Precaution against electrical shock.
(d) Welding.
(e) Routine procedure in case of accidents, fires, etc.
(f) Watchmen, warning notices and barriers.

G7.10 Public Morality

The Contractor shall pay his attention to public morality of his staffs and labour regardless in or out of the Site and shall be responsible to prevent such arbitrations between his employees and persons in the neighborhood of the Works in accordance with Clause 34. (9) Disorderly Conduct, etc., of the General Conditions of Contract. The Contractor shall also be responsible to keep the public traffic including pedestrian, on the existing national roads and Project roads, to be passed safely and smoothly without danger.

G7.11 Payment for Provision of Safety Equipment and Instrument

Payment to the Contractor for the provision of safety equipment/instrument and sign boards will be made at the lump sum price stated in Item No. 0/13 in the Bill of Quantities in the following manner:

(i) Seventy (70) percent of the lump sum price will be paid when the Engineer certifies that all the temporary equipment/instrument and sign boards have been acceptably provided, and

(ii) The remaining thirty (30) percent of the lump sum price will be paid when the Engineer certifies that all the temporary equipment/instrument and sign boards have been acceptably removed.

G8. Temporary Works

G8.1 General

All Temporary Works including, but not be limited to, the concrete plant, water supply system, electric power supply system, telecommunication system, buildings, including the Contractor's site office and the Engineer's site office, dewatering system, construction roads and other facilities shall be furnished, installed, operated, maintained and subsequently removed by the Contractor as approved by the Engineer.

At least sixty (60) days prior to installation of the Temporary Works, the Contractor shall prepare and submit to the Engineer for his approval the details pertaining to such Works including scale, capacity, layout, installation programme and schedule in accordance with Clause G3.2 of these General Specifications. The Engineer shall have the right to direct the Contractor to modify or change the Contractor's proposals if he deems it necessary in the opinion of the Engineer. Such direction of the Engineer shall not relieve the Contractor of his obligations and responsibilities under the Contract.

The Contractor shall be responsible for obtaining all necessary permission, consent and the like of national/ local authorities and/or corporations concerned in connectin with the works of temporary facilities and to carry out those works in accordance with the regulations, rules, instructions and other statutory requirements to the satisfaction of the authorities, corporations concerned and the Employer.

The Construction of the temporary facilities shall not be started without the prior permission and/or consent of the authorities, and corporations concerned and the prior approval of the Engineer.

G8.2 The Work Area

The Employer will be responsible for making all land and places within the Site available for both the Temporary and Permanent Works as defined in Sub-clause 1.(1) (e) (iv) of Vol. II, Part I - General Conditions of Contract. The Site shall however be limited to the land and places within the lines on the outer-most side of the permanent structures to be constructed under the Contract and within the working space which have been proposed by the Contractor in his layout plans, design, drawings and programmes, and which have become a part of the Contract in accordance with the provisions of Clause G3.2.

The Work Area as shown on the Drawings or as designated by the Engineer shall be the land or space to be used for the execution of the Works and shall be granted by the Employer to the Contractor for use free of cost. The Contractor shall present drawings showing his proposed general arrangement of Temporary Works including roads, buildings, power supply and water supply systems within the Work Area and shall be approved by the Engineer.

The Contractor shall not use lands exceeding limits of the Site. In exceptional circumstance with prior approval of the Engineer, the Contractor can be allowed use of such land but shall be responsible for obtaining the consent and agreement of the owners, occupants or public authorities of the land or spaces outside the Site for the purposes of the Works. The Contractor shall notify in writing the Engineer's Representative of that he has obtained such consents from them.

The Contractor shall, if so directed by the Employer or the Engineer pay all costs, expenses, compensation and other disbursement, incurred from acquisition or renting the working land or spaces to the owner, occupants or authorities.

If the Contractor intends to locate some of the Temporary Works outside the Work Area shown on the Drawings, such proposal shall be optional but all costs required for doing so, including right-of-way, rent of land and the like shall be borne by the Contractor and shall be deemed to be included in the relevant items in the Bill of Quantities. Any delay or restriction caused by such matters shall not relieve the Contractor of his obligation to meet the requirements of the Contract and no extension of time shall be allowed for any delay caused thereby.

Clearing of land by the Contractor shall not be made without the written approval of the Engineer and shall be kept to a minimum because tree cutting is generally not permitted.

Prior to proceed with erection of the temporary buildings and facilities of the Contractor, all land and spaces shall be developed by the Contractor with clearing, stripping, grubbing, filling, compacting, shaping, and so forth as proposed in his proposal which have become a part of the Contract.

No separate payment shall be made for the land preparation including soil conservation works and all the cost thereof shall be deemed to be included in the relevant unit rates and lump sum prices stated in the Bill of Quantities.

G8.3 Mobilization and Demobilization

(1) Transport of Construction Plant and Equipment, and Materials

The Contractor shall secure the transport of all Construction Plant and Equipment, apparatus, materials and others needed for execution of the Works which will be brought to and removed from the Site.

No separate payment will be made for the transportation cost. All costs including freight, insurance and others incurred from the transportation of all the imported Construction Plant and Equipment, and materials to be brought to and to be subsequently removed from the Site shall be deemed to be included in the unities. t rates and lump sum prices for the various items in the Bill of Quantities.

(2) Temporary Buildings

The Contractor shall provide, maintain and subsequently remove where directed, such temporary buildings as the Contractor's office, workshops, staff and labour camps, first aid facility and other buildings necessary for the execution of the Works. The Contractor shall design and submit site plans, construction programme and general particulars of the proposed temporary buildings to the Engineer for his approval.

The Contractor shall furnish, maintain and subsequently remove where directed, furnitures of the Contractor's office, temporary accomodations and living facilities for his employees, including all necessary services for water supply, drainage, lighting and heating, roads, paths, parking places and refuse disposal as approved by the Engineer.

The Contractor shall furnish, at least thirty (30) days prior to commencement of the Works, his design and drawings to the Engineer for approval for the construction of the Engineer's site office, having a floor area of about one hundred (100) m^2.

The Contractor shall supply, construct, operate and maintain the Engineer's site office and the common facilities which shall be subject to the approval of the Engineer.

The execution of the Engineer's site office shall be completed within sixty (60) days after the approval of the layout unless otherwise directed by the Engineer.

The construction of the temporary buildings shall not be started without the Engineer's approval.

The Contractor shall provide all necessary labour, material, spares and equipment, for proper maintenance of the Engineer's site office including servicing and maintenance of all utilities till the time specified in the Contract or as directed by the Engineer.

The Employer has the right to request the Contractor to leave a whole or a part of the temporary buildings in the Site for his use during the period of operation and maintenance. In this case, the equitable adjustment will be done on the basis of negotiation between the Employer and the Contractor.

Payment to the Contractor for the temporary buildings will be made at the lump sum prices for Items No. 0/03 for the Engineer's site office and No. 0/05 in the Bill of Quantities in the following manner:

(i) Seventy (70) percent of the lump sum prices will be paid when the Engineer certifies that all the temporary buildings have been acceptably furnished and have become accommodative, and

(ii) The remaining thirty (30) percent of the lump sum price will be paid when the Engineer certifies that all the temporary buildings have been acceptably removed.

(iii) No separate payment will be made for the costs incurred from repairing, maintaining and subsequently removing of the temporary buildings and such cost shall be deemed to be included in the unit rates and lump sum prices for the various items in the Bill of Quantities.

Payment for furnishing and installation of the office furnitures and equipment for the Engineer's site office in Item 0/04 in the Bill of Quantities will be made at Provisional Sum in accordance with the provisions of Clause 58 of Vol. II, Part I - General Conditions of Contract.

(3) Construction Plant and Equipment

The Contractor shall install, operate, maintain and subsequently remove all Construction Plant and Equipment required for the efficient execution of the Works. In particular, the Contractor shall supply all those items listed on the Schedule of Major

Construction Plant and Equipment in the Contract at the time stated therein or at such other time as may be deemed necessary in the opinion of the Engineer. The Construction Plant and Equipment shall not be removed from the Site except with the written approval of the Engineer.

The Engineer may, if he considers it necessary for the execution of the Works in accordance with the Contract, order to the Contractor to supply additional items of the Construction Plant and Equipment or extend the period for which the Construction Plant and Equipment is required, without any additional payment to the Contractor. The Contractor shall supply and stock all spare parts for the Construction Plant and Equipment to ensure the efficient execution of the Works.

If required, the Contractor shall make available to other contractors to be employed by the Employer for the Works, any Construction Plant and Equipment including concrete plant on a Daywork basis to such contractors provided always that the Engineer's direction on the priority of use of the Construction Plant and Equipment shall be final.

The Contractor shall submit a Monthly Equipment Report which lists the following information about the Construction Plant and Equipment, as prescribed in Clause G4.3:

(i) List of all equipment located at the Site.
(ii) Daily working and operation record of each equipment.
(iii) Inspection, repair and maintenance record.
(iv) Quantities of fuel, lubricant oil and tires consumed.
(v) Overhauling record.
(vi) Accident report.
(vii) List of deadlined equipment and action being taken to put them back in operation.

No separate payment will be made for the Construction Plant and Equipment. The cost for transportation to and from the Site, installation and removal at the Site, operation, maintenance, repair, depreciation and all other costs required for the Construction Plant and Equipment necessary for the Works shall be deemed to be included in the unit rates and lump sum prices for the appropriate work items stated in the Bill of Quantities.

The Employer has the right to request the Contractor to leave the Construction Plant and Equipment in its site for his use during the period of operation and maintenance, if deemed necessary. The compensation will be determined on the basis of negotiation between the Employer and the Contractor.

(4) Water Supply System

The Contractor shall install, operate, maintain, repair and subsequently remove the temporary water supply system for the Contractor's temporary buildings, Construction Plant and Equipment, Engineer's site office, and other places of the works on the Site according to the Contractor's proposal and layout plans, etc. that have become a part of the Contract. The supply of water shall be piped continuously unless otherwise approved by the Engineer.

The Contractor shall design such temporary water supply system in accordance with the places of the work sites and the buildings that need the water and install the system according to the plans and design. Detailed plans and drawings shall be prepared by the Contractor and submitted to the Engineer for his approval including water source of such water supply system and treatment proposed for meeting the applicable standard of quality of water.

Except otherwise permitted by the authorities concerned and/or directed by the Engineer the existing public water supply may not be available for all or part of the Works, and the Contractor may obtain water from the adjacent river, drains or wells by pumping up with adequate storage furnished at selected places in the Site. The Contractor shall provide suitable systems capable to supply treated water for drinking, washing, sanitation and others as required for the Works.

In case of the water received from the existing public water supply system, the water charges for its consumption shall be paid by the Contractor to the authority concerned, directly.

The charges for the water consumption of the Engineer's site office shall be paid separately by the Contractor directly to the authority concerned and the charges paid by the Contractor shall be added to the subsequent interim payment.

The temporary water supply system shall be operated and maintained by the Contractor until the Certificate of Completion is issued under Clause 48 of the Conditions of Contract, or for such longer period as may be directed by the Engineer.

The Employer has the right to request the Contractor to leave the water supply system in its site for his use during the period of operation and maintenance. In that case, the

equitable adjustment will be done on the basis of negotiation between the Employer and the Contractor.

Costs for depreciation, freight, insurance and others incurred from the transportation of all equipment and materials, erection and installation, and subsequent removal of the temporary water supply system shall be included in the lump sum price for Item No. 0/08 in the Bill of Quantities. Costs for operation, maintenance and repairing of the temporary water supply system shall be deemed to be included in the unit rates or lump sum prices for the respective items of the Bill of Quantities.

Payment to the Contractor will be made at the lump sum price tendered for Item No. 0/08 in the Bill of Quantities in the following manner :

(i) Seventy (70) percent of the lump sum price will be paid when the Engineer certifies that the water supply system has been acceptably installed and has become operational, and

(ii) The remaining thirty (30) percent of the lump sum price will be paid when the Certificate of Completion is issued by the Engineer.

(5) Electric Power Supply System

The temporary electric power supply system shall be designed, installed, operated, maintained, repaired and subsequently removed by the Contractor for efficient execution of the Works.

The Contractor shall check up availability of electric power from the existing power distribution and/or carrier lines conducted by the P.T. Perusahaan Lstrik Negara (PLN) to the point nearest to the work site for bulk supply. The Contractor shall provide for his use all necessary temporary electrical equipment and materials such as transformers, switchgears and distribution lines to transform the supply to suit his needs and shall thereafter distribute the supply to the required locations in accordance with his plans and design.

Emergency power sources such as stand-by generators with sufficient capacities for the execution of the construction works shall also be provided by the Contractor at places where power supply should be secured under any duration of power supply failure in the

main transmission line or in the temporary power supply system to be provided by the Contractor.

The Contractor shall submit his plans and detailed drawings to the Engineer for the approval. The Contractor shall install the temporary electric power supply system with the approval of the Engineer and the P.T. PLN.

Payment to the Contractor will be made by the lump sum price for Item No. 0/09 in the Bill of Quantities in the following manner:

(i) Seventy (70) percent of the lump sum price will be paid when the Engineer certifies that the temporary power supply system has been acceptably installed and has become operational, and

(ii) The remaining thirty (30) percent of the lump sum price will be paid when the Certificate of Completion is issued by the Engineer.

Consumption of electric power received from the existing power lines of the P.T. PLN shall be paid by the Contractor to the P.T. PLN at the rate of current tariff of Rp/kWh basis measured at the higher voltage side of the step-down transformer. Cost for such power consumption paid by the Contractor shall be deemed to be included in the unit rates or lump sum prices for the respective items in the Bill of Quantities.

Power consumed in the Engineer's site office shall be measured separately and the charges paid by the Contractor to P.T. PLN shall be added to the subsequent interim payment from the Employer to the Contractor.

In case of power supply failure from the existing power line, the Contractor shall make his own stand by arrangement and cost of the stand-by generators and generation costs shall be borne by the Contractor.

The costs for the operation and maintenance of the facilities provided by the Contractor shall be also deemed to be included in the unit rates and lump sum prices for the various items in the Bill of Quantities.

The Employer has the right to request the Contractor to leave the temporary electric power supply system in its place for his use during the period of operation and

maintenance. The compensation will be determined on the basis of negotiation between the Employer and the Contractor.

(6) Telecommunication System

The Contractor shall arrange under the supervision of the appropriate authority or undertaking for installation of necessary number of telephone exchanges having necessary number of extensions connected to the public telephone system.

An internal telecommunication system including overhead telecommunication lines at the Site shall be installed, maintained and subsequently removed by the Contractor.

The Contractor shall submit his plans and detailed drawings to the Engineer for the approval of the Engineer. The Contractor shall not install the temporary telecommunication system without the approval of the Engineer.

The temporary communication system shall allow free use of the Employer, the Engineer, their employees and workman, or any persons authorized to be on the Site by the Employer or the Engineer.

The Employer has the right to request the Contractor to leave such system in the places for his use during the period of operation and maintenance. In that case, the equitable adjustment will be done on the basis of negotiation between the Employer and the Contractor.

Payment to the Contractor will be made by the lump sum price for Item No. 0/10 in the Bill of Quantities in the following manner:

(i) Seventy (70) percent of the lump sum price will be paid when the Engineer certifies that such system has been acceptably installed and has become operational, and

(ii) The remaining thirty (30) percent of the lump sum price will be paid when the Engineer issues the Certificate of Completion under Clause 48 of the Conditions of Contract.

Communication charges by the telephone and telex to the outside of the Work Area including international communication shall be paid by the user at the current

tarif to the P.T. TELKOM. The charges paid by the Contractor shall be deemed to be included in the unit rates or lump sum prices for the respective items in the Bill of Quantities.

All costs incurred from the operation and maintenance of such system during the period of the Contract shall be deemed to be included in the unit rates or lump sum prices for the respective items in the Bill of Quantities.

(7) Temporary Construction Roads

The Contractor shall provide and maintain the temporary access/construction roads for approaching to the construction sites, plants, spoil banks and other temporary facilities, including associated drainage and stream crossing facilities in the Site and around the working sites.

Such roads shall be planned, designed and built by the Contractor as may be considered necessary for the efficient execution of the Work. The Contractor shall provide all necessary signs to comply with Clause G7.8, Sign. Reference may be made to Clause 7.11, Chapter 7, Road Work, of the Technical Specifications..

The Contractor shall submit his plans and drawings showing the alignments and roadway structures to the Engineer for his approval and shall not commence the construction of such roads without the Engineer's approval.

Sources of embankment materials and methods of disposal of excavated materials shall also be described in his plans. Type of pavement including metaling shall be optional but the roads shall be constructed to an all-weather standard. Associated drainage and stream crossing facilities shall also be constructed where deemed necessary. The temporary access roads shall be designed, constructed and demolished so as not to interfere with the other contractors' works and public facilities and not to damage the completed Permanent Works.

The roads shall be kept in good condition by watering and grading.

Contractor shall demolish a part or all of the temporary construction roads as directed by the Engineer after those roads have served for the Work.

Where the public roads and or private estate or farm roads may be used by the Contractor for the purpose of access and haul roads, the Contractor shall be liable for making prior arrangement with the public authority concerned and owners, maintenance, restoration, traffic control, security and prevention of life, properties and materials against incidental injury and damage pursuant to Sub-clause 20. (1) (Care of Works), 21. (Insurance of Works, etc.), 22. (1) (Damage to Persons and Property) and 23. (1) (Third Party Insurance) of Vol. II, Part I - General Conditions of the Contract.

The costs for construction, maintenance, and subsequent removal, of the Contractor's temporary access roads will be paid in the lump sum price for Item No. 0/01 stated in the Bill of Quantities. Payment to the Contractor will be made in the following manner:

(i) Seventy (70) percent of the lump sum price will be paid, in progressive proportion of planned length of respective roads to planned total length of all roads, when the Engineer certifies that the respective roads have been constructed as planned and have become serviceable.

(ii) The remaining thirty (30) percent of the lump sum price will be paid when the Certificate of Completion is issued by the Engineer.

(8) Travel and Passage on Public Roadways and Their Maintenance

The Contractor can use and utilize the existing public roadway network including those of the estates and access roads in order to mobilize and subsequently demobilize to execute the Contract. The Contractor shall however acquaint himself with the rules, regulations and restrictions enforced on travel, passage, limits or strictures and loads, etc. by the national and regional authorities concerned.

All of vehicles, Construction Plant and Equipment in type of self-drive equipped with track (caterpillar) shall be prohibited for travel and passage on the public roadway surfaced with flexible pavement such as asphalt coat and bituminous seal except metalling or graveling.

The Contractor shall learn such regulations and restrictions upon travel, passage and loads limits and shall not proceed with transporting works without prior confirmation and approval of the authorities concerned.

The Contractor shall be responsible for maintenance, repairs and restoration of the public roadway and access roads which are used by the Contractor during period of the Contract and shall render to :

(a) maintain always all existing roadway structures, bridges, culverts, drains and waterways,

(b) fill depressions, holes and hollows by approved materials and rectify gradient, surfaces as directed,

(c) maintain all posts, pillars such as fender guide, guard end etc., and road side structures such as guard rails, fences, signs, and so forth,

(d) make roads clean by removing and washing dust, debris, timbers, branches of roadside trees and other trash, and

(e) maintain and repair cut-slope and fill-slope of roadways.

Any works of maintenance, improvement, rectification and the like to the existing public roadway and access roads to the places of the Works made by the Contractor for his own convenience without order or direction of the Engineer shall be considered that the works have been done at his own risk and expense.

Maintenance of the same existing public roadways and access roads to the Site used by the plural contractors shall be carried out by the Contractor who is designated and directed by the Engineer.

All costs incurred from the maintenance, restoration, security and prevention of injury and damage to persons, property, facility and materials, so forth for the public and private roads and access roads used by the Contractor shall be included in the lump sum price for Item No. 0/02 in the Bill of Quantities.

Payment to the Contractor will be made at the lump sum price and to the sum calculated in proportion to the progress rate of the Permanent Works certified by the Engineer on the bi-monthly statement of account.

(9) Security of Existing Public and Private Properties

The Contractor shall be responsible for the security of all the existing water supply conduit and pipes, electric power distribution lines, telephone cables, roadway drains, buildings, land and yard and whatever the utilities, facilities and properties belonging to and/or under control of the public authorities, corporations, legal person and persons and shall have no right to interfere with the reason for execution of the Contract.

All the aforementioned utilities, facilities and properties which have been damaged and/or demolished by failure of the Contractor without prior permission and/or agreement of the authorities concerned shall be restored, recovered and/or replaced at the Contractor's own costs as agreed with or as satisfied by the authorities otherwise specified or directed in the Contract.

No separate payment will be made for the security of existing public and private properties and all costs shall be deemed to be included in the unit rates and lump sum prices for the various items in the Bill of Quantities.

No payment to the Contractor for such costs incurred from the preceded damage and recovery shall be considered by the Employer.

(10) Trespass

In carrying out the Works, the Contractor shall pay attention to properties or interests of the owners or occupants outside the limits of the Site. The Contractor shall construct and maintain temporary fences and the likes to prevent trespass by his employees and the employees of his Sub-contractors and shall be wholly responsible for making good to any loss or damage caused by such trespass.

No separate payment will be made for prevention of trespass and all costs shall be deemed to be included in the unit rates and lump sum prices for the various items in the Bill of Quantities.

(11) First-aid Kit

The Contractor shall provide a registered nurse and maintain a suitably furnished and equipped first-aid kit at the Site, and shall provide one (1) motor ambulance with a driver, to be kept in a convenient location to be approved by the Engineer.

The Contractor shall in all respects be fully responsible for ensuring necessary first-aid services to his staff and all workmen including transport for injured personnel to the hospital or clinic in the nearby city or town as and when required.

The Contractor shall pay all first-aid and clinic charges for his laborers and employees due to accidents that occur on the Works.

The first-aid service shall also be made available free of charge to all of the Employer's staff and their dependents, the Engineer's staff and their dependents and other persons who may be designated by the Engineer.

The Contractor shall, upon completion of the Works or at such other time as the Engineer may direct, dismantle and remove the first-aid kit including its equipment.

The general layout and design of the first-aid kit shall be subject to the approval of the Engineer. The first-aid kit shall be fully operational within ninety (90) days from the date of issuance of the Engineer's written Notice to Proceed.

The lump sum price for Item No. 0/07 in the Bill of Quantities shall cover the costs for provision, supply, installation and subsequent disposal of all furnitures, equipment, drugs and other consumable medical goods required for the first-aid kit, for provision of the ambulance, and costs for construction of any temporary building.

Payment to the Contractor will be made at the lump sum price for Item No. 0/07 in the Bill of Quantities in the following manner:

(i) Seventy (70) percent of the lump sum price will be paid when the Engineer certifies that the first-aid kit has been acceptably furnished and has become operational, and

(ii) The remaining thirty (30) percent of the lump sum price will be paid when the Certificate of Completion is issued by the Engineer.

Costs for providing all staff and driver employed for the operation of the first-aid kit and for maintenance of furniture, equipment and ambulance shall deemed to be included in the unit rates or lump sum prices for the respective items in the Bill of Quantities.

(12) Boreholes and Exploratory Excavation

The Contractor shall at any time during the execution of the Works make boreholes or carry out exploratory excavation and additional cross section survey when the Engineer requires the Contractor to do such exploratory works.

Costs incurred from such exploratory works shall be included in the Provisional Sum for Item No. 0/11 in the Bill of Quantities and shall be added to the subsequent interim payment.

Payment to the Contractor shall be made to the sum calculated by the Provisional Sum for Item No. 0/11 and added to the subsequent bi-monthly statement of account certified by the Engineer. Payment shall be made in accordance with the provisions of Clause 58 (Provisional Sums), in Vol. II, Part I - General Conditions of Contract.

(13) Material Testing Laboratory and Equipment

The Contractor shall provide, operate, maintain, and subsequently remove from the Site a temporary testing laboratory building equipped with items of testing equipment and apparatus to carry out quality control tests on cement, concrete aggregates, concrete, embankment materials, etc. in accordance with the relevant Sections in the Technical Specifications.

The Contractor shall submit detailed drawing of the temporary building including the layout of equipment and facilities for approval by the Engineer before commencing construction.

The laboratory and furnishings shall be of good quality and shall comprise a testing room having a sufficient area to accommodate the testing equipment, one office room of more than 15 m^2 floor area for the Engineer, washing room, store room and lavatory.

The Contractor shall employ a sufficient number of qualified supervisors and laboratory assistants for carrying out the tests as specified. The Contractor shall submit his laboratory management rules to the Engineer for approval prior to the start of any laboratory tests.

The Contractor shall be liable for accuracy of the laboratory equipment, apparatus and test records which shall be submitted to the Engineer for his examination within reasonable time. Testing equipment and apparatus of the laboratory shall conform to the relevant standards specified in Clause G6.1 hereinbefore and shall be available and accessible for the Engineer at all time.

Payment for the provisions of the temporary testing laboratory building will be made at the lump sum price stated for Item No. 0/06 in the Bill of Quantities, which price shall include the cost of construction and removal of the building and appurtenant facilities, and the supply and installation of test equipment and is subsequent removal and cleaning.

No separate payment will be made for management, operation and maintenance of the testing laboratory. All the costs thereof, including cost for staff, labourers, supply of water, fuel, electric power and the consumable materials required for the tests, shall be included in the lump sum price stated for Item No. 0/06 in the Bill of Quantities.

(14) Dewatering System

The Contractor shall design, construct, maintain and subsequently remove a dewatering system for the execution of the Works, including installation, operation and maintenance of dewatering equipment, with sufficient units of standby. The facilities and equipment for the dewatering system shall be subject to the approval of the Engineer.

The Contractor shall also install, maintain, repair and subsequently remove cofferdam, diversion channels, drains, ditches, catch basins, sump-pits and other necessary subsidiaries for making places of the structure, plants, buildings and others in the Site clean and dry at all times.

No separate payment will be made for the dewatering system and all costs shall be deemed to be included in the unit rates or lump sum prices for the respective items in the Bill of Quantities.

Notwithstanding the Contractor's plans and drawings have been approved by the Engineer, the Contractor shall be responsible for dewatering and draining from the places of the Works and liable for any damage caused by flood, inundation, intrusion of ground water and the like.

No additional payment to the Contractor for such damage and no time extension shall be considered. Damage and time loss resulted from flood, inundation and/or intrusion of ground water shall not be deemed to be "Excepted Risk" under Clause 20.(2) provided in the General Conditions of Contract.

(15) Sewerage and Other Pollutants

The Contractor shall supply, install, operate, maintain and subsequently remove the adequate treatment process for disposal of sewerage from all temporary buildings including houses, offices, camps, etc. to be constructed by the Contractor. The Contractor shall construct, operate and maintain at the Site temporary toilet facilities complete with adequate water closets, urinals and hand-basins, septic tanks, absorption trenches or other sewerage disposal installation, for all of his personnel.

The temporary toilet facilities shall meet the requirements of the Government health authority. The location of these facilities and their construction shall be as approved by the Engineer. Sewerage from temporary facilities shall be disposed of in hygienic manner as approved.

The Contractor shall take all reasonable precautions to prevent silting, erosion of beds and banks and pollution of rivers, streams and watercourses; and interference with the supply to or abstraction from underground water sources and pollution of the water.

The Contractor shall prevent pollution of river water arising from his operations and in particular prevent its contamination by toxic chemical substance, sewage, oil, greases, etc., silt, cement, dust and other sediment.

The Contractor shall construct stilling pools or other approved works in order to ensure the cleanliness of water discharged into rivers. The Contractor shall keep the Employer indemnified against all claims arising from any pollution of rivers.

If any accidental pollution of any river should occur, the Contractor shall report the fact as quickly as possible to the Engineer and in no circumstances later than 24 hours.

Separate payment will not be made for the sewerage and all costs shall be deemed to be included in the unit and lump sum prices in the Bill of Quantities.

(16) Soil Conservation

All precautions shall be taken by the Contractor to prevent the erosion of soil from any lands used or occupied by the Contractor for the purpose of the Temporary Works and of the bed or banks of any river or stream and the deposition of excavated or eroded material in any river or stream that may result from the execution of the Works.

If in the opinion of the Engineer, the Contractor's operations in areas other than the Permanent Works, cause erosion hazards after removal of such works or reinstatement to the original, the Contractor shall undertake soil conservation measures in these areas as directed by the Engineer. The method of soil conservation measures shall be submitted by the Contractor to the Engineer for his approval prior to the execution of the said works. All soil conservation measures shall be carried out at the earliest possible time, as approved by the Engineer, to ensure that the required protection is established by the time of completion of the Works.

No separate payment will be made for the soil conservation and such costs shall be deemed to be included in the respective unit or lump sum prices in the Bill of Quantities.

(17) Danger of Floatation

The Contractor's attention is drawn to the danger of floatation of structures forming parts of the Works during the course of execution of the Contract. Although this can not occur with any finished structures, it can not be ruled out during the period of construction. The Contractor shall, therefore, furnish all plans and precautions proposed to be adopted for protection of structures from floatation during construction. If so desired, the Engineer may advise the Contractor to provide additional safety measures against floatation of structures during construction. In no case, however, the Contractor shall be relieved of his responsibility towards safety of structures during construction. Damage and time loss resulting from the above condition shall not be deemed to be "Excepted Risk" under Sub-clause 20.(2) provided in the General Conditions of Contract. The Contractor shall dismantle and remove from the Site all such safety measures after completion of the Works.

(18) Site Clearance for Acquired Houses and Other Buildings

The Contractor shall remove, after seeking prior approval of the Engineer, houses and other buildings acquired for implementation of the Project. All houses and other buildings to remain in place shall be protected from damage.

All combustible materials from clearing operations shall be burned or removed from the Site or otherwise disposed of as directed by the Engineer.

All materials to be burned shall be piled neatly. Piling for burning shall be done in such a manner and in such locations as to cause the least fire risk. All burning shall be so thorough that the cleared materials are reduced to ashes. The Contractor shall at all times take special precautions to prevent fire from spreading to areas beyond the limits of the cleared areas and shall have available at all times, suitable equipment and supplies for use in preventing and fighting fires in accordance with the provisions of Clause G7.6 of Vol. III, Part I - General Specifications.

Measurement, for payment, for such site clearing for acquired houses and other buildings will be made on the basis of the total designated surface area in square meters as directed by the Engineer.

Payment for site clearing work shall be made at the unit price stated in Item No. 0/17 in the Bill of Quantities to the area in square meters and so certified by the Engineer. The unit price shall include all costs of equipment, tools, materials and manpower required to complete the works.

(19) Transport Facilities

The Contractor shall provide the Engineer's staff with transport consisting of the following vehicles :

Description	Quantity
4-wheel drive, long wheel base	2 nos.
Motor bicycle, 90 cc	4 nos.

All the vehicles listed above shall be brand new and shall conform to the specifications stipulated in Annex - GS (2) hereof; and shall be, within ninety (90) days from the

receipt of the Letter of Acceptance, supplied to the Engineer at the Site. Should any vehicle at any time become, in the opinion of the Engineer, unserviceable, the Contractor shall replace it by a new one without delay.

Payment to the Contractor will be made by the lump sum price for Item 0/15 in the Bill of Quantities. The lump sum price will be paid, eighty (80) percent when the Engineer certifies that the vehicles have been acceptably delivered to the Engineer and have become operational and the balance twenty (20) percent when the Engineer certifies that the vehicles have been restored fully along with requisite spares at the end of the Contract.

All costs incurred from the driver's wage, fuel, repair, maintenance and costs of the replacement, its comprehensive insurance and registration, etc. shall be paid by the Contractor during the Contract period and shall be deemed to be included in the unit rates and lump sum prices in the Bill of Quantities. At the completion of the Contract, the above mentioned vehicles shall be the property of the Engineer. If components or parts of the vehicles in due course wear out or failed during the construction and maintenance period, these components or parts must be replaced and no separate payment will be considered for these replacements.

In addition to the above, parts book, instruction manual and spare parts equivalent to an amount of ten (10) percent of the vehicle's purchase price shall be provided by the Contractor for each vehicle at the time of transfer.

G.9 PARTICULAR ITEMS

G9.1 Performance Security

The Contractor shall furnish a Performance Security in accordance with Sub-Clause 7.(1) of the General Conditions of Contract.

No separate payment will be made for the Performance Security which provides for the cost of complying with the requirements of the General Conditions of Contract. All the costs thereof shall be included in every items of the Bill of Quantities.

G9.2 Insurances

The Contractor shall insure the Works and the Construction Plant and Equipment in accordance with Clause 21 of the General Conditions of Contract, and shall provide the insurance policies to the Employer in accordance with Sub-clause 25.(1) of the General Conditions of Contract.

The Contractor shall obtain Third Party Insurance (including Employer's Property) in accordance with Sub-Clause 23.(1) of the General Conditions of Contract, and shall provide the insurance policies to the Employer in accordance with Sub-Clause 25.(1) of the General Conditions of Contract.

The Contractor shall insure against accident or injury to workmen in accordance with Sub-Clause 24.(2) of the General Conditions of Contract, and shall provide the insurance policy to the Employer in accordance with Sub-Clause 25.(1) of the General Conditions of Contract.

G9.3 Payment

All costs incurred by the Contractor in complying with requirements of Clauses 21, 23, 24 and 25 in Vol. II, Part I - General Conditions of Contract shall be deemed to be included in the lump sum price, Item No. 0/12, tendered therefor in the Bill of Quantities.

One hundred (100) percent of the total lump sum price for the insurances tendered in Item No. 0/12 will be made upon the Engineer's approval for the contract with insurers

accompanied with the policies of all the insurances and receipts for payment of premium for the Works, Third Parties and against accident to workmen.

G.10 SURVEY EQUIPMENT

G10.1 General

The Contractor shall supply the following survey equipment which are to be used by the Engineer for his own survey works:

Description	Quantity
Transit w/tripod	1 set
Auto-level w/tripod	1 set

All the survey equipment listed above shall be brand new. Detailed specifications of the survey equipment required will be furnished by the Engineer later. The equipment shall be, within ninety (90) days from the receipt of the Letter of Acceptance, supplied to the Engineer at the Site. Should any survey equipment at any time become, in the opinion of the Engineer, unserviceable, the Contractor shall replace it by a new one without delay.

G10.2 Payment

Payment to the Contractor will be made by the lump sum price for Item No. 0/14 in the Bill of Quantities. The lump sum price will be paid, eighty (80) percent when the Engineer certifies that the survey equipment has been acceptably delivered to the Engineer and has become operational and the balance twenty (20) percent when the Engineer certifies that the survey equipment has been restored fully at the end of the Contract.

ANNEX

SYMBOLS AND ABBREVIATIONS

Symbols and abbreviations used in the Specifications are generally in accordance with the following list. Symbols for units of measurement basically conform to the SI System.

1. Length, area and volume

m	micron = m x 10^{-6}
mm	millimetre
m	metre
km	kilometre
mm^2	square millimetre
m^2	square metre
km^2	square kilometre
ha	hectare
m^3	cubic metre
l	litre
rad	radian

2. Time and time derived units

s	second
min	minute
h	hour
d	day
mm/s	millimetres per second
m/s	metres per second
km/h	kilometres per hour
m/s^2	metres per second squared (acceleration)
m^3/s	cubic metres per second
Hz	hertz (periods per second)

3. Mass, force and derived units

kg	kilogram
g	gram = kg x 10^{-3}
mg	milligram = kg x 10^{-6}
mg/l	milligrams per litre
t	tonne = kg x 10^3 (metric ton)
kg/m^3	kilograms per cubic metre

t/m^3	tonnes per cubic metre
N	newton
N/m^2	newton per square metre = 1 Pa
bar	bar = $N/m^2 \times 10^5$
Pa	pascal = 1 N/m^2
	(1 MPa = 9.807 $kgf/c\ m^2$ in gravity unit)
atm	standard atomosphere = 101325 Pa
J	joule = 1 Nm (newton-metre)
KJ	kilojoule = $J \times 10^3$
W	watt = 1 J/s
kW	kilowatt = $W \times 10^3$
MW	megawatt = $W \times 10^6$
C	degrees Celsius

4. Electrical units

A	ampere
V	volt
kVA	kilovolt ampere
kWh	kilowatt hour

5. Other symbols and abreviations

AC	alternating current
approx.	approximately
bhp	brake horse power
CIF	cost, insurance and freight
DC	direct current
dia. or diam.	diameter
fig.	figure
FOB	free on board
hp	horsepower
horiz.	horizontal
HT	high tensile (steel)
HV	high voltage (cables)
LV	low voltage
max.	maximum
min.	minimum
no.	number (units) as in 6 no.

No.	number (order) as in No. 6
OPC	ordinary Portland cement
ppm	parts per million
RH	rapid hardening (Portland cement)
rev	revolution
temp.	temperature
veh.	vehicle
vert.	vertical
vol.	volume
w/c	water cement (ratio)
wt	weight
%	percent
u/s	upstream
d/s	downstream

CONSTRUCTION TIME SCHEDULE (GUIDE DATES)

Construction time schedule for the whole works of each Package of the Project has been prepared by the Employer and is given in the Tender Documents to assist the Tenderer and Contractor in preparing their detailed construction time schedules, and to show the dates when various parts of the works are to be ready to receive the related equipment. The following dates from the Commencement Date shall be considered as a general guide and shall be included in all programmes to be prepared by the respective Contractors.

Commencement date for Packages - 1	**May 2000**
Completion of access roads	3 months
Completion of all works	48 months
Commencement date for Package - 2	**Jauary 2003**
Start of Embankment, dump fill	3 months
Completion of all works	27 months
Commencement date for Packages - 3	**January 2004**
Completion of access roads	3 months
Start of excavation	2 months
Completion of all works	36 months

ANNEX (To Clause G8.3 (19)) ANNEX - GS (2)

SPECIFICATIONS FOR VEHICLES

I. 4 - WHEEL DRIVE, LONG WHEEL BASE

(1) General : The equipment shall be a 4-wheel drive car having a seating capacity of 6 persons and right hand drive. The wheel base shall be not less than 2.7 m.

(2) Engine : The equipment shall be powered by a water-cooled, multicylinder, 6-stroke-cycle gasoline engine with an output of 130 PS or more. The engine shall be equipped with an electric engine starting system and a dry type air cleaner.

(3) Clutch : The clutch shall be dry, single plate, and foot operated.

(4) Power Transmission : The equipment shall be provided with a transmission with at least 4 forward and 1 reverse speed, and a 2-speeds transfer case for 4-wheel drive. The shifting levers shall be floor type.

(5) Brake : The equipment shall be provided with hydraulic service brake with power assistance and mechanical parking brakes.

(6) Spring and Shock Absorber : The equipment shall be provided with front and rear leaf springs and shock absorbers.

(7) Body : The equipment shall be provided with a hard top, four side doors and swing-out type rear doors. The rear seats shall be inward folding type.

(8) Type : The equipment shall be provided with off-the-road tyres of 7.50-16-6 PR or equivalent and 1 complete set of spare wheel with tyre on mounting bracket.

(9) Fuel Tank : The capacity of fuel tank shall not be less than 70 liters and the cap shall be lockable.

(10) Electric System : The electric system shall be tropically insulated.

(11) Accessories : The equipment shall be provided with a heavy duty front bumper, pull hooks in front and trailer hitch in rear, windshield wiper and washer, rearview mirror, sun visor, cooler, lighting system and other standard accessories.

(12) Tools : The standard maintenance tool kit including hydraulic jack and tool bag shall be furnished with the equipment.

TABLES

Table 1 Temperature in Jakarta

Station: Jakarta, Seokarno-Hatta International Airport

Monthly Mean Temperature

(unit: Celcius degree)

Month	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	Mean
Jan.	26.0	25.8	26.5	26.2	25.8	26.1	26.2	25.9	25.0	26.5	25.9	26.0
Feb.	26.1	25.8	26.5	25.4	26.4	25.9	26.3	25.9	26.2	26.2	26.0	26.1
Mar.	26.4	26.7	26.9	26.3	26.5	26.7	26.8	26.3	26.0	26.2	26.6	26.5
Apr.	26.9	27.0	27.3	26.8	27.3	26.7	26.8	26.5	26.6	27.0	27.0	26.9
May	27.1	27.2	27.3	26.8	27.0	27.0	27.1	27.0	26.4	27.3	27.1	27.0
Jun.	26.8	27.2	26.6	26.5	26.6	26.8	26.9	26.7	26.5	26.9	27.0	26.8
July	26.0	26.6	26.4	26.5	26.1	26.5	26.2	26.6	25.6	26.4	27.0	26.4
Aug.	25.7	26.2	26.4	26.5	26.2	26.2	26.3	26.5	25.8	26.6	26.8	26.3
Sep.	26.1	26.9	26.9	26.8	26.7	26.8	26.5	26.6	26.3	26.6	26.9	26.6
Oct.	26.7	27.9	26.9	29.0	27.5	27.4	26.3	27.0	27.4	27.0	-	27.3
Nov.	26.3	27.7	27.1	27.2	27.7	27.4	26.3	26.7	27.6	26.4	-	27.0
Dec.	26.8	26.8	25.9	26.4	26.5	26.6	26.2	26.6	27.1	26.3	-	26.5

Monthly Maximum Temperature

(unit: Celcius degree)

Month	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	Max
Jan.	31.6	32.2	32.4	31.4	32.1	31.4	32.4	31.8	31.2	32.4	32.1	32.4
Feb.	32.6	32.0	32.4	30.2	32.8	31.4	33.5	31.6	32.0	32.0	31.0	33.5
Mar.	32.6	33.2	33.4	32.8	33.6	31.8	32.2	33.7	33.0	32.0	32.1	33.7
Apr.	33.4	32.8	33.5	34.2	34.5	33.4	33.4	33.2	32.4	33.2	34.8	34.8
May	33.4	34.2	33.3	32.2	34.9	33.4	33.0	33.2	32.8	33.2	33.1	34.9
Jun.	33.6	33.2	33.1	33.4	33.0	34.4	32.8	33.2	32.7	32.9	33.2	34.4
July	33.9	32.8	32.5	33.2	32.6	33.2	32.4	32.4	32.3	32.1	32.7	33.9
Aug.	32.6	33.6	33.2	32.6	32.2	33.2	32.1	33.0	33.0	33.2	32.8	33.6
Sep.	32.7	33.4	33.8	33.9	32.8	34.2	32.7	33.5	34.2	33.2	33.2	34.2
Oct.	33.2	35.2	34.2	34.2	34.0	34.9	33.0	33.2	35.0	33.1	-	35.2
Nov.	33.5	35.2	34.4	33.6	35.2	33.4	33.0	33.6	34.4	32.8	-	35.2
Dec.	32.8	33.5	33.5	31.8	32.5	33.6	33.2	33.0	33.6	33.4	-	33.6
Max.	33.9	35.2	34.4	34.2	35.2	34.9	33.5	33.7	35.0	33.4	34.8	35.2

Monthly Minimum Temperature

(unit: Celcius degree)

Month	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	Min
Jan.	20.2	22.0	21.9	20.0	22.2	22.8	22.1	22.4	22.0	22.6	22.0	20.0
Feb.	21.6	21.6	22.4	22.0	22.6	22.8	22.0	22.0	21.6	22.4	21.4	21.4
Mar.	22.4	22.8	22.9	21.8	22.7	22.8	23.0	22.0	22.7	22.6	22.0	21.8
Apr.	22.3	22.9	21.0	22.4	22.8	22.6	22.9	22.1	22.6	22.8	22.7	21.0
May	20.5	22.6	23.2	22.0	22.5	22.3	22.4	22.4	21.0	22.2	22.1	20.5
Jun.	21.3	22.2	21.6	21.6	21.0	20.3	21.6	22.0	21.0	22.9	21.6	20.3
July	18.5	21.3	21.3	21.2	20.7	20.6	21.0	21.6	18.6	21.8	22.0	18.5
Aug.	18.5	19.9	21.4	21.2	21.8	21.2	21.5	21.4	17.4	21.4	21.7	17.4
Sep.	20.0	20.6	21.2	21.9	21.6	20.8	21.8	21.3	19.7	21.4	21.6	19.7
Oct.	21.4	22.4	22.4	22.2	22.0	21.4	22.5	22.0	21.2	22.8	-	21.2
Nov.	21.8	23.0	22.9	22.0	22.0	22.6	22.1	22.0	22.8	22.5	-	21.8
Dec.	22.2	22.0	21.0	22.4	22.4	22.3	21.7	22.2	22.6	22.3	-	21.0
Min	18.5	19.9	21.0	20.0	20.7	20.3	21.0	21.3	17.4	21.4	21.4	17.4

Table 2 Relative Humidity in Jakarta

Station : Jakarta, Soekarno-Hatta International Airport

Monthly Mean Relative Humidity

(unit: %)

Month	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	Mean
Jan.	88	87	86	87	88	88	88	88	88	87	86	87
Feb.	86	88	85	88	87	89	88	87	86	87	88	87
Mar.	85	84	85	84	86	87	87	83	87	87	85	85
Apr.	85	84	84	82	83	87	86	85	85	85	80	84
May	83	82	86	86	83	84	86	84	82	84	81	84
Jun.	83	81	83	83	83	93	83	84	80	85	79	83
July	82	79	80	81	83	80	82	81	78	83	79	81
Aug.	82	76	81	83	85	80	82	82	76	80	80	81
Sep.	83	76	78	80	82	77	83	79	75	80	80	79
Oct.	83	76	81	79	80	77	85	80	75	83	-	80
Nov.	84	77	81	80	80	83	83	83	79	85	-	82
Dec.	83	84	85	86	87	86	85	84	82	84	-	85

Monthly Maximum Relative Humidity

(unit: %)

Month	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	Max
Jan.	98	98	100	100	98	99	98	98	98	98	98	100
Feb.	98	98	98	100	98	98	98	98	99	98	99	100
Mar.	97	98	98	98	99	98	98	98	98	98	99	99
Apr.	98	98	98	98	100	98	98	98	98	97	98	100
May	98	98	98	99	98	99	98	100	98	98	97	100
Jun.	98	98	99	98	98	98	98	98	98	98	98	99
July	98	98	99	98	98	97	98	98	98	98	97	99
Aug.	98	97	98	98	98	99	98	98	97	97	98	99
Sep.	100	97	98	98	98	98	98	98	98	97	98	100
Oct.	98	97	98	98	98	97	99	98	98	97	-	99
Nov.	98	97	97	97	98	99	98	98	98	98	-	99
Dec.	98	98	98	98	99	98	99	97	98	97	-	99
Max.	100	98	100	100	100	99	99	100	99	98	99	100

Monthly Minimum Relative Humidity

(unit: %)

Month	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	Min
Jan.	64	62	53	63	64	65	67	66	59	60	57	53
Feb.	56	62	59	68	60	65	59	62	57	59	65	56
Mar.	58	58	55	58	63	63	54	54	57	58	57	54
Apr.	60	58	49	48	52	59	50	57	54	56	49	48
May	57	49	63	60	41	55	52	51	53	54	51	41
Jun.	53	50	49	49	53	49	51	54	51	58	56	49
July	46	43	47	45	54	47	50	52	39	50	44	39
Aug.	42	42	51	52	54	49	50	49	36	49	48	36
Sep.	55	44	48	43	51	47	55	41	40	45	52	40
Oct.	55	46	49	49	54	48	58	49	43	56	-	43
Nov.	53	40	50	52	51	50	55	53	52	59	-	40
Dec.	55	53	51	61	62	59	51	56	51	59	-	51
Min	42	40	47	43	41	47	50	41	36	45	44	36

Table 3 Prevailing Wind in Jakarta

Station: Jakarta, Seokarno-Hatta International Airport

Monthly Mean Speed of Prevailing Wind

(unit: Knots, 1Knot=1.852m/h)

Month	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	Mean
Jan.	6	5	4	4	5	7	5	6	7	6	7	6
Feb.	4	4	5	6	5	7	5	6	7	6	7	6
Mar.	5	4	5	8	6	5	5	5	5	6	5	5
Apr.	4	4	6	7	5	5	5	4	5	5	5	5
May	4	5	5	5	6	5	5	4	5	5	5	5
Jun.	4	4	5	6	5	5	6	5	5	5	5	5
July	4	4	5	6	5	6	6	5	5	5	5	5
Aug.	4	4	5	5	6	6	5	6	7	5	6	5
Sep.	4	5	6	5	6	6	5	5	5	5	5	5
Oct.	4	5	6	5	7	6	4	5	6	5	-	5
Nov.	5	5	5	7	6	5	4	5	5	5	-	5
Dec.	4	6	7	5	6	5	7	6	6	7	-	6

Monthly Maximum Speed of Prevailing Wind

(unit: Knots, 1Knot=1.852m/h)

Month	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	Max
Jan.	18	18	18	28	38	42	50	54	60	52	46	60
Feb.	24	18	18	28	22	46	50	54	60	52	52	60
Mar.	24	16	28	42	32	50	34	44	44	42	38	50
Apr.	16	18	22	36	26	44	50	42	40	58	38	58
May	18	20	40	18	38	40	36	38	46	60	52	60
Jun.	25	20	22	28	20	49	36	42	40	46	38	49
July	18	16	22	26	36	28	44	36	38	46	42	46
Aug.	20	18	24	28	40	36	36	38	42	34	46	46
Sep.	20	18	24	24	40	26	44	38	34	42	44	44
Oct.	20	24	34	22	46	28	39	44	42	44	-	46
Nov.	28	22	28	26	52	38	46	52	40	56	-	56
Dec.	16	20	34	30	48	70	48	56	50	46	-	70
Max.	28	24	40	42	52	70	50	56	60	60	52	70

Direction of Prevailing Wind

Month	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Jan.	NW	NW	NW	N	W	W	N	W	NW	W	N
Feb.	NW	NW	W	W	W	SW	N	W	NW	W	NW
Mar.	NW	NW	W	W	W	E	NE	N	W	W	NE
Apr.	NE	E	E	W	NE	W	NE	SW	N	E	NE
May	SE	S	SW	S	NE	E	NE	E	E	N	NE
Jun.	E	E	E	SW	SE	E	NE	E	NE	N	NE
July	E	E	E	E	S	E	E	E	NE	E	NE
Aug.	NE	E	S	N	NE	E	S	E	E	NE	NE
Sep.	NW	E	NE	N	S	E	SW	NE	NE	NE	NE
Oct.	NW	NE	SW	S	S	NE	W	NE	NE	NE	-
Nov.	W	W	W	W	SW	S	N	W	NE	SW	-
Dec.	NW	SW	W	N	W	SW	W	W	W	W	-

Table 4 Rainfall in Jakarta

Station: Jakarta, Seokarno-Hatta International Airport

Monthly Rainfall

(unit: mm/month)

Month	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	Mean
Jan.	503	644	371	209	533	349	398	494	392	403	346	422
Feb.	369	384	227	441	174	394	198	345	328	328	546	339
Mar.	195	104	106	155	73	197	255	88	341	198	116	166
Apr.	164	116	73	68	106	241	108	108	146	131	172	130
May	77	89	276	208	162	22	140	74	34	98	124	119
Jun.	23	13	67	41	57	30	78	54	40	112	57	52
July	93	68	17	51	124	-	35	41	-	115	74	69
Aug.	268	-	50	4	153	10	114	60	-	18	36	79
Sep.	124	5	17	64	57	-	88	36	-	48	105	60
Oct.	58	5	98	35	35	6	107	71	1	102	-	52
Nov.	114	81	52	35	29	91	131	102	102	244	-	98
Dec.	237	280	313	284	325	117	278	177	55	250	-	232
Total	2,225	-	1,667	1,595	1,828	-	1,930	1,650	-	2,047	-	1,818

Maximum Daily Rainfall

(unit: mm/day)

Month	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	Max
Jan.	175	189	101	56	83	58	116	101	58	77	86	189
Feb.	133	118	47	71	36	98	50	136	85	50	107	136
Mar.	110	35	43	40	20	91	58	17	85	44	42	110
Apr.	46	45	27	15	27	58	48	25	31	35	55	58
May	58	55	57	78	56	15	41	37	21	39	55	78
Jun.	6	10	30	14	29	24	16	18	27	37	26	37
July	32	27	14	22	39	-	15	18	-	76	73	(76)
Aug.	77	-	22	2	43	10	67	39	-	18	15	(77)
Sep.	47	4	7	50	55	-	36	18	-	22	35	(55)
Oct.	26	5	23	23	19	6	25	50	1	38	-	(50)
Nov.	23	34	15	8	11	52	22	39	42	67	-	(67)
Dec.	79	71	87	86	77	28	108	39	16	80	-	(108)
Max	175	(189)	101	86	83	(98)	116	136	(85)	80	(107)	189

Rainy Days

(unit: days/month)

Month	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	Mean
Jan.	22	27	21	14	26	25	16	23	25	24	16	22
Feb.	14	22	12	25	15	21	16	14	16	23	24	18
Mar.	13	11	13	16	10	10	14	12	19	23	11	14
Apr.	12	12	6	12	12	13	8	13	14	13	14	12
May	4	5	13	13	13	4	11	7	3	9	8	8
Jun.	8	2	7	7	8	3	11	7	5	11	4	7
July	8	4	2	8	9	-	4	6	-	9	3	(6)
Aug.	9	-	9	3	12	1	7	7	-	3	7	(6)
Sep.	12	2	3	3	2	-	6	6	-	6	8	(5)
Oct.	8	1	11	7	5	1	17	7	2	10	-	7
Nov.	16	7	14	10	7	11	16	11	9	19	-	12
Dec.	9	16	19	20	21	15	16	15	12	14	-	16
Total	135	-	130	138	140	-	142	128	-	164	-	140

Table 5 Elevation of Bench Marks (1)

Bench Mark No.	Elevation (m)	Remarks
TTG.281	14.131	Reference point
TTG.280(NWP.514)	11.969	Reference point
TTG.177(NWP.60)	40.138	Reference point
TTG.279	13.090	Recovered point
TTG.278	6.841	Recovered point
TTG.276	5.144	Recovered point
TTG.275(PP.743)	3.503	Recovered point
TTG.271(PB.012)	2.137	Recovered point
TTG.270A	3.414	Recovered point
TTG.260(PP.809)	2.507	Recovered point
PP.101A	1.348	Recovered point
PP.103A	0.932	Recovered point
PP.107A	0.772	Recovered point
PP.1088B	11.566	Recovered point
PP.108A	1.124	Recovered point
PP.1110B	5.368	Recovered point
PP.1114B	2.910	Recovered point
PP.1271B	2.342	Recovered point
PP.1299B	3.014	Recovered point
PP.1302B	3.345	Recovered point
PP.316	0.012	Recovered point
PP.407	58.453	Recovered point
PP.701	1.881	Recovered point
PP.707	2.256	Recovered point
PP.716	3.132	Recovered point
PP.722A	2.947	Recovered point
PP.733B	5.250	Recovered point
PP.745A	4.153	Recovered point
PP.765	2.484	Recovered point
PP.767	3.097	Recovered point
PP.814B	4.031	Recovered point
PP.815B	3.304	Recovered point
PP.822	6.454	Recovered point
PP.823B	5.774	Recovered point
PP.824B	4.355	Recovered point
PP.845A	6.313	Recovered point
PP.876A	9.642	Recovered point
PP.1290B	3.146	Recovered point
PP.1291B	2.149	Recovered point
PP.1296B	3.282	Recovered point
PP.1300B	3.232	Recovered point
BATAS(TP)	5.550	Recovered point
DKI.1058	4.607	Recovered point
DKI.1082	4.219	Recovered point
DKI.1167	3.213	Recovered point
DKI.127	3.026	Recovered point
DKI.389	4.783	Recovered point

Table 6 Elevation of Bench Marks (2)

DKI.521	5.959	Recovered point
DKI.535	1.034	Recovered point
DKI.580	4.333	Recovered point
DKI.671	4.474	Recovered point
DKI.701	3.515	Recovered point
DKI.704	2.472	Recovered point
DTK.094	3.350	Recovered point
DTK.258	0.403	Recovered point
DTK.372	8.489	Recovered point
DTK.384	10.064	Recovered point
DTK.960	3.118	Recovered point
CF.0	2.418	Recovered point
BM.01	1.703	Recovered point
BM.02	0.574	Recovered point
BM.06	3.204	Recovered point
BM.09	0.641	Recovered point
GPS.1005	1.968	Recovered point
GPS.1005A	3.577	Established point
GPS.2034	9.320	Established point
96001	1.574	Established point
96002	1.679	Established point
96003	2.178	Established point
96004	3.898	Established point
960041	4.194	Established point
96006	2.452	Established point
96007	1.547	Established point
96008	0.891	Established point
96009	1.348	Established point
96010	1.948	Established point
96011	0.013	Established point
96012(BATAS)	0.918	Recovered point
96014	2.074	Established point
96015	1.950	Established point
96016	1.933	Established point
96017	0.853	Established point
96018	3.270	Established point
96019	2.717	Established point
96020	1.846	Established point
96021(GPS.2030)	5.656	Established point
96022(GPS.2031)	4.074	Established point
96023	5.621	Established point
96024	7.037	Established point
96025	11.194	Established point
96026(HL.23)	1.906	Recovered point
96027(HW.2)	1.411	Recovered point

Table 7 Coordinates of GPS Points

Point No.	North(m)	East(m)	Height(m)*	Remarks
1002	9,319,222.72	688,525.64	3.54	Reference Point
1005	9,318,745.17	691,122.74	1.00	Reference Point
1006	9,322,254.90	694,141.55	0.62	Reference Point
1008	9,326,097.42	690,431.26	0.06	Reference Point
1011	9,312,998.14	699,713.56	9.63	Reference Point
2026	9,322,291.24	691,443.37	1.55	
2027	9,321,833.06	691,433.31	1.18	
2028	9,318,285.96	693,504.96	3.26	
2029	9,318,129.35	693,165.65	1.20	
2030	9,315,714.29	693,216.78	3.32	
2031	9,315,445.60	693,155.15	4.77	
2032	9,312,193.22	694,474.77	16.73	
2033	9,312,235.48	694,095.31	10.86	
2034	9,314,571.85	691,155.41	8.30	
2035	9,314,879.80	691,394.48	10.87	
2036	9,320,707.80	687,981.99	3.73	
2037	9,321,090.58	688,117.23	4.10	
2038	9,323,301.89	688,023.13	2.22	
2039	9,322,785.00	688,578.89	2.20	
1005A	9,319,235.24	691,098.80	1.63	
1006A	9,321,936.63	694,056.50	0.79	
1008A	9,325,962.77	690,175.47	0.10	
W1-1-1	9,323,208.91	691,590.29	-0.52	Recovered Point
W1-1-2	9,323,347.95	691,679.05	-0.31	Additional Point
W2-1R	9,314,855.14	691,763.67	9.15	Recovered Point
W2-2R	9,314,619.89	691,869.78	7.40	Recovered Point

Note * Height of GPS points is indirect level to calculated using the earth ellipsoid (WGS-84)

Table 8 Physical Properties of Soils

Hole	Depth (m)	Type of Soil	Gs	Wn (%)	gn t/m3	gd (t/m3)	gsat (t/m3)	en	n (%)	Sr (%)	Wsat (%)	% Fines (%)	%Clay (%)	LL (%)	PL (%)	PI (%)
A-1	6.45-7	sandy silt	2.752	43.85	1.56	1.087	1.692	1.533	60.5	78.73	55.7	62.1	22	59.7	24.3	35.3
	8.45-9	clay	2.729	98.07	1.462	0.738	1.468	2.697	72.953	99.226	98.8	94.1	34	145.4	35.9	109.5
	14.45-15	sady silt	2.738	47.44	1.676	1.137	1.722	1.409	58.48	92.21	51.45	64.4	6	55.3	26.2	29.1
	18.45-19	silty clay	2.711	57.93	1.676	1.061	1.67	1.555	60.86	101.02	57.54	97.5	41	95.6	29.4	76.2
	21-22	silty sand	2.71	42.2	1.54	1.085	1.685	1.498	59.96	76.38	55.26	92.2	52	106.5	48.2	58.3
	23.45-24	silty clay	2.661	42.79	1.819	1.274	1.795	1.089	52.13	104.57	40.9	92.8	41	84.2	30	54.2
	28.45-29	clay	2.768	41.14	1.846	1.308	1.835	1.116	52.75	102	40.53	95.1	42	112.4	27.7	84.7
	33.45-34	clay	2.57	45.44	1.789	1.23	1.751	1.089	52.14	107.2	42.39	97.6	40	129	27.8	101.3
B-1	2.4-2.9	silty sand	2.755	28	1.65	1.29	1.8	1.136	53.17	67.9	41.22	30	11	40.7	16.1	24.6
	4.45-5	sandy silt	2.666	43.16	1.907	1.332	1.832	1.001	50.04	115	37.56	54.8	4	113.1	34.7	78.3
	9.45-10	silty clay	2.78	71.52	1.43	0.834	1.534	2.334	70.01	85.17	83.97	92.7	29	91.1	24.1	67
	14.45-15	clayey silt	2.688	65.09	1.606	0.973	1.611	1.763	63.81	99.23	65.59	92.7	38	104.6	45.7	59
	17-17.5	silty clay	2.662	52.18	1.699	1.116	1.697	1.384	58.06	100.34	52	76.6	18	117.4	38.6	78.8
	21.5-21.7	silty clay	2.685	41.44	1.685	1.191	1.743	1.231	55.18	89.5	46.3	94.9	60	132.6	36.4	96.2
	28.45-29	clay/silt	2.629	23.86	1.895	1.53	1.948	0.781	41.8	87.3	27.3	95.8	60	94.5	24.2	70.3
B-2	4.45-5	clay	2.48	59.62	1.617	1.013	1.605	1.448	59.15	102.1	58.39	97.6	44	84.5	28.8	55.7
	10-10.55	clay	2.663	52.11	1.661	1.092	1.682	1.439	59	96.45	54.02	69	16	70.9	29	42
	11-11.7	clayey silt	2.686	49.9	1.501	1.002	1.629	1.682	62.7	79.6	62.62	78.9	35	82.1	40.4	41.7
	15-15.35	sand/clay /silt	2.722	44.9	1.71	1.18	1.747	1.307	56.6	93.54	48	64.5	8	66.2	26.5	39.7
	22.45-22.9	clay + silt, sandy	2.633	55.56	1.669	1.073	1.665	1.454	59.25	100.6	55.23	76.9	24	95.4	27.7	67.7
	25-25.35	clay + silt	2.733	64.7	1.636	0.993	1.63	1.751	63.66	101	64.01	90	37	101	32.3	68.6
C-1	5.5-5.9	clay	2.554	63.08	1.607	0.985	1.6	1.592	61.42	101.2	62.33	95.2	38	91.1	30.4	60.7
	10.6	silty sand	2.727	26.23	1.753	1.389	1.879	0.964	49.1	74.23	35.34	36.4	5			
	15-15.3	silty clay	2.571	55.15	1.651	1.064	1.65	1.416	58.61	100.1	55.08	85.8	20	91.7	28.1	63.6
	19-19.25	silty clay	2.428	59.25	1.558	0.978	1.575	1.482	59.7	97.1	61.03	90.9	18	108.9	38.8	70.1
D-1	5-5.3	silt + clay, sandy	2.454	78.61	1.495	0.857	1.496	1.932	65.9	99.8	78.72	83	18	72.3	34.8	37.6
	12-13	silty sand	2.775	30.1	1.879	1.445	1.924	0.921	47.94	90.61	33.19	21.8	3			
O-1	5-5.45	silty clay	2.574	57.21	1.671	1.063	1.65	1.422	58.7	103.6	55.23	94.4	42	128	33	95
	10-10.35	silty clay	2.438	84.84	1.442	0.78	1.46	2.125	68	97.3	87.17	95.8	41	138.6	54.2	84.4
	14.4-15	sandy siltstone	2.57	30.5	1.696	1.3	1.794	0.978	49.43	80.19	38.04	61.5	22	59.5	32.7	26.8
B-2	proctor	clay + silt, sandy	2.556	28.96	1.985			13.6	93.15	5.45	5.32	72.9	26	55.2	19.1	36.2

Table 9 Results of Unconfined and Triaxial Compression Tests

Sample Hole	Depth (m)	Soil nature Type of Soil	% Fines (%)	%Clay (%)	Unconf. compression qu kg/cm2	Triaxial Tests c (kg/cm2)	UU c(kg/cm2)	UU ϕ°	CU c(kg/cm2)	CU ϕ°	CU c'(kg/cm2)	CU ϕ °	CD c(kg/cm2)	CD ϕ°
A-1	8.45-9	clay	94.1	34	0.19	0.095	0.11	3.8						
	14.45-15	sady silt	64.4	6	0.34	0.17	0.62	27					0.62	27
	18.45-19	silty clay	97.5	41	0.34	0.17			1.01	9.3	0.28	27		
	23.45-24	silty clay	92.8	41	0.47	0.235	0.36	8.5						
	28.45-29	clay	95.1	42	0.64	0.32	0.66	4.6						
	33.45-34	clay	97.6	40	0.51	0.255	0.194	2.5						
B-1	4.45-5	sandy silt	54.8	4	0.24	0.12							0.25	29
	9.45-10	silty clay	92.7	39	0.2	0.1	0.401	6.7						
	14.45-15	clayey silt	92.7	38	0.67	0.335	0.46	8.6						
	17-17.5	silty clay	76.6	18	0.61	0.305	0.6	2.5						
	21.3-21.7	silty clay	94.9		0.63	0.315	0.4	3.3						
	28.45-29	clay/silt	95.8		0.7	0.35	0.6	3.9						
B-2	4.45-5	clay	97.6	44	0.35	0.175	0.28	9.7						
	10-10.55	clay	69	16	0.28	0.14	0.3	6.9						
	15-15.35	sand/clay /silt	64.5	8	0.35	0.175							0.36	25
	22.45-22.9	clay + silt, sandy	76.9	24	0.17	0.085			0.09	17.1	0.07	21.4		
	25-25.35	clay + silt	90	37	0.19	0.095	0.5	9						
C-1	5.5-5.9	clay	95.2	38	0.17	0.085	0.181	9						
	10.6	silty sand	36.4		0.23	0.115								
	15-15.3	silty clay	85.8	30		0	0.3	8.1						
	19-19.25	silty clay	90.9	18	0.24	0.12	0.85	3.7						
D-1	5-5.3	silt + clay, sandy	83	18	0.15	0.075	0.47	9.1	0.33	9.8	0.14	32.3		
O-1	5-5.45	silty clay	94.4	42	0.25	0.125	0.214	9.2						
	10-10.35	silty clay	95.8	41	0.17	0.085	0.47	9.1						
B-2	proctor	clay + silt, sandy	72.9						0.34	20.6	0.4	25.4		
D-1	proctor	clay + silt, sandy	88.4						0.45	13.4	0.31	35.3		

Table 10 Results of Consolidation Tests

Hole	Depth (m)	Soil	LL (%)	Wn (%)	eo (%)	Pc Kg/cm2	Cc	Cv cm2/day	OCR %
A-1	8.45-9	clay	145.4	98.07	2.697	0.64	0.874	382.9	0.91
	14.45-15	sady silt	55.3	47.44	1.409	2.2	0.35	711.0	1.2
	18.45-19	silty clay	99.6	57.93	1.555	1.7	0.4	324.8	1.1
	23.45-24	silty clay	84.2	42.79	1.089	2.2	0.2	380.9	1
	28.45-29	clay	112.4	41.14	1.116	1.8	0.25	323.9	0.87
	33.45-34	clay	129	45.44	1.089	1.7	0.31	536.8	0.62
B-1	4.45-5	sandy silt	113.1	43.16	1.001	0.67	0.58	230.3	2.2
	9.45-10	silty clay	91.1	71.52	2.334	2.7	0.62	205.1	3.5
	14.45-15	clayey silt	104.6	65.09	1.763	3.6	0.45	630.8	3.7
	17-17.5	silty clay	117.4	52.18	1.384	2.1	0.43	469.9	1.85
	21.3-21.7	silty clay	132.6	41.44	1.231	2	0.36	472.0	1.36
	28.45-29	clay/silt	94.5	23.86	0.781	1.8	0.22	541.5	0.87
B-2	4.45-5	clay	84.5	59.62	1.448	1.55	0.66	287.5	2.63
	10-10.55	clay	70.9	52.11	1.439	2.1	0.38	450.8	2.1
	15-15.35	sand/clay /silt	66.2	44.9	1.307	2.05	0.31	562.7	1.62
	22.45-22.9	clay + silt. sandy	95.4	55.56	1.454	2.1	0.49	496.3	1.3
	25-25.35	clay + silt	101	64.7	1.751	2	0.39	423.9	1.04
C-1	5.5-5.9	clay	91.1	63.08	1.592	1.9	0.32	505.6	2.6
	15-15.3	silty clay	91.7	55.15	1.416	3	0.3	476.2	2.27
	19-19.25	silty clay	108.9	59.25	1.482	2.8	0.34	557.5	1.7
D-1	5-5.3	silt + clay. sandy	72.3	78.61	1.932	2.1	0.92	584.8	5.3
O-1	5-5.45	silty clay	128	57.21	1.422	2.9	0.39	473.6	3.28
	10-10.35	silty clay	138.6	84.84	2.125	2.2	0.37	410.1	1.5
B-2	proctor	clay + silt. sandy	55.2	28.96	13.6	2.6	0.31	559.5	
D-1	proctor	clay + silt. sandy	93.6	50.2	26.19	3	0.31	505.3	

Table 11 Result of Fresh Water Quality Analysis

Item	Parameter	Unit	Maximum Limit	ST-A	ST-B	ST-C	ST-D	ST-E	ST-F	ST-G	ST-H	ST-I
A	Physical											
	1 Temperature	C		28	29	27	28	28	27	27	27	27
	2 Total Dissolved Solids	mg/l		734	118	113	252	1696	1040	1433	516	472
B	Chemical											
	1 Mercury	mg/l	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	2 Ammonia Nitrogen	mg/l	0.02	5.44	1.14	1.33	2.13	7.19	5.83	5.74	3.36	3.05
	3 Arsenic	mg/l	0.5	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
	4 Fluoride .	mg/l	1.5	0.4	0.13	0.12	0.23	0.45	0.42	1.68	0.41	0.35
	5 Cadmium	mg/l	0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
	6 Chlorine	mg/l	0.003	0.02	0.02	0.04	0.06	0.03	0.03	0.02	0.14	0.15
	7 Chromium	mg/l	cero	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	8 Nitrite	mg/l	0.06	0.038	0.101	0.212	<0.005	<0.002	<0.005	<0.005	<0.005	0.091
	9 Dissolved Oxygen	mg/l	>3	0	2.5	1.7	1.5	0	0	0	0	0
	10 pH	units	6.0 - 8.5	6.5	6.6	6.7	6.8	7.1	6.9	7.2	7	6.8
	11 Selenium	mg/l	0.05	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
	12 Zinc	mg/l	0.02	0.57	0.01	0.02	0.04	0.04	0.05	0.03	0.06	0.05
	13 Cyanide	mg/l	0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
	14 Hydrogen Sulfide	mg/l	0.002	1.468	<0.002	<0.002	<0.002	1.244	0.308	0.549	<0.002	<0.002
	15 Copper	mg/l	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	16 Lead	mg/l	0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
	17 Phenol	mg/l	0.001	<0.001	<0.001	<0.001	<0.001	0.787	0.685	0.85	0.203	0.114
	18 Oil & Grease	mg/l	0.5	5.2	2	3.2	4.8	6.4	4	2.4	4.8	4.4
	19 Detergents	mg/l	2.00E-01	3.42	2.48	1.69	1.31	12.88	7.45	6.22	2.78	2.06
	20 BOD	mg/l		35.8	7.6	8.5	19	47	32.8	45.5	15.2	23.8
	21 COD	mg/l		83.6	17.6	21	46.2	118.8	70.4	96.8	45.1	63.8

ST : Sampling Station
Maximum Limit :Standard Decree of DKI Jakarta for Surface Water, Fisheries, and Aquaculture
Source : UNILAB PERDANA pt - Environmental Laboratory
Cengkat Barat. December 21, 1996

Table 12 Result of Oceanic Water Analysis

Item	Parameter	Unit	SEA WATER STANDARD	ST-J	ST-K	ST-L
A	Physical					
	1 Temperature	C		29	29	29
	2 Salinity	0/00	10% Dev.N	3.06	3.03	
	3 Suspended Solids	mg/l	< 80	2	3	
B	Chemical					
	1 Mercury	mg/l	0.003	<0.001	<0.001	<0.001
	2 Ammonia Nitrogen	mg/l	<1	0.16	0.21	1.41
	3 Arsenic	mg/l	0.01	<0.005	<0.005	<0.005
	4 Niquel	mg/l	<0.002	<0.002	<0.002	
	5 Cadmium	mg/l	<0.01	<0.005	<0.005	<0.005
	6 Silver	mg/l	<0.05	<0.02	<0.02	
	7 Chromium	mg/l	<0.01	<0.01	<0.01	<0.01
	8 Nitrite	mg/l	0	<0.005	<0.005	<0.005
	9 Dissolved Oxygen	mg/l	>4	5.6	6.1	2.5
	10 pH	units	6 - 9	7.6	7.7	7
	11 Selenium	mg/l	<0 005	<0.002	<0.002	<0.002
	12 Zinc	mg/l	<0.1	0.05	0.05	0.05
	13 Cyanide	mg/l	0.2	<0.005	<0.005	<0.005
	14 Hydrogen Sulfide	mg/l	<0.03	<0.002	<0.002	<0.002
	15 Copper	mg/l	<0.06	<0.02	<0.02	<0.02
	16 Lead	mg/l	<0.01	<0.01	<0.01	<0.03
	17 Phenol	mg/l		<0.001	<0.01	<0.001
	18 Oil & Grease	mg/l	<5	2	1.2	2.8
	19 Detergents	mg/l		0.12	0.08	1.48
	20 BOD	mg/l	<45	15.4	12.2	10
	21 COD	mg/l	<80	41.3	37.5	24.2

ST : Sampling Station
Sea Water Standard : Kep. 02/MenKLH/I/88, for biotic life.
Source : UNILAB PERDANA pt - Environmental Laboratory
Jakarta Bay, December 21, 1996.