

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

MINISTRY OF SETTLEMENT AND REGIONAL DEVELOPMENT
THE REPUBLIC OF INDONESIA

**THE DETAILED DESIGN
OF
FLOOD CONTROL, URBAN DRAINAGE AND
WATER RESOURCES DEVELOPMENT IN
SEMARANG IN THE REPUBLIC OF INDONESIA**

FINAL REPORT

COMPONENT C:
URBAN DRAINAGE SYSTEM IMPROVEMENT

BIDDING DOCUMENTS

PACKAGE 3:
BANDARHARJO DRAINAGE SYSTEM IMPROVEMENT

VOLUME 3:
SPECIFICATION

AUGUST 2000

CTI ENGINEERING INTERNATIONAL CO., LTD.

IN ASSOCIATION WITH

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**MINISTRY OF SETTLEMENT AND REGIONAL DEVELOPMENT
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WATER RESOURCES DEVELOPMENT IN SEMARANG**

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**VOLUME 2
SPECIFICATION**

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SECTION GS 1. GENERAL SPECIFICATION

1.1 DEFINITIONS

The term "Engineer" used in the Specification shall have the same meaning as "Project Manager" as defined in clause 1 of the Conditions of Contract.

1.2 DESCRIPTION OF THE PROJECT

1.2.1 Overview of the Project

The city of Semarang suffers frequent flooding in the wet season and water shortage in the dry season. Progressing land subsidence, mainly caused by ground water extraction, further exacerbates flooding in low-lying areas in the North of the city.

To mitigate these problems and to enhance economic development the project for Flood Control, Urban Drainage and Water Resources in Semarang has been brought about with the assistance from the Government of Japan.

The project has been broadly divided into the following three components which address different aspects of the project. The components are as follows:

- West Floodway / Garang River Improvement;
- Urban Drainage System Improvement; and
- Construction of the Jatibarang Multipurpose Dam

The object of the Urban Drainage System Improvements component is to reduce the frequency of flooding in the northern part of Semarang City. This is to be achieved by improving the discharge capacity of the Semarang River and to prevent flooding to adjacent low-lying areas by creation of dikes. Within the Asin River Drainage Area and the Bandarharjo Drainage Area large areas are too low to permit gravity drainage. In such areas, pumped drainage systems are to be implemented.

1.2.2 Contract Packages

For the purposes of implementation each of the three components has been subdivided into contract packages. There is a total of 8 packages of work in the project with the breakdown as shown in the following table. The package for the work covered by this document is highlighted to clarify its position in relation to the project components and to other packages.

COMPONENT	DESCRIPTION OF PACKAGES
West Floodway / Garang River Improvement	Package 1: West Floodway and Garang River Improvement Works Package 2: Reconstruction of Simongan Weir Package 3: Raising of Railway Bridge over West Floodway
Urban Drainage System Improvement	Package 1: Semarang River Drainage System Improvement

	Package 2: Asin River Drainage System Improvement Package 3: Bandarharjo Drainage System Improvement
Construction of the Jatibarang Multipurpose Dam	Package 1: Jatibarang Multipurpose Dam including Appurtenant Structures Package 2: Operation and Maintenance Buildings and Goa Kreo Bridge

1.2.3 Relationship between Components and Packages

In general, from the point of view of construction, there is no relationship nor interface between packages of different components.

Packages within the same component may have common interfaces.

Works by others may be under construction in the same areas during the implementation of work packages of this project.

1.2.4 Scope of Work

When completed the Bandarharjo Drainage System Improvement works will improve the drainage of a 2.2 km² area through the creation of a poulder with a pumping system discharging to the Baru River.

The Works to be carried out under this Contract shall, unless otherwise stated in the Contract, comprise the supply of all materials, labour, equipment, construction plant, temporary works and anything else for the completion of the Works in strict accordance with the Contract or as directed by the Project Manager.

The elements of the Works to be completed under this package shall consist of, but not be limited to, the following:

- Improvements to the Baru River
- Construction of the Baru Retarding Pond
- Construction of the Baru Pumping Station
- Supply and installation of mechanical works for the Baru Pumping Station
- Construction of Baru pump station maintenance buildings
- Construction of the Baru gate
- Construction of the Baru Conveyance Channel
- Construction of the Bandarharjo-West Secondary Channels
- Treatment of spoil containing heavy metals
- Construction of dikes

A complete description of the Works is contained in the various documents comprising the Contract.

1.2.5 Concurrent Contracts

Concurrent with the construction of the Works the Employer will have under construction, on adjacent or overlapping sites, works for contract Package 1:

Semarang River Drainage System Improvement and Package 2: Asin River Drainage System Improvement.

The Contractor shall plan his operations as far as it is practicable to avoid any interference or delay to the work of the Employer and of other contractors engaged by the Employer on those operations.

To assist in co-ordinating his operations with the work being done by others, the Contractor shall establish direct site liaison and communications as necessary with the Engineer and other contractors employed by the Employer for all purposes associated with his proposed operations. In the event that the requirements of the Contractor, the Employer and other contractors conflict at any stage of the work, the Engineer shall decide the order in which work shall proceed.

The Engineer shall be given reasonable notice of all meetings between the Contractor and other contractors employed by the Employer and the Engineer shall be entitled to be present at such meetings. The Contractor is to submit to the Engineer copies of all written communications issued to other contractors at the time of issue or received from other contractors at the time of receipt if it bears direct relation to the Contract and the Works.

Subject to the rights of the Contractor under the Contract, the decision of the Engineer shall be final in the event of any disagreement between the Contractor and other contractors employed by the Employer referred to in this clause, which cannot be resolved mutually.

1.3 GENERAL INFORMATION

1.3.1 Topography

The site and adjacent area is flat and low lying. The Semarang and Asin rivers are tidal within the site. Some low-lying areas are subject to flooding during wet weather and high tides.

1.3.2 Climate

The climate of the Semarang area is typically tropical, characterised by two (2) distinct seasons: a Rainy Season and a Dry Season. These result from the seasonal changes in the atmospheric circulation pattern, caused by the annual north-south migration of the Inter-Tropical Convergence Zone.

Summarised below are the climatic characteristics of the construction site area, which are based on climatological data observed in the period of 1968 to 1996 at BMG-Semarang Station operated by Centre of Meteorology and Geophysics.

Mean annual rainfalls	: 2,378 mm
Mean annual temperature	: 27.3 deg. C
Mean maximum temperature through a year	: 31.9 deg. C
Mean minimum temperature through a year	: 23.5 deg. C
Mean monthly rainfall during dry season (Apr to Oct)	: 124 mm
Maximum temperature during dry season (Apr to Oct)	: 32.8 deg. C
Minimum temperature during dry season (Apr to Oct)	: 23.4 deg. C

More detailed data is included in the Supplementary Information provided to Bidders.

1.3.3 Soil Conditions

Soil conditions at the site generally consist of alluvial deposits 20 to 25 m thick overlying hard clay. Further details are contained in the Supplementary Information provided to Bidders.

1.3.4 Quality of Water in the Semarang and Baru Rivers

The water in both rivers exhibits high BOD, have low dissolved oxygen and contains contaminants including heavy metals.

1.3.5 Access to the Site

1.3.5.1 Location of Site

The site is located in Semarang City, Central Java Province, Indonesia.

1.3.5.2 Existing Roads and Transportation Facilities

Access to the Site can generally be achieved via the network of public roads and streets in the vicinity of Site. The North Ring Road, which links with other main trunk roads, passes close to the site.

An airport and a shipping port exist in Semarang.

The Contractor shall fully inform himself of the conditions of roads, traffic conditions and traffic regulations with respect to gaining access to the Site for the purposes of performing the Works and shall take all necessary actions to ensure availability of access to the Site as required.

1.3.5.3 Load Limits

- a The public roads and bridges have widely varying load limits and the Contractor shall be responsible for determining the load limits existing at the time and ensuring that his Equipment does not exceed such limits. Before moving any heavy construction equipment into public roads and bridges, the Contractor shall make suitable arrangements with the appropriate Government authorities and obtain their approval for the passage of such traffic.
- b The Contractor shall use every possible means to prevent any of public roads or bridges connecting with or on the road to the Site from the being damaged by any traffic of the Contractor or his subcontractors.
- c The Contractor shall make any necessary repairs or replacement of any structure or route damaged as a result of his own negligence. Such repair or replacement shall be done to the satisfaction of the Engineer or the relevant Government authorities and shall be at the Contractor's expense.

1.3.5.4 Tracked Vehicles

The Contractor shall not travel tracked vehicles or plant on any bituminous sealed road surface or bridge. Rubber tired vehicles conforming to applicable load restrictions will be permitted to use bituminous sealed road.

1.3.5.5 Safety

The Contractor shall take necessary care at all times to ensure the convenience and safety of residents along or nearby the roads and streets used to access the Site.

1.3.5.6 Construction of Additional Access Roads

All additional roads required by the Contractor as temporary road on the Site shall be provided by the Contractor at his expense.

1.3.5.7 Maintenance

All damage caused to the public roads used by the Contractor for access to the Site shall be promptly repaired by the Contractor at his expense.

1.3.6 Sources of Materials

Earth material for fill materials, fine and coarse aggregates for concrete, sand, gravel and asphalt for road paving, cement, reinforcing bars, and fuel and oil products are generally obtainable in the Central Java area.

The Contractor shall make arrangements to procure or obtain such materials in a reasonable time.

The Contractor shall submit to the Engineer for his approval material test data of concrete aggregate, sand, gravel, cobble, etc. from the sources proposed by the Contractor before such materials are procured from suppliers or supply areas developed.

1.3.7 Spoil Disposal Areas

The Contractor shall be responsible for locating suitable spoil disposal areas for the placement of earth materials unsuitable for other purposes, surplus to requirements, for treatment of contaminated spoil and for waste building materials resulting from the demolition activities.

Potential spoil disposal areas are located near the coast between the mouth of the Semarang River and Semarang Harbour as shown in the Supplementary Information supplied with the Bid Documents.

The Contractor shall be deemed to have satisfied himself of the availability of suitable spoil disposal areas and of the nature of access to such areas and shall have allowed for all cost associated with gaining rights to use, getting access to and managing spoil disposal areas, including the treatment of contaminated soil in the rates and lump sum prices in the priced Bill of Quantities.

1.3.8 Water Supply, Power and Telephone Facilities

Water, electric power and telephone services are available in the vicinity of the site. The Contractor shall make his own arrangements for procurement of such utilities.

1.4 CONTRACT DOCUMENTS AND DRAWINGS

1.4.1 Contract Documents

The Contractor will be provided with a maximum of five (5) sets of Contract Documents for his own use. Tender Documents in the Contractor's possession shall be marked superseded or returned to the Employer after issue of the Contract Documents and will not be recognised in the administration of the Contract. Further instructions issued by the Engineer shall be kept at all times on the Site by the Contractor and shall be available to the Engineer and his staff.

1.4.2 Bid Drawings

The drawings included in the Bidding Documents are to be used for bidding purposes only. The drawings show the work to be carried out in accordance with the Contract as definitely and in as much detail as is possible at the time of bidding. The Contractor may use the Bid Drawings for placing preliminary orders for materials or for preparing drawings of Temporary Works. However, the Bid Drawings shall not be used as a basis for fabrication of equipment or for construction of the Works.

1.4.3 Construction Drawings

Bid Drawings will be supplemented or superseded by such Construction Drawings as necessary for the purpose of the proper and adequate execution of the Works. Two (2) full size prints of such Construction Drawings will be issued by the Engineer to the Contractor in accordance with the construction programme required under the provisions of clause 1.5. On receipt of the Construction Drawings, the Contractor shall check them carefully and advise the Engineer in writing of any discrepancies, errors or omissions and full instructions will be furnished to the Contractor should any discrepancies, errors or omissions be found. The Contractor shall be required to perform the Work in accordance with such Construction Drawings at the applicable rates bid in the priced Bill of Quantities for such work or work of a similar nature. Although the Drawings are prepared to scale, work shall be based upon dimensions shown on the Drawings and not on dimensions scaled from the Drawings.

The Engineer may, from time to time during the construction, issue further drawings to supplement or amend the Construction Drawings, if deemed necessary. Such further drawings shall become part of the Construction Drawings.

The Contractor shall be governed by figure dimensions as given on the Drawings. Where the required dimensions are not shown in figures, the Contractor shall obtain such dimensions from the Engineer before proceeding with the construction of the portion of the Works to which they refer. In every case, detailed drawings shall take precedence over general drawings.

When additional information regarding foundation or other conditions becomes available as a result of excavation work, further testing or otherwise, and if it is found desirable to make changes in the alignment, cross section, dimensions or design of the Works to conform to such conditions, the Employer reserves the right to make such changes as in the opinion of the Engineer are necessary or desirable, and the Contractor shall forthwith comply with any such direction of the Engineer.

Bid drawing may be used as construction drawings, as defined above, when authorised, in writing, by the Engineer.

1.4.4 Drawings to be furnished by the Contractor

1.4.4.1 General

All of the various types of drawings as stated hereinafter shall be prepared in a form approved by the Engineer and submitted in advance to give the Engineer sufficient time to review and approve them without causing any delay to the field works. The Contractor shall provide qualified staff and a sufficient number of draftsmen and assistants capable of producing all drawings required.

All drawings and supporting computations to be submitted by the Contractor for the Engineer's approval shall be in English. All dimensions shall be given in the metric system. The drawings shall be in JIS A1 size (594 mm by 841 mm) unless otherwise specified or approved by the Engineer.

The Contractor shall be held responsible for all drawings and documents not submitted within the time limits stipulated in clause 1.4.5. and for all costs involved for delays and damages consequent thereto. Contractor's drawings approved by the Engineer are to be used for construction.

1.4.4.2 Working Drawings

The Contractor shall prepare the working drawings for all items of the Permanent Works on the basis of the Construction Drawings issued by the Engineer. The working drawings shall show sufficient details of the structure of the works or the construction methods or procedures such as, but not limited to, excavation and embankment fillings, concrete reinforcement bar arrangement including bending/cutting schedule and bar list, expansion joints, contraction joints, construction joints, concrete placement details, waterstop layout, equipment installation, etc., by which the Contractor will proceed with the field construction and operation. Further, drawings presenting full details of items not to be incorporated into the permanent Works but which affect the quality of work such as concrete forms, supports, etc., shall also be included in the working drawings. All the working drawings related to any section on the Works shall be approved by the Engineer prior to the time the Contractor plans to perform such section of work.

1.4.4.3 Shop Drawings

Shop drawings shall be prepared by the Contractor, or the Contractor's materials/equipment supplier on behalf of the Contractor, to show the outline, dimensions, type of material, etc., of particular items indicated in the Drawings and/or Specifications and as directed by the Engineer. Such shop drawings shall be submitted by the Contractor to the Engineer for approval.

1.4.4.4 Drawings of the Temporary Facilities

Thirty (30) days before starting any section of the temporary facilities specified in clause 1.9 hereof, the Contractor shall submit to the Engineer for approval drawings showing details of such facilities.

The drawings for temporary facilities shall show the locations and other pertinent details of the principal components of the construction plant, offices, quarters, warehouses, storage areas, workshops, labour camps and other temporary buildings and facilities which the Contractor proposes to construct in the Works area.

If any change is made in the items mentioned above during erection or after the items become operational, the Contractor shall submit revised drawings showing such changes to the Engineer for approval.

1.4.4.5 As-Built Drawings

Throughout the period of construction, the Contractor shall maintain an up-to-date set of as-built drawings for the various items of work completed. Such drawings shall show all authorised changes to the Construction Drawings and Shop 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.

The up-to-date set of as-built drawings shall be subject to periodical inspection at the Site by the Engineer and if the drawings are found unsatisfactory or not up-to-date the Contractor shall bring them up-to-date within fourteen (14) days after inspection. If any part of the Permanent Works delineated on the drawings is complete, the pertinent as-built drawings, after approval by the Engineer, shall be signed by both the Engineer and the Contractor, or their representatives, and three (3) copies shall be kept by the Engineer.

The as-built drawings shall be made on high quality reproducible paper so that clearly readable copies can be made. The finished set of as-built drawings shall be submitted by the Contractor to the Engineer for his approval and transmittal to the Employer in the manner specified in Clause 1.4.5.4.

1.4.4.6 Other Drawings

Drawings other than those mentioned above, which are of a general nature, such as the proposed construction methods, temporary works for construction purposes, schematic diagrams and outlines of how various types of work are to be performed shall, as directed by the Engineer or as stipulated in the Contract Conditions and Specification, be submitted to the Engineer for approval.

1.4.4.7 Form and Presentation of Drawings

a General

All shop Drawings and Working Drawings produced by the Contractor or his subcontractors for this Contract shall use a common system of sizes, title blocks and numbers in accordance with this Subclause, regardless of who produces the drawings.

b Drawing Sizes and Standards

All drawings shall be drawn in the accordance with clause 1.4.4.1.

c Title Blocks

- i The Contractor shall submit a sample of the title block he proposes to use for approval by the Engineer. The general format of the title blocks shall follow those of this Specification.
- ii The Contractor or his subcontractor's title blocks shall show the Contractor's and subcontractor's name, the date, the title, and number of the drawing and each new issue of the drawing shall be identified by a revision letter as a part of the number. In addition each drawing shall show the following details in the lower right hand corner:

FLOOD CONTROL, URBAN DRAINAGE AND WATER
RESOURCES DEVELOPMENT IN SEMARANG

COMPONENT : URBAN DRAINAGE SYSTEM IMPROVEMENT

PACKAGE 2 : BANDARHARJO DRAINAGE SYSTEM
IMPROVEMENT

DRAWING NO. :

d Numbering System

- i Primary reference to drawing numbers on all drawings, correspondence, operation, and maintenance instructions and elsewhere, shall be the number from the Engineer's numbering system, which system will be notified to the Contractor.
- ii The Contractor may, if he desires, insert his own reference number in the appropriate place on the title block.
- iii Drawing number shall be as allocated by the Engineer.

e Quality

The quality of working drawings, shop drawings, "as-built" drawings and drawings for temporary works shall be in accordance with Clause 1.4.5.

f Drawing Index

The Contractor shall compile a drawing index for all drawings produced by himself and his subcontractors. The Contractor shall submit an up-to-date copy of each sheet of the index to the Engineer at three monthly intervals or on request.

g Drawing on Site

Copies of the latest revisions of all drawings shall be sent to the Contractor's site office as soon as possible after they are approved. The drawings shall be available at all reasonable time for inspection by the Engineer.

1.4.5 Submittal and Approval of Contractor's Drawings

1.4.5.1 General

- a It is to the Contractor's advantage to prepare his drawings and submit them to the Engineer at the earliest possible time to avoid delay in the fieldwork due to lack of approved Drawings on hand for the construction crew.
- b Any work done prior to the Engineer's approval of the drawings shall be at the Contractor's risk. Approval by the Engineer of the Contractor's drawings shall not relieve the Contractor from any of his obligations in the complying with the provisions of the Contract.

1.4.5.2 Procedure for Submittal and Approval

- a Unless otherwise specified the Contractor shall submit his working drawing, shop drawings and other required drawings to the Engineer for approval at least sixty (60) days prior to the commencement of construction of any particular item of work. Shop drawings for any particular item which has to be fabricated outside of the Site shall be submitted early enough to allow adequate time for review, approval, fabrication, transportation and receipt at the Site.
- b Four (4) clearly readable print copies of each drawing shall be submitted to the Engineer by means of a standard transmittal sheet. The format of the transmittal sheet shall be as approved by the Engineer.
- c The engineer shall have the right to direct the Contractor to provide additional details and change in the drawings if the are necessary to ensure compliance with the provisions and intent of the Specifications.

Within thirty (30) days after the receipt of the drawings submitted by the Contractor, and the Engineer shall return one (1) copy thereof of the Contractor marked "Approved for Construction", "Approved for Construction-Except as Noted", or "Not Approved Resubmit".

- d The return and receipt of any approved drawing shall be deemed to authorise the Contractor to proceed with the work covered by such drawing, but before proceeding with the work the Contractor shall first submit to the Engineer by logged transmittal sheet two (2) prints of each drawing. When requested by the Engineer, one (1) transparency of working drawings and shop drawings shall also be submitted together with two (2) prints. Copies of all approved drawings shall be maintained at the Contractor's site office in proper order.
- e When correction or revision is directed on the Contractor's submitted drawings, the Contractor shall make the necessary corrections and/or revisions in a timely manner and shall resubmit them in two (2) copies to the Engineer in the same manner as for new drawing. This procedure shall continue until the drawings have been finally approved.

1.4.5.3 Other Information

All applicable requirements of this Clause shall apply equally to other submittals described in Clause 1.5.

1.4.5.4 As-Built Drawings

Within one (1) month following the issue of the Certificate of Completion of the Works, the Contractor shall furnish to the Engineer, for his approval; and transmittal to the Employer, the final version of as-built drawings. These as-built drawings shall consist of:

- a Two (2) sets of transparent polyethylene sheets ;
- b Three (3) sets of full-sized (A1 size) bound copy ; and
- c Ten (10) sets of reduced size (A3 size) bound copy.

1.4.6 Payment

Payment for Drawings in accordance with this clause 1.4 shall be made at the Lump Sum price entered in the priced Bill of Quantities.

For the purposes of monthly progress payments the amount completed, expressed as a percentage of the total number of drawings required to be completed by the Contractor, shall be determined. Payment shall be calculated by multiplying the percentage completed by the lump sum for Drawings entered in the priced Bill of Quantities. Payment for drawings shall never exceed the lump sum entered in the priced Bill of Quantities.

1.5 CONSTRUCTION PROGRAMME, CONSTRUCTION PLAN, PROGRESS REPORTS AND OTHER SUBMITTALS

1.5.1 General

The Contractor shall prepare and submit a construction programme, a construction plan, progress reports and other required documents in the manner specified herein.

1.5.2 Construction Programme

1.5.2.1 General

- a In accordance with Clause 27 of the Conditions of Contract, within sixty (60) days after receiving the letter of Acceptance, the Contractor shall submit to the Engineer a detailed construction time schedule of the overall works for approval. The schedule shall be in accordance with the construction programme submitted with the Tender and approved by the Letter of Acceptance but shall provide significantly more details in accordance with this clause. The details required shall include each main activity such as, but not limited to, each main item referred to in the Bill of Quantities associated with each of the main items of work as listed in clause 1.2.4 of the General Specification. Activities shown on the schedule shall consist not only of the actual construction sequence including mobilisation, but also time allowances necessary for the preparation and approval of drawings and samples, for the procurement and shipment of materials and equipment including obtaining licences and permits for procurement and/or importation, for the installation of the special time, for possible delays caused by floods or inclement weather conditions, religious holidays, etc. The construction time schedule shall be prepared and submitted in computerised bar chart and CPM network forms. The critical path(s) shall be marked on the network as well as float for each activity. An original copy of the software and manuals used to prepare this schedule shall be submitted to the Engineer for the use of his Consultant for the duration of the Contract. The Contractor shall submit copies of the construction time schedule and all subsequent revised Construction Programmes in accordance with Clause 27 of the Conditions of Contract and shall also submit the computer input data on floppy disk on each occasion. The software shall also be capable of comparing actual and planned progress both physically and financially and this information should be prepared and submitted on a fortnightly basis.
- b The construction time schedule shall be so prepared that all the Works are to be completed by the Intended Completion Date as stated in Contract Data in accordance with clause 17 of the Conditions of Contract.
- c The construction time schedule shall be subject to modifications and changes as necessary and, after approval by the Engineer, shall become part of the Contract.
- d The Construction Programme as approved by the Engineer shall be closely monitored and kept current. It shall be formally updated by the Contractor once in every four (4) months or at any time directed by the Engineer, and submitted to the Engineer each time for approval. Revisions to the Construction Programme shall show the effects of any variations and compensation events.

1.5.2.2 Revision of Programme

- a If in the course of execution the rate of progress of the Works or any section thereof falls behind the approved Construction Programme and if, in the opinion of the Engineer, the Contractor shall not be able to complete the Works or such section of the Works by the time required, then the Engineer may order the Contractor to increase his work force or supplement the Construction Plant on Site or take any other adequate steps to expedite the rate of progress for that section, submit for

approval a revised construction programme showing the proposed measures to complete the Works on time.

- b If the Contractor proposes to modify or revise the Construction Programme and if the change affects the Engineer's design and drawings programme, the Employer shall not be responsible for the consequence of the late issuance of Construction Drawings attributable to the change even after the approval by the Engineer of the modification or the revision of the Construction Programme.

1.5.3 Construction Plan

1.5.3.1 General

Within sixty (60) days after receiving the Letter of Acceptance for the whole Works under the Contract as specified the Contract Data, the Contractor shall submit a revised general construction plan including a detailed list of equipment to be mobilised, particulars of Temporary Works and method statements for major items of work to the Engineer for approval. The plan shall be prepared on the basis of the General Plan submitted by the Contractor with his Bid and the following mandatory requirements. Any instructions given by the Employer and/or the Engineer on and after award of the Contract shall be incorporated.

1.5.3.2 Mandatory Requirement to be included in the Construction Plan

The construction plan shall take into account the following mandatory requirement:

- (a) Pile driving shall not be carried out at night.

1.5.4 Weekly Schedule

The Contractor shall, at the end of each week, submit to the Engineer for his review and comments two (2) copies of a weekly schedule for the succeeding week in a form approved by the Engineer. The schedule shall contain appropriate comments with regard to the work to be performed on each major item as well as other construction work related to the execution of the Works including procurement of materials, transportation of materials and equipment, preparation of drawings and other items required by the Engineer.

1.5.5 Monthly Progress Report

1.5.5.1 Written Report

The Contractor shall submit, before the tenth (10th) day of each month or at any time designated by the Engineer, five (5) copies of a monthly progress report in a form acceptable to the Engineer detailing the progress of the Works during the preceding month. The report shall contain, but not be limited to, the following items:

- (a) A brief but detailed description of all works executed during the reporting month together with a cumulative summary of progress to date for each main activity.
- (b) Total overall percentage of work completed up to the end of reporting month as well as the total overall schedule percentage completed and the forecast completion date computed by the critical path method (or

other method previously approved by the Engineer) as of the end of the reporting month with appropriate comments on progress.

- (c) Actual percentage of each main work item completed, as well as their schedule percentage, with appropriate comments on their progress. The percentages shall be provided for each month and cumulatively.
- (d) Schedule of activities to be started within the succeeding two (2) months with the forecast starting and completion dates. If the dates are different from those shown on the approved Construction Programme an explanation shall be given.
- (e) List of manpower by trade, and supervisory personnel by position, employed during the reporting month.
- (f) List of Construction Plant and materials on Site used in the execution of the Works including those that arrived at or were removed from the Site. The records shall include duration for which Equipment was not in working order.
- (g) Total work quantities to be incorporated in the permanent Works including, but not limited to, the following items:
 - i. Total quantities of various classifications of excavation and embankment.
 - ii. Total quantities of various classes of concrete poured.
 - iii. Main items of the temporary works performed during the reporting month.
 - iv. General description of the weather conditions during the reporting month including records of each rainfall duration.
 - v. List of each accident involving, lost time, and/or death of any person, damage suffered by Works, properties and equipment.
 - vi. Occurrence of any event or condition that might delay or prevent completion of the Works in accordance with the current, approved Construction Programme and the steps taken by the Contractor to correct the situation.
 - vii. Schedule of the amount of payments received to date and the amount of any monthly invoice submitted but not yet paid.
 - viii. Estimated amount of payment from the Employer to the Contractor for the succeeding month.
 - ix. Colour photographs (not smaller than 8 cm x 12 cm) of the work progress of all major components of the Works from start to completion taken at locations directed by the Engineer. A brief description and date of each photograph shall be stated. The date shall be imprinted in each negative and photograph. A minimum of two photographs shall be taken of each major component under construction in the month including temporary works.
 - x. Any other matters which may be required under the Contract or statement concerning any matter arising from or relating to the execution of the Works during the reporting month.

1.5.5.2 Video Report

The Contractor shall make a video tape recording of the progress of the Works on a monthly basis and shall engage a professional recording company approved by the Engineer to carry out the work.

The monthly recording shall be of 30 minutes duration and shall be carried out throughout the duration of the Contract or as directed. Additional recordings may be necessary to record significant milestone events.

A copy of each monthly recording shall be submitted to the Engineer. The recording shall be accompanied with dialogue describing the events recorded.

At the completion of the Works the monthly recordings shall be compiled and edited into a single recording of four hours duration, or as directed, complete with approved dialogue and soundtrack and submitted to the Engineer.

1.5.6 Daily Report

The Contractor shall prepare daily and periodical reports in a form approved by the Engineer. The following items:

- a Weather conditions;
- b Staff and labour force employed on the work;
- c Materials and equipment on Site;
- d Work in progress including locations and estimates of daily production;
- e Work in preparation;
- f Accident or any other reason causing a suspension of the work;
- g Occurrence of any event or condition that might delay the progress of work; and
- h All other information relevant to the progress of the Works.

1.5.7 Joint Meeting to Discuss Progress

A regular meeting between key personnel of the Engineer and the Contractor's authorised representative shall be held once a week at a time agreed upon by both parties to discuss the progress being made, the work proposed for the forthcoming week and any problem having a direct bearing on the immediate or near term work activities.

1.5.8 Other Submittals

During the course of the Works the Contractor shall submit to the Engineer for approval construction programmes, design computations, financial schedules, construction plans, various plans of work, survey, tests and operation, reports on the results of survey, test and inspection, written description of equipment to be used, pamphlets, brochures and samples of materials and equipment, and other required documents and good as prescribed in this Specification and as directed by the Engineer. Such submittal of documents and good shall be made in advance to avoid causing any delay to the field works. The procedure for submittal and approval shall be in the same manner as specified in Clause 1.4.5.

1.5.9 Payment

Except as otherwise specified, separate payment will not be made for complying with the requirements of clause 1.5 and all costs shall be deemed to be included in the rates and lump sum prices entered in the priced Bill of Quantities.

1.6 STANDARDS AND TESTS

1.6.1 Standards and Specifications

All materials and equipment to be furnished and installed for the Works and all construction works to be executed under the Contract shall conform to the respective standards and specifications stated in the Specification. Where applicable standards and specifications for any material, equipment and construction are not stated in the Specification, they shall conform to the latest edition of the relevant standards of the following organisations:

JIS	: Japanese Industrial Standard
AASHTO	: American Association of State Highways and Transportation Officials
JCEA	: Japan Civil Engineers Association
ACI	: American Concrete Institute
AISI	: American Iron and Steel Institute
ASTM	: American Society for Testing and Materials
AWS	: American Welding Society
USBR	: Water and Power Resource Service, United States Department of the Interior (formerly United States Bureau of Reclamation)
SSPC	: Steel Structures Painting Council
HGPS	: Hydraulic Gate and Penstock Association, Japan
JRA	: Japan Road Association
SII	: Standard Industries Indonesia
PBI	: Peraturan Beton Indonesia
PKKI	: Peraturan Konstruksi Kayu Indonesia

If the Contractor proposes equivalent standards or specifications for materials and equipment, he shall state the exact nature of the proposed change and shall submit complete standards and specifications in English, including information and data on such materials and equipment, for approval of the Engineer. Such submittal shall be made in sufficient time for approval by the Engineer and failure to do so the purchase of any proposed equivalent materials and equipment prior to the approval of the Engineer shall be at the Contractor's risk.

The Contractor shall have available in his site office at all times at least one (1) copy of every standard referred to in this Specification or necessary for the execution of the Works.

1.6.2 Inspection, Examination and Testing of Materials and Equipment

Materials and equipment furnished by the Contractor, which will be incorporated in the Permanent Works, shall be subject to inspection, examination and test as provided in the Contract. To allow sufficient time to provide for inspection, examination and testing, the Contractor shall submit to the Engineer at the time of issue, copies in duplicate of all orders, including drawings and other pertinent information covering the materials and equipment to be furnished by the Contractor, or shall submit other

evidence in the event of such orders being issued verbally or by letter. The inspection, examination and testing of materials and equipment or the waiving of inspection, examination and testing thereof shall in no way relieve the Contractor of the responsibility for furnishing materials and equipment meeting the requirements of this Specification.

All examinations and tests shall be carried out by the Contractor in the presence of the Engineer in accordance with the normal practice for such examination and tests. The Contractor may carry out the examinations and tests with his staff and equipment available at the Site. Examinations and tests carried out off the site shall be made at a laboratory approved by the Engineer.

The Engineer shall be at liberty to reject any material or equipment that does not comply with the requirements of the Contract notwithstanding any previous approval thereof. The Contractor shall not be entitled to any extra payment or extension of time for completion of the Works on account of the rejection of materials due to their non-compliance with the requirements of the Contract, or of the waiting time required for carrying out the examinations and tests.

The Contractor shall furnish test samples as requested and shall provide reasonable assistance and co-operation as necessary to permit tests to be performed on materials or work in place, including reasonable stoppage of work during testing.

The Contractor shall co-operate in all manners required with the independent testing team authorised under Keputusan Menteri Pekerjaan Umum, Nomor 22/229/KPTS/1999, dated 13 July 1999.

1.6.3 Test and Testing Laboratory

The Contractor shall provide the laboratory with all of the necessary testing equipment and apparatus. The Contractor shall provide his own qualified staff and laboratory assistants capable of carrying out all of the laboratory testing required for all the materials to be used for the Works including physical and/or mechanical properties of soil, aggregate, concrete, asphalt, their products and so on, as specified in the Specification. All testing equipment and apparatus provided by the Contractor in accordance with this Clause shall remain the property of the Contractor on completion of the Works.

The Contractor shall carry out all field tests such as compaction tests, concrete workability tests and so on in accordance with the manner and frequency prescribed in the Specification and shall provide the testing equipment and apparatus, testing staff, labour and consumables necessary for carrying out his field testing. The Contractor shall prepare schedules of his field and laboratory testings taking into account the work progress schedule and shall submit them to the Engineer for approval.

The Engineer will supervise the Contractor's testing for the purpose of adequate and sufficient quality control of the Works during its execution. The laboratory and equipment shall be made available and accessible to the Engineer at all times.

The Contractor shall identify specific locations of tests directed by the Engineer, by survey if necessary, and include such information in all test reports.

All test reports shall be submitted to the Engineer as soon as possible and within 24 hours of their completion.

1.6.4 Payment

Separate payment will not be made for complying with the requirements of this Clause 1.6 and all costs shall be deemed to be included in the rates and lump sum prices entered in the priced Bill of Quantities for the items to which the standards and tests apply.

1.7 MOBILISATION AND DEMOBILISATION

1.7.1 General

Mobilisation shall refer to the transportation of construction plant and equipment, based on the construction programme submitted by the Contractor in accordance with Clause 27 of the Conditions of Contract and Clause 1.5 hereof, from the place of origin to the Site where they are to be used. When the mobilisation has been substantially completed to the extent the Works can be effectively performed and obtain the scheduled progress, the Contractor shall submit the required documentation for the Engineer's approval and certification. Subject to the authorisation of the Engineer the Contractor may at any time during the execution of the Works, make alteration, reduction and/or improvement to the Equipment.

Demobilisation shall include the removal of the Contractor's Equipment from the Site.

1.7.2 Equipment

The Contractor shall furnish the necessary Equipment, as defined in Clause 1 of the Conditions of Contract, required for the execution of the Works. The Engineer may, if he consider it necessary for the execution of the Works in accordance with the Contract, instruct the Contractor to furnish additional Equipment. All equipment to be furnished by the Contractor shall be complete with all spare parts and the Contractor shall maintain a sufficient stock of such spare parts to ensure the efficient execution of the Works.

1.7.3 Programme and Notice of Transportation

Concurrently with the submittal of program in accordance with Clause 27 of the Conditions of Contract, the Contractor shall furnish the Engineer with a complete transportation programme for Equipment, showing in detail the sequence of transportation and delivery on the Site to comply with his proposed construction programme.

The Contractor shall keep the Engineer informed of the arrival of plant, materials and Equipment at the Site.

1.7.4 Payment

Payment for mobilisation and demobilisation will be made at the lump sum price tendered therefore in the priced Bill of Quantities. Progress payment will be made in the following manner :

- i Seventy percent (70 %) of each approved Sub-item of the lump sum price tendered in the priced bill of Quantities will be paid upon certification by the Engineer that mobilisation has been substantially completed for each item of plant or equipment shown in the Contractor's breakdown submitted with his bid.

- ii The remaining thirty percent (30 %) of each approved Sub-item of the lump sum price tendered in the price Bill of Quantities will be paid upon certification by the Engineer that the demobilisation of concerned equipment has been completed for each of the items of plant or equipment mentioned above.

Monthly estimates of progress for payments of mobilisation and demobilisation shall be supported with appropriate records and documents showing that mobilisation or demobilisation for each item of plant or equipment as mentioned above has been completed during the month for which the estimate is prepared.

1.8 ESTABLISHMENT

1.8.1 General

The items described hereunder refer to the work required to be performed by the Contractor for his establishment on site and to prepare the site ready for the execution of the Works

1.8.2 Temporary Roads and Bridges

1.8.2.1 General

- a. The Contractor shall construct and maintain temporary construction roads, including haul and access roads, bridges, and the associated drainage and stream crossing facilities necessary for the execution of the Works. The Contractor shall also improve or modify the existing roads within the site of the Works provided by the Employer for the purpose of the execution of the Works. Demolition and removal of this temporary work shall be subject to the approval of the Engineer.
- b. The Contractor shall make the necessary arrangements with the appropriate Local Government Authorities and private land owners where the site of the Works will encroach on land outside the right of way of such roads .
- c. The Contractor shall make the necessary arrangements with the appropriate Local Government Authorities and private landowners where new temporary access and haul roads are required through private land.
- d. Not less than thirty (30) days before the Contractor intends to commence construction of any part of the temporary construction roads, the Contractor shall submit to the Engineer for approval a detailed construction plan including:
 - The location and design of the temporary construction roads, including the associated drainage and stream crossing facilities; and
 - The construction method and construction time schedule of such temporary construction roads,

The location of these roads shall be in accordance with the Contractor's proposals submitted with his Bid and approved in the Letter of Acceptance or as otherwise approved by the Engineer.

1.8.2.2 Design Requirements for Temporary Roads and Bridges

- a The temporary construction roads shall be designed so as to generally have a driveway width of 6.0 m, where practicable to do so, and a longitudinal slope of less than 10 %. The roads shall be provided with an area for shunting vehicles at appropriate intervals. When a temporary slope is necessary at the riverside of a dike, such slope shall be down to the downstream side from the top of dike.
- b The Contractor shall execute the required clearing and grubbing and construct the temporary construction roads in accordance with the approved drawings and construction programme. Topsoil shall be stripped and stockpiled for restoration purposes in accordance with paragraph d. of this Subclause. Surplus material from required excavation may be allowed as construction material for the construction roads. The Contractor shall provide a gravel pavement or other measures in stretches where trafficability is in the opinion of the Engineer, not sufficient for the efficient transportation of equipment and materials.
- c Where the temporary construction roads cross existing stream flow such as a river, drainage channel or irrigation channel, the Constructor shall provide an appropriate section of concrete or steel pipe or other means to allow water discharge. All crossings damaged or destroyed by heavy rainfall shall be restored by the Contractor at his cost if, in the opinion of the Engineer, such restoration is necessary.
- d The Contractor shall be responsible for the repair at his own expense of any damage to the temporary construction roads caused by the passage of heavy equipment and trucks used by the Contractor or his subcontractors for the execution of the Works or caused by other contractors employed on the site by the Employer or by the public, where applicable. On the completion of the Works, such temporary construction roads, except those which are directed to be left on the Site, shall be removed and the land restored to its original condition to the satisfaction of the Engineer.

1.8.2.3 Use of Roads by Others

During the period of the Contract, the Employer and other contractors employed by the Employer will be engaged on other works in the vicinity of the Works covered by this Contract, and the Contractor shall allow the Employer and such other contractors free and unrestricted use of all temporary roads. Public roads shall remain open to the public at all times.

1.8.3 Contractor's Site Office and Facilities

1.8.3.1 General

The Contractor shall provide, maintain and operate the Contractor's Site office and construction facilities which include, among other things, staff quarters, warehouse, workshop, laboratory, labour camp and other temporary buildings and facilities necessary for the execution of the Works, and shall remove them upon the completion of the Works except as otherwise specified in the Contract or directed by the Engineer.

The Contractor shall submit revised layout plans and general particulars of such temporary buildings and facilities to the Engineer for his approval. The construction of any buildings or facility shall not be started until the Contractor's proposals have been finally approved by the Engineer.

1.8.3.2 Construction Camp

- a The Contractors shall make his own arrangements for the obtaining a suitable site for the construction by the Contractor, as proposed in his Tender and approved in the Letter of Acceptance, of housing camps and for other facilities and amenities for his employees and for the employees of his subcontractors.
- b The Contractor's staff quarters and labour camp shall be provided with all the necessary services for drainage, electricity, lighting, roads, paths, parking spaces, fencing, sanitation including sewage treatment, water supply, cookhouse, fire prevention and fire fighting equipment.

1.8.3.3 Contractor's Site Office

The Contractor shall provide the Site office as soon as the preparatory work at the Site takes place. The Site office shall be constructed in a location approved by the Engineer with all the necessary facilities for drainage, lighting, sanitation, parking spaces, etc.

1.8.3.4 Completion of Site Office and Construction Facilities

The Contractor shall notify the Engineer in writing as soon as the temporary buildings and facilities have been constructed and are ready for operation. The Engineer shall certify that such buildings and facilities have been constructed in accordance with the approved plans..

1.8.4 Engineer's Site Office and Facilities

1.8.4.1 General

The Contractor shall provide, maintain and operate an office facility for the sole use of the Engineer and his staff. The facility shall include desk working areas for the Engineers staff numbering 5 and meeting facilities shall cater for 10 persons.

The office facility may be either an existing building in close proximity to the site, owned or rented by the Contractor, or a new, temporary facility constructed on or in close proximity to the site.

The Contractor shall submit plans and particulars of his proposal for the Engineer's Site office for the Engineer's approval prior to constructing the facility or entering into any agreement for renting a premises for the intended purpose.

The requirements to be fulfilled under this clause are detailed hereunder.

1.8.4.2 Office Building

The building shall be not less than 70 m² in plan area and shall contain rooms for use as office space and for the conduct of meetings, a kitchen and a toilet.

All offices and meeting rooms shall be air conditioned.

Architectural items to be provided shall include blinds, floor coverings and light fittings.

Furniture to be provided shall include filing cabinets, drawing storage units, book shelves, desks and chairs, meeting table and chairs.

Utility services shall included electric power, telephone, water supply and sewerage. The cost of all utility services, except telephone usage charges shall be borne by the Contractor.

The Contractor shall provide all other incidental items such as white boards, desk lamps, water cooler, crockery etc. in order that the office environment is functional, secure, complete and to the approval of the Engineer.

1.8.4.3 External works

If the facility is constructed on a green site, external works shall include perimeter fencing, paved car parking for a minimum of 2 vehicles and footpaths.

If the facility is an existing premises parking areas for at least 2 vehicles shall be exclusively available for the Engineer and his staff. Other external works, as specified above, shall be provided to the extent practicable.

1.8.4.4 Manpower

The Contractor shall provide full-time watchmen and a janitor.

1.8.4.5 Maintenance and Operation

The Contractor shall ensure that the Engineer's site office is at all times maintained in good order and provided with the utility services noted above.

1.8.4.6 Removal and Hand-over

At the conclusion of the Contract the Contractor shall, in the event that the facility comprises a new, temporary building on or near the site, remove all of the buildings and facilities provided under this clause and reinstate the area to the satisfaction of the Engineer and all items of furniture and office equipment shall be handed over to the Employer.

In the event that the facility is owned or rented by the Contractor, at the conclusion of the Contract the facility shall cease to be part of the Works and all items of furniture and office equipment shall be handed over to the Employer.

1.8.5 Payment

1.8.5.1 Contractor's Site Office and Facilities

Payment for Contractor's Site Office and Facilities will be made at the lump sum price entered therefore in the priced Bill of Quantities

Monthly progress payment will be calculated on the basis of paying 70% of the said lump sum in proportion to monthly progress of the whole of the Works.

The final payment, representing 30% of the lump sum, will be paid following the Engineer's approval of the removal of the Contractors site office and facilities as applicable.

1.8.5.2 Engineer's Site Office and Facilities

Payment for Engineer's Site Office and Facilities will be made at the lump sum price tendered therefore in the priced Bill of Quantities.

Monthly progress payment will be calculated on the basis of paying 70% of the said lump sum in proportion to monthly progress of the whole of the Works.

The final payment, representing 30% of the lump sum, will be paid following the Engineer's approval of the removal of the Engineer's site office and facilities as applicable.

1.9 TEMPORARY FACILITIES

1.9.1 General

1.9.1.1 Temporary Facilities

- a For the purposes of this Specification temporary facilities shall include facilities such as crushing plants, concrete batching plants, casting yards, prestressing yards, etc. used for the preparation and storage of materials for the Works.
- b All Temporary Facilities shall be provided, installed, operated, maintained and subsequently removed by the Contractor, except as otherwise provided in the Contract.

1.9.2 Approval of Temporary Facilities

- a The Contractor's proposal for the erection of all temporary facilities shall be in accordance with the proposals submitted in with the Contractor's Bid or with such modifications as approved by the Engineer from time to time.
- b The Contractor shall submit to the Engineer for approval, within thirty (30) days from the receipt of the Letter of Acceptance, the revised general plan of temporary facilities, based on the proposals in the Bid including scale, capacity, layout, dimension, installation programme and schedule, and foundations. The Engineer may direct the Contractor to modify or change the proposals, if in the opinion of the Engineer it is deemed necessary. Such direction of the Engineer shall not relieve the Contractor from any of his obligations and responsibilities under the Contract.
- c Before starting any part of temporary facilities the Contractor shall, at least thirty (30) days before starting construction, submit to the Engineer for the approval the detailed proposal for such part of the temporary facilities including plans, drawings, schedules, and other information as specified in clauses 1.4 and 1.5 of the General Specification which will supplement or modify the general plan of the temporary facilities already submitted by him.

1.9.2.1 Removal of Temporary Facilities

Unless otherwise directed or approved by the Engineer, all temporary facilities constructed by the Contractor shall be removed and the area made safe, vegetation and natural drainage reinstated prior to the end of the Defects Liability Period.

1.9.2.2 Payment

Separate payment will not be made for temporary facilities and all the costs thereof shall be deemed to be included in the various rates and lump sum prices entered in the priced Bill of Quantities.

1.9.3 Use of Construction Facilities and Work Areas

1.9.3.1 Location of Temporary Works

The Contractor shall, as far as practicable, lay out the temporary facilities within the Site. Owing to the dense development adjacent to the site it is expected that additional temporary works areas will be required. The

Contractor shall make his own arrangements for the obtaining a suitable site for any of his temporary works which cannot be accommodated within the site. All costs associated with obtaining such areas shall be borne by the Contractor.

1.9.3.2 Damage to Crops and Property

The Contractor shall limit the movement of his crew and equipment so as to minimise damage to crops and property. Before acceptance of the Works by the Employer the Contractor shall restore the land occupied by the temporary facilities as nearly as practicable to its original condition.

1.9.3.3 Indemnity against damage or injury

The Contractor shall be directly responsible to the Employer for any damage or injury to crops or land whether in the possession of the Employer or any other person, resulting from his operations and shall indemnify and keep indemnified the Employer against all losses and claims for such damage and injuries which may arise in connection with the risk as provided for in clause 12 of the Conditions of Contract

1.9.3.4 Rights of Others to Use Construction Facilities

Other contractors employed by the Employer and their workmen and workmen of the Employer and of other Government authorities who will be carrying out work on or near the Site of the Works shall have the right to use, without charge, the access facilities, including bridges and roads, of which the Employer has given possession to the Contractor or which have been constructed or acquired by the Contractor for use in constructing the Works.

1.9.3.5 Facilities to be made available by the Contractor

Reticulated water, drainage systems and any other such facilities, constructed or acquired by the Contractor for use in carrying out the Works, which are available without entailing any appreciable increase in cost to the Contractor as determined by the Engineer shall be made available without charge to the Employer and any other contractors employed by the Employer at mutually convenient times.

1.9.3.6 Temporary Works by Others

- a In the event that other contractors employed by the Employer have constructed temporary works in the vicinity of the Works covered by the Contract, the Contractor shall have free and unrestricted use of all temporary roads constructed by other contractors but shall not cause any obstruction on such roads.
- b Before the completion of other contracts, the Contractor shall notify the Engineer of the temporary roads constructed by other contractors and areas of land utilised by temporary works of other contractors that he proposes to use for the remaining period of such temporary roads and areas, as approved by the Engineer, and they shall be deemed to form part of Contractor's obligations under this clause as if constructed by him.
- c The Contractor shall maintain such roads and areas from the date of possession in accordance with the requirement for all items provided under Establishment. On the completion of the Works, such roads and

areas, unless otherwise approved by the Engineer, shall be removed and the land restored to its original condition prior to commencement of the other contracts to the satisfaction of the Engineer.

- d Separate payment will not be made for maintenance, improvement, removal and reinstatement of these roads and areas, where required, and the cost of all works required by this clause shall be deemed to be included in the rates and lump sum prices of the various items in the priced Bill of Quantities.

1.10 TEMPORARY TRAFFIC CONTROL

1.10.1 Scope

To facilitate traffic through or around the Works, or wherever ordered by the Engineer, the Contractor shall install and maintain at prescribed points on the Site and at the approaches to the Site, traffic signs, lights, barricades and other facilities as required by the Engineer for the direction and control of traffic. The wordings on all signs shall be in the Indonesian language. The size, colour, lettering and location of all signs shall be subject to the Engineers approval. Attention shall be paid to the international system of traffic sign or as applicable in Indonesia.

Where required, or on when directed by the Engineer, the Contractor shall furnish and station competent flagmen whose sole duty shall be to direct the movement of the traffic through or around the Site.

In addition to the requirements of the above Subclauses, the Contractor shall furnish and erect, within or in public areas in the vicinity of the Site, such warning and guide signs as may be ordered by the Engineer.

1.10.2 Payment

- a Separate payment will not be made for complying with the provisions of this Clause 1.10 and the cost of all works required by this clause shall be deemed to be included in the rates and lump sum prices of the various items in the priced Bill of Quantities.

1.11 GARBAGE DISPOSAL

1.11.1 Scope

- a The Contractor shall undertake the collection of and disposal of all garbage from within the Site, the Contractor's Site office, the Contractor's temporary facilities, the Engineer's Site office and other areas used in connection with the Works. Garbage collections shall be made at least twice each week and shall continue until completion of the Works.
- b Garbage shall be disposed of in a properly constructed incinerator followed by burial of the residue in an approved location. The Contractor shall submit the proposed design and layout of garbage disposal facilities for approval. Where available, garbage collection by local authorities shall be used in preference to disposal as noted above.

1.11.2 Payment

Separate payment will not be made for the provision for garbage disposal and the cost of this work shall be deemed to be included in the lump sum

price entered in the priced Bill of Quantities for Contractor's Site Office and Facilities.

Payment for clearing of garbage is addressed in Section TS 1.

1.12 REMOVAL OF FLOATING RUBBISH

1.12.1 Scope

Removal of all floating rubbish which affects the progress of the Works shall be the responsibility of the Contractor.

All floating rubbish retrieved shall be removed from the Site in a manner for which the Engineer has given his prior approval.

1.12.2 Payment

Separate payment will not be made for the provision for Floating Rubbish Removal and the cost of this work shall be deemed to be included in the rates and lump sum prices entered in the priced Bill of Quantities.

1.13 DIVERSION AND CARE OF WATER

1.13.1 General Requirements

The Contractor shall be responsible for the removal of all water encountered during the execution of the whole of the Works.

The Contractor shall design, construct and maintain all temporary diversion and protective works which are necessary for construction and to prevent surface, drainage and groundwater from entering excavations and shall furnish all materials required therefor.

The Contractor shall furnish, install, maintain and operate all necessary pumping and other equipment for dewatering the various parts of the Works on the surface, in open cut excavation and in the river channel and shall maintain the foundations and other parts of the work free from water as required for constructing each part of the Works and as required, and for a period after any part of the Works is completed for inspection, safety or for any reason determined by the Engineer to be necessary.

The Contractor shall not interrupt or interfere with the natural flow of the existing drainage channels for any purpose without the written approval of the Engineer.

In the event that the Contractor blocks or constructs the flow path of any existing drainage channel he shall provide pumps of sufficient capacity and /or bypasses such that normally expected flows shall not be impeded.

The Contractor shall remove all water from the sites of all construction work and shall keep the excavations free of water while excavating, preparing foundations, pile driving and while placing backfill or concrete or as otherwise required for completing the Works. The Contractor shall be responsible for and shall repair, at his expense, any damage to foundations, excavation slopes or any other parts of the Works caused by water, floods or by his failure to protect the Works in accordance with the requirements of this clause. Temporary diversion and protective works, conduits, and sumps shall be readily accessible at all times and the Contractor shall maintain in operating condition an assembly of standby transportable and portable

lighting facilities which is adequate, as determined by the Engineer, to provide illumination, at short notice, to any or all of the temporary works.

All temporary cofferdams and protective work shall be removed or levelled as approved by the Engineer to give a neat appearance and so as not to interfere in any way with the operation or usefulness of the permanent works. Temporary cofferdams constructed within the boundaries of the permanent works shall be removed completely. Temporary cofferdams shall not be constructed on or against any part of the permanent works unless the Contractor can demonstrate that no damage to the permanent works will result and shall not be so constructed without the approval and the presence of the Engineer.

1.13.2 Payment

Payment for Coffering and Dewatering for specific items of work where payment items are included in the Bill of Quantities shall be made in accordance with the provisions of Section TS 2, of the Technical Specification.

For all other cases, no payment shall be made for complying with this general obligation of the Contractor described in this clause and the cost of this work shall be deemed to be included in the rates and lump sum prices entered in the priced Bill of Quantities.

1.14 MAINTENANCE OF EXISTING PUBLIC ROADS

1.14.1 General

The Contractor shall maintain all roads within the vicinity which he uses for purposes of carrying out the Works required by this Contract

1.14.2 Contractor's Operations

- a If the Contractor's operations obstruct or hinder the passage of traffic on the roads described in this Clause, the Contractor shall provide and maintain for the duration of such disruption an alternative route, approved by the Engineer, of a standard not less than that of the road so affected.
- b Existing roads and bridges have their load limits and the Contractor shall be responsible for determining such load limits. Before moving any heavy construction traffic into highways, roads, and bridges, the Contractor shall make suitable arrangements with the relevant authorities and obtain their approval for the passage of such traffic.
- c The Contractor shall not travel tracked vehicles or equipment on any bituminous sealed road surface. Rubber tyred vehicles conforming to applicable load restrictions will be permitted to use bituminous sealed road surfaces.
- d All the work of improvements or modifications on the existing public roads made by the Contractor for his own convenience shall be at the Contractor's own risk and expense.

1.14.3 Maintenance of Roads

- a The Contractor shall be wholly responsible for maintenance of the public roads used by him in the execution of the Works.

b In maintaining these roads the Contractor shall:

- i reinforce to pass his traffic, if necessary, and keep in good working condition at all times all road structures, bridges, culverts, drains and other waterways;
- ii patch potholes with approved materials, keep the road surfaces in good repair, and perform all grading and necessary resurfacing;
- iii maintain all fenders, posts, guideposts, guard posts, rails, fencing, signs, signposts and other roadside structures;
- iv keep road surfaces and shoulders free from all earth, mud, stones, timber, rubbish, and other debris and materials removed from the Works;
- v adequately maintain cut-slopes and fill-slopes of the roads and appurtenant drainage ditches; and
- vi keep the road surface watered where dust is likely to be a safety or health problem.

1.14.4 Payment

Separate payment will not be made for complying with the requirements of this Clause, and the cost of this work shall be deemed to be included in the various rates and lump sum prices entered in the priced Bill of Quantities.

1.15 PLANT, EQUIPMENT AND MATERIALS TO BE FURNISHED BY THE CONTRACTOR

1.15.1 General

1.15.1.1 Plant, Equipment and Materials to be Furnished by The Contractor

The Contractor shall furnish all items of plant, equipment and materials required for the execution of the Works except as otherwise provided for in the Contract.

1.15.1.2 Trades Names and Catalogue Numbers

Unless specifically stated otherwise, any reference in this Specification or on the Drawings to trade names or catalogue numbers or to a particular manufactured product does not imply that article or product so mentioned is the only one that may be supplied or used. Any reference so made is purely given as to the standard of the quality, class, type and finish of the items specified to be used. Articles or products of similar type and quality produced by other manufactures shall be submitted by the Contractor to the Engineer for approval for use in the Works.

1.15.1.3 Conformity of Plant, Equipment and Materials with Specification.

- a All plant, equipment and materials which form part of the permanent Works shall be new and shall conform to the standards provided in the Specification. Where the requirements for any plant, equipment and materials are not stated in this Specification, the plant, equipment and materials shall conform with the appropriate and most recent Indonesian, Japanese or American Standard or such other standard as the Engineer may approve.

- b The Contractor shall make diligent effort to procure the specified materials but where, because of priorities or other causes, materials required by the Specification are not available, substitutes may be used with the prior approval of the Engineer. The approval will state the amount of price adjustment, if any, to be made. The Engineer's decision as to whether substitution will be permitted and as to what substitute materials may be used will be final, binding and conclusive.

1.15.1.4 Payment

- a When a separate item, which includes the furnishing of any plant, equipment or materials, is provided in the Bill of Quantities, the cost of furnishing, transporting, storing and handling such plant, equipment or materials shall be deemed to be included in the rate or lump sum price entered for that item in the priced Bill of Quantities.
- b Where no separate item is provided in the Bill of Quantities for furnishing any plant, equipment or materials required to be furnished by the Contractor, the cost of furnishing, transporting, storing and handling such plant, equipment or materials shall be deemed to be included in the rates or lump sum prices entered in the priced Bill of Quantities for the items for which plant, equipment or materials are required.

1.15.2 Inspection of Plant, Equipment and Materials

- a Plant, equipment and materials furnished by the Contractor shall be subject to inspection in accordance with the Contract at any one or more of the following locations as determined by the Engineer:
 - The place of production or manufacture.
 - The shipping point.
 - The Site.
- b The Contractor shall furnish without additional charge all facilities, labour and materials reasonably needed for performing the inspections, examinations and tests as may be required by the Engineer.
- c The Contractor shall submit the Engineer all information covering the plant, equipment and materials required by the Engineer for the purpose of inspection which shall in no way relieve the Contractor from his responsibility for furnishing plant, equipment and materials in compliance with the Specifications.
- d Separate payment will not be made for complying with the requirements of this Clause and all costs shall be deemed to be included in the rates and lump sums entered in the priced Bill of Quantities.

1.16 SAFETY, HEALTH CONTROL AND SECURITY

1.16.1 General

The Contractor shall be responsible for all safety, health controls and security and shall submit to the Engineer details of the organisation and regulations for these purposes.

1.16.2 Safety Precautions

1.16.2.1 General

The Contractor shall comply with any safety instruction given by the Engineer. In the performance of the Works, the Contractor shall exercise every reasonable precaution to protect from injury persons or property. The Contractor shall erect and maintain all necessary temporary fencing, barricades, barriers, signs and lights and provide fire alarm, fire extinguishing and fire fighting services at strategic points on the Site and adequate ventilation, lighting and safe working conditions for his workmen engaged in the performance of the Works. The Contractor shall adopt and enforce such rules and regulations as may be necessary and desirable in the work and in its supervision. Safety measures shall include but shall not be limited to those measures mentioned in this clause.

1.16.2.2 Safety Officer

The Contractor shall constantly employ during the progress of the Works an employee qualified in safety, and familiar with the type of work being performed, whose assignment shall include initiation of measures for the protection of health and the prevention of accidents and who shall see, by personal inspection, that all safety rules and regulations are enforced. The Contractor shall hold regularly scheduled safety meetings at least once each month with his engineers, supervisors and foremen and, when directed, with the Engineer. The Contractor shall keep the Engineer advised as to when these meetings are to be held and shall provide the Engineer with a copy of the proposed agenda.

1.16.2.3 Temporary Fencing

The Contractor shall erect, maintain and remove suitable and approved temporary fencing to enclose such areas of the permanent Works and areas of land occupied by the Contractor within the Site as may be necessary to implement his obligations under the Contract in approved manner. Where any temporary fence has to be erected alongside a road, footpath, or other public thoroughfare, it shall be of the type required by and shall be erected to the satisfaction of the Government authority concerned.

1.16.2.4 Lighting

- a In the event of night work being carried out, the Contractor shall provide sufficient lighting to ensure that in all places where work is in progress :
 - i safe working conditions are provided for the Contractor's personnel and the Engineer;
 - ii the Works can be constructed in complete compliance with the Contract; and
 - iii a complete inspection of all Works in progress can be made by the Engineer.
- b Unless otherwise directed by the Engineer, the minimum service illuminance on ground or working surfaces to be provided for the various operations or work areas shall be as tabulated below :

ILLUMINANCE		
OPERATION OR AREA	Design Minimum	
	Value (Lux)	Measured Value (Lux)
Earthworks and excavation	50	20
Temporary Bridge	20	10
Access and haul roads where cross traffic or other hazardous conditions exist	20	10
Concrete placing	100	50
Maintenance shops and Auxiliary buildings	300	200

- c All moving equipment or plant used during night operations or in tunnels shall be equipped with sufficient lights and reflector to ensure safe working conditions.
- d Not less than fourteen (14) days before the start of any night operations, the Contractor shall submit to the Engineer his proposals for lighting in the areas in which he proposes to work at night. The Contractor shall modify the proposals if directed and shall not begin operations at night, until the proposals for lighting have been approved.
- e The submission to or approval by the Engineer of the Contractor's proposals for lighting shall not relieve the Contractor of any of his liabilities or obligations under the Contract.

1.16.2.5 Signs

- a The Contractor shall provide all necessary signs for the Works. These shall include, but not be limited to
 - i standard road signs;
 - ii warning signs;
 - iii danger signs;
 - iv control signs;
 - v safety signs; and
 - vi direction signs.
- b Wording on all signs shall be in the Indonesian language. The size, colour, lettering and location of all signs will be subject to approval, and attention shall be paid to international system of signs.
- c The Contractor shall maintain all signs placed by himself as well as those placed by the Employer.
- d 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.

1.16.2.6 Other Safety Measures

- a When working in the vicinity of electrical equipment and in the interest of safety and security, the Contractor shall complete the erection of any safety fencing around electrical and mechanical equipment by the time that the said apparatus is connected to any electrical supply.
- b Explosives - in the use, handling and storage of explosives, the Contractor shall comply with the guidelines given in Clause 1.16.4 and with all statutory regulations of Indonesia, and the 'Safety Regulations for Sensitised Ammonium Nitrate Blasting Agents' (United States Department of the Interior, Bureau of Mines). The handling or use of explosives shall be discontinued during the approach and progress of a thunderstorm. All persons shall be removed from danger areas to a place of safety during such periods. The Contractor shall supply and install a suitable approved instrument to continuously measure atmospheric electric activity during blasting operation and to sound an alarm when such activity reaches danger levels.
- c Use of Lasers - The use of lasers on the Site shall be done with due regard to eye hazard and all personnel working on the site shall be warned accordingly.
- d Safety instructions - Within sixty (60) days of the receiving the Letter of Acceptance, the Contractor shall, at his own cost, supply and issue to his employees, those of his subcontractors and the Engineer, in English, Bahasa Indonesia and in other languages used by his employees at the Site, a booklet containing safety regulations based on good practice. The booklet shall be pocket size and issued to each person employed at the Site. Proof copies of the booklet shall be submitted to the Engineer for approval before printing and amendments shall be made to the booklet to his entire satisfaction. The Contractor shall issue the booklet immediately after printing as required by this clause and ensure that all employees are fully conversant with the instructions. Safety instructions shall deal with all safety including but not limited to the following items where relevant to the Works :
 - i protective clothing, headgear and footwear;
 - ii use of lifting equipment;
 - iii use and storage of explosives;
 - iv earthmoving;
 - v formwork and reinforcement erection;
 - vi concreting;
 - vii structural steelwork;
 - viii compressed air;
 - ix welding and painting;
 - x routine for accidents or fires; and
 - xi watchman, warning notices and barriers.
 - xii electrical safetyThe Contractors shall allow for ten (10) booklets in the English language for the use of the Engineer.
- e Accident Report - The Contractor shall promptly report to the Engineer, in a form to be prescribed, all accidents involving death or serious injury

to staff or workmen, and shall furnish monthly reports of all accidents to staff or workmen involving loss of time, giving such information as may be directed.

1.16.2.7 Provision of Safety Equipment

All persons employed on the Works are to be provided with safety equipment appropriate to the tasks upon which they are engaged such as helmets and safety equipment shall be compulsory as deemed necessary by the Engineer.

1.16.2.8 Payment

Separate payment will not be made for complying with the provisions of this Clause and all costs shall be deemed to be included in the rates and lump sum prices entered in the priced Bill of Quantities.

1.16.3 Sanitary Arrangements

1.16.3.1 Scope of Work

- a The Contractor shall keep the Site in a clean and hygienic condition, and shall provide and maintain sanitary conveniences for use of the persons employed in the Works to the extent, in the manner and at such places as approved by the Engineer and by any Government health authority concerned. All persons connected with the Works shall be enjoined to use these conveniences.
- b The Contractor shall install, operate and maintain an adequate treatment process for disposal of sewage from all temporary buildings including houses, offices, camps, etc., to be constructed by the Contractor, and from all temporary toilet facilities at the Site. Sewage shall be disposed of in a hygienic manner. The Contractor shall post notices and take such other necessary precautions as may be necessary to keep the Site clean. The sewage treatment plant shall be subsequently removed upon completion of the Contract.

1.16.3.2 Payment

Separate payment will not be made for complying with the requirements of this Clause and all costs shall be deemed to be included in the item in the priced Bill of Quantities for Contractor's Site Office and Facilities.

1.16.4 Explosives and Fuels

1.16.4.1 General

- a The Contractor shall make arrangement for the transportation, storage and handling of explosives and fuels in a safe manner to protect the public in accordance with the laws and security regulations of Republic of Indonesia.
- b The Contractor shall obtain all necessary licences and shall pay all fees and charges as may be necessary for moving explosives and fuels from place to place and storing at the same. The Contractor shall prepare and file all applications and obtain the approvals from the authorities of the Government of Indonesia concerned.

- c The Contractor shall furnish and install an efficient warning system, such as, but not limited to sirens and signs, so that adequate warning may be given to all workers and the public endangered by the charging or firing the explosives. The Contractor shall ensure, prior the discharging an explosive, that the area to be blasted is clear of all residents, pedestrians, and vehicular traffic. In addition, he shall post all flagmen on each of the roads leading to the areas so as to stop and prevent any traffic and person from entering the area until the "all clear" notice is given.
- d Explosives shall be stored at a safe distance from the public areas, work areas and living quarters. The location of explosives magazines compound shall be as approved by the Engineer. The compound shall be surrounded with barbed wire and the magazine shall be protected by safety locks, shall be well-ventilated, and shall be fitted with lightning arresters. The explosive magazine shall be surrounded by earth dikes, if so required by safety regulations or directed by the Engineer, according to the location of the Site of the magazine. Adequate air space shall be provided between the ceiling and the roof to prevent internal room temperatures rising to dangerous levels. The Contractor shall not make use of any explosive without the approval of the Engineer. Approval by the Engineer shall not relieve the Contractor from any of his obligations and responsibilities for all blasting operations.
- e The Contractor shall keep a record of use of each kind of explosive, detonator and lead wire by preparing a daily record of warehousing, delivery and in-stock quantities, and shall report periodically to the Engineer as directed.
- f If electrical blasting is used, possible electric discharge in the ground due to thunderstorm, electric lines, electric motors, etc., shall be carefully observed. As soon as a discharge which could affect the safety level of detonators is noted or anticipated, electrical blasting operation shall be interrupted.
- g Above-ground gasoline and liquefied petroleum gas storage tanks shall not be located within the limits of the camp Site or closer than 1,000 meters to any building in the Site.

1.16.4.2 Payment

Separate payment will not be made for complying with the requirements of this Clause and all costs shall be deemed to be included in the item in the priced Bill of Quantities for Contractor's Site Office and Facilities.

1.16.5 Fire Prevention

1.16.5.1 General

The Contractor shall take every precaution to prevent fire occurring on or about the Site. The Contractor shall comply with the laws and regulations of the appropriate Government authority relating to fires and shall provide fire fighting equipment, which the Engineer considers to be suitable and adequate, ready to use in all structures, buildings or the works under construction, including his labour camps and ancillary buildings. The Contractor shall maintain such equipment and such additional fire fighting equipment as may be required, in good working condition until the Works are accepted by the Employer.

The Contractor shall extinguish promptly any fire which may occur on the Site wherever the fire may originate. In this regard, he shall employ all requisite equipment and manpower for fire fighting up to the limits of his equipment and manpower employed at the Site including the equipment and manpower of his subcontractors.

1.16.5.2 Payment

Separate payment will not be made for complying with the requirements of this Clause and all costs shall be deemed to be included in the various rates and lump sums entered in the priced Bill of Quantities.

1.16.6 Earthing

1.16.6.1 General

All appliance and facilities which are possibly subject to lightning strikes shall be electrically grounded and the effectiveness of such grounding shall be periodically checked by the Contractor.

1.16.6.2 Payment

Separate payment will not be made for complying with the requirements of this Clause and all costs shall be deemed to be included in the various lump sums and rates entered in the priced Bill of Quantities.

1.16.7 Medical and Health Services

1.16.7.1 General

- a The Contractor shall make his own arrangement on the Site for treatment of casualties in a first aid unit in conformity with the requirement of all duly constituted medical and health authorities. The Contractor shall provide such first aid units and shall be responsible for and bear all costs in connection with the first aid services including removal by ambulance of injured or sick employees to hospital in Semarang or other places
- b The Contractor shall provide first aid services for the Employer's and Engineer's staff working on the Site.

1.16.7.2 Payment

Separate payment will not be made for medical and health facilities provided by the Contractor for his employees, for his subcontractors and the Employer's and Engineer's staff, as required by this clause, and all costs shall be deemed to be included in the various rates and lump sums entered in the priced Bill of Quantities.

1.16.8 Security

1.16.8.1 Responsibility of the Contractor

- a The Employer will specify overall security requirements for the project and the Contractor shall perform to such requirements and be responsible for such action of his personnel in respect of such requirements.

- b The Contractor shall be responsible for the security of the Works and the Employer's Quarters at Site and shall provide and maintain continuously and adequate security force to fulfil these obligations. The duties of the Contractor's security force shall include, but not be limited to, maintenance of order on the Site, provision of all lighting, fencing, guards, flagmen, all other measures necessary for the protection of the Works within the Site, all material delivered to the Site, the public, and all persons employed in connection with the Works, continuously throughout working and non-working periods, including nights, Sundays and holiday, for the duration of the Contract.

1.16.8.2 Payment

- a. Separate payment will not be made for the provisions of security services and all costs shall be deemed to be included in the various rates and lump sum prices entered in the priced Bill of Quantities.

1.17 SURVEY AND MEASUREMENT OF THE WORKS

1.17.1 Bench Mark and Reference Point

Horizontal Control

Reference points have been established on the Site by the Employer as shown on the Drawings or as advised by the Engineer. The Contractor shall use the co-ordinates of such reference points in setting out the Works. Any reference points damaged as the result of action by the Contractor shall be replaced by the Contractor at his own expense.

The Contractor may establish temporary reference points for his own convenience but each point shall be of a design and at a location approved by the Engineer. Each point shall be accurately related to the points established by the Employer.

Vertical Control

The Site is subject to ongoing subsidence and all elevations previously established by the Employer are unreliable.

The Contractor shall construct a minimum of four (4) bench marks in areas which will not be affected by the Works in the vicinity of the Site to be used for all vertical control surveying operations. A bench marks shall consist of a concrete block measuring at least 700 mm deep by 500 mm base width with a 20 mm dia steel rod vertically embedded in it protruding for a distance of 20 mm at the top to act as a levelling point. Alternatively, clearly identifiable, rigid, parts of existing major structures may be used. The choice of bench marks and/or the design of constructed bench marks and their locations shall be subject to the approval of the Engineer.

The elevations of such bench marks shall be established by means of a closed levelling traverse conducted by a specialised firm of surveyors engaged by the Contractor. The maximum permitted elevation difference error shall be $10 \sqrt{D}$ mm where D is the length of the traverse expressed in km. The reference for the levelling traverse shall be a government bench mark (TTG) to be nominated by the Engineer located on firm high ground in Semarang City where subsidence is not occurring.

The Contractor may establish temporary bench marks for his own convenience but each point shall be of a design and at a location approved

by the Engineer. Each point shall be accurately related to the main reference bench marks described above.

1.17.2 Responsibility for Setting Out

The Contractor shall be solely responsible for the correct setting out of the Works and shall employ experienced and qualified surveyors approved by the Engineer.

The Contractor shall furnish all materials, labour and equipment including stakes, templates, patterns, platforms and special labour that may be required by the Contractor in setting out any part of the Works. The Contractor shall use survey equipment of the type and accuracy to permit correct setting out and control of the Works.

The Contractor's obligations for surveying shall include the surveying of the original surface levels where works are to be performed. The method used and spacing of cross-sections shall be agreed by the Engineer prior to commencement of the survey. The spacing of cross sections shall be 20 m for the Baru River.

Before surveying the original surface levels to be plotted in the working drawings as described in Clause 1.4.4, the Contractor shall give the Engineer at least 7 days notice before commencing such survey in order that the Engineer or his representative can witness and verify levels so determined. The original surface level determined shall be subject to the Engineer's approval.

Owing to the very soft mud in the bed of the Baru River, a foot plate of a size approved by the Engineer or similar device to prevent excessive penetration into the mud shall be attached to all levelling staves.

The Contractor shall co-operate with the Engineer in checking the setting-out and in performing the measurement surveys for record and payment purposes. The Contractor shall render all necessary assistance to the Engineer and shall provide, as required for the use of the Engineer, sufficient quantities of pegs, poles, straight edges, stagings, mounds, templates, profiles, survey assistants, labourers and transport for checking the Contractor's setting-out and measurement of the Works.

1.17.3 Survey Data and Calculations

The Contractor shall submit all survey data, information, calculations, results and records to the Engineer as soon as they are available.

1.17.5 Payment

Payment for surveying shall be made at the lump sum entered in the priced Bill of Quantities. Monthly progress payments shall be made in proportion to the progress of the Work.

1.18 OTHER ITEMS

1.18.1 Information Board

The Contractor shall provide a free-standing board for the purpose of providing information about the project to the public. The board shall be not less than 2 m x 1.5 m. The information to be displayed and the location shall be directed by the Engineer. The design of the display and the supporting structure shall be subject to the Engineer's approval.

1.18.2 Securities and Insurance

1.18.2.1 Performance Security and Advance Payment Security

The Contractor shall furnish an Advance Payment Security and a Performance Security and in accordance with Clause 52 of the Conditions of Contract to ensure the refund of the Advance Payment and for the due performance of the Contract respectively.

1.18.2.2 Insurance

The Contractor shall effect certain insurances relating to the Contract in accordance with Clause 13 of the Conditions of Contract. In handling compensation to workmen under the above Clauses, the Contractor shall arrange that any compensation amount determined shall be paid without delay by the Contractor to the workmen entitled to such compensation irrespective of the time for payment of insured amount from the Insurance company to the Contractor.

1.18.2.3 Payment

Separate payment will not be made for complying with this Clause and the Conditions of Contract and all costs shall be deemed to be included in the rates and lump sums for the various items entered in the priced Bill of Quantities.

1.18.3 Audits by the Employer

1.18.3.1 General

The Employer shall be entitled at his discretion to conduct audits as necessary for his own investigation in connection with :

- a Cost incurred in relation to any compensation event as provided in clause 44 of the Conditions of Contract;
- b Cost incurred in the event of termination of the contract as provided in Clause 59 or 63 of the Conditions of Contract; and
- c Any other costs that the Contractor may claim to the Employer, which are not specifically covered by the terms of the Contract.

1.18.3.2 Records

The Contractor is obligated to keep accurate and up-to-date accounts and records concerning the above items.

1.18.3.3 Payment

Separate payment will not be made for complying with the requirements of this Clause and all costs shall be deemed to be included in the rates and lump sums entered in the priced Bill of Quantities.

1.18.4 Liquidated Damages

1.18.4.1 Amount of Liquidated Damages

If the Contractor should fail to complete the Works by the Intended Completion Date as defined in Clause 1.1 of the Conditions of Contract, the

Contractor shall pay to the Employer liquidated damages pursuant to clause 49 of the Conditions of Contract.

1.18.4.2 Maximum Damages

The maximum amount of liquidated damages payable or allowable to the Employer will be limited to the percentage of the final Contract Price stated in the Contract Data.

1.18.4.3 Other Rights of the Employer

Nothing contained in this Clause shall prejudice or affect any other rights of the Employer under the Contract.

1.18.5 Monthly Statement

1.18.5.1 General

The Contractor shall submit a monthly statement in accordance with the requirements of Clause 42 of the Conditions of Contract. The monthly statement shall be accompanied by copies of all survey notes, records of measurements and calculation which the Engineer has directed to be prepared by the Contractor in support of the amounts claimed for the claimed for the work executed.

1.18.5.2 Payment

All costs associated with the submission of the monthly statement shall be deemed to be included in the rates and lump sum prices entered in the priced Bill of Quantities.

1.18.6 Hours and Days of Working

Before commencement of work on the Contract, the Contractor shall notify the Engineer, in writing, of the days, hours and of the number of shifts that he proposes to work and shall give at least 48 hours notice to the Engineer of any changes to such hours of working and/or number of shifts that may be necessary during the currency of the Contract.

The Contractor shall not carry out work between sunset and sunrise without the prior written approval of the Engineer.

1.18.7 Prevention of Water Pollution

1.18.7.1 Scope

The Contractor's construction activities shall be performed by methods that prevent entrance or accidental spillage of solid matter, contaminants, debris and other objectionable pollutants and wastes into streams, flowing or dry water courses and underground water sources. Such pollutants and wastes include but not restricted to refuse, garbage, cement, concrete, sewage effluent, industrial waste, oil and other petroleum products. The Contractor shall submit his plan showing the location and design of the water pollution prevention systems and facilities to the Engineer for approval.

1.18.7.2 Payment

Separate payment will not be made for complying with the provisions of this Clause, and the costs shall be deemed to be included in the rates and lump sum prices entered in the priced Bill of Quantities.

1.18.8 Noise Control

1.18.8.1 Noise Level Limitations

The Contractor shall conduct all his operations such that noise levels created are within the limits stated in the decree of the State Minister of Environment Nomor : Kep -- 48/Men LH/1996, dated 25/10/96.

1.18.8.2 Payment

Separate payment will not be made for complying with the provisions of this Clause, and the costs shall be deemed to be included in the rates and lump sum prices entered in the priced Bill of Quantities.

1.19 MEASUREMENT AND PAYMENT (GENERAL)

The method of measurement shall be in accordance with the methods and procedures stipulated in the particular clauses and as set forth herein.

The various unit rates and lump sums for each work item entered in the priced Bill of Quantities shall be deemed to have included full compensation for supplying all materials, labour, equipment consisting of owning, operation and repair costs, and other expenses necessary to complete the work in accordance with the Drawings, the Specifications, the instructions of the Engineer and compliance with all other obligations, including rectification of defects, as required under the Contract.

1.19.1 Tolerance for Measurement

This clause explains the tolerance for measuring the dimensions of the work and the method of calculation of the quantity of the work completed in the following categories:

(1) Category - 1 (linear metres, m)

The work item shall be measured to the second decimal place of a metre and be approved by the Engineer at every work stage on an inspection sheet.

The amount of payment will be determined by multiplying the measured length by the unit rate and then rounding the result to the nearest integer.

The following items are to be included in this category :

- Drain Pipe, PVC Pipe Dia. 100 mm
- Expansion Joint
- Furnishing and Driving PC Test Pile, Dia. 500 mm, Type A
- Furnishing and Driving PC Sheet Pile (t=220 mm)
- Furnishing and Driving PC Piles, Dia. 500 mm, Type A
- Furnishing and Driving Steel Sheet Pile, Type II
- Log Pile, Dia. 150 mm L=2.0 m
- Log Pile, Dia. 150 mm L=3.0 m
- Log Pile, Dia. 150 mm L=4.0 m
- Utility Pipe, PVC Pipe Dia. 150 mm

(2) Category - 2 (square metres, m²)

The work item shall be measured to the second decimal place of a square metre by multiplying the two dimensions, measured to two decimal places, and rounded off, and approved by the Engineer at every work stage on an inspection sheet.

The amount of payment will be determined by multiplying the measured area by the unit rate and then rounding the result to the nearest integer.

The following items are to be included in this category :

- Concrete Block Pavement
- Joint Filler, 10mm thick (Elastic Material)
- Pointing
- Chipping of Existing Dike Surface
- Sodding

(3) Category - 3 (cubic metres, m³)

The work item shall be measured to the second decimal place of a cubic metre by multiplying the three dimensions, measured to two decimal places of a metre, and rounded off and approved by the Engineer at every work stage on an inspection Sheet.

The amount of payment will be determined by multiplying the measured volume by the unit rate and then rounding the result to the nearest integer.

The following items are to be included in this category :

- Aggregate Class A
- Aggregate Class B
- Backfill
- Backfill with Cobble
- Backfill with Gravel
- Backfill with Sandy Soil
- Backfill with Selected Soil
- Cement Mortar
- Cobble Stone
- Common Channel Excavation including Hauling and Treatment of Contaminated Soil
- Common Excavation including Hauling and Spoiling
- Concrete Kerb
- Concrete, Type B including Formwork
- Concrete, Type C1 including Formwork
- Concrete, Type C1 including Formwork and Falsework
- Concrete, Type C1 including Formwork, Scaffolding and Falsework
- Concrete, Type E including Formwork
- Embankment
- Excavation below Water Level including Hauling and Treatment of Contaminated Soil
- Gabion Mattress t=500mm (Galvanized)
- Gravel Bedding
- Gravel Filling
- Sand Bedding
- Secondary Concrete, Type C2
- Stripping of Top Soil
- Structural Excavation

- Structural Excavation with Shoring
- Wet Stone Masonry

(4) Category - 4 (Number {No.} or Set)

The work item shall be measured to the exact number of items or sets installed and approved by the Engineer at every work stage on an Inspection Sheet.

The amount of payment will be determined by multiplying the number by the unit rate and then rounding the result to the nearest integer.

The following items are to be included in this category :

- Demolition of Existing Pumping Stations
- Elastomeric Bearing Pad (350 x 280 x 73.)
- Rubber Sheet (400 x 100 x 30)
- Supply of Backhoe, 0.35 m³
- Supply of Dump Truck, 8 t
- Supply of Garbage Container, 6 m³
- Supply of truck Crane, 2.2 t
- Weep Hole, Dia. 50 mm
- Diesel Engine Units
- Fuel Service Tank
- Fuel Transfer Pump
- Furnishing and Installing Main Pump Units
- Gate Leaf
- Gear Boxes
- Guide Frames
- Hoist
- Overhead Crane
- Stop Log

(5) Category - 5 (mass)

a) (Mass in kg)

The work item shall be measured to the second decimal place of a metre and multiplied by the approved mass per metre at every work stage on an inspection sheet.

The amount of payment will be determined by multiplying the calculated quantity by the unit rate and then rounding the result to the nearest integer.

The following items are to be included in this category :

- Deformed Reinforcing Bars
- Hand Rail
- Safety Hand Rail (Type-I)
- Safety Hand Rail (Type-II)
- Dowel Bar. Dia. 19mm, 1.0 m long (round bar and PVC)

b) (Mass in tonne Note: 1 tonne = 1000 kg mass)

The mass shall be determined by reference to delivery notes from the specialised supplier, duly approved by the Engineer or his representative, to the accuracy of the third decimal place of a tonne (1 kg).

The amount of payment will be determined by multiplying the approved quantity by the unit rate and then rounding the result to the nearest integer.

The following items are to be included in this category :

- Asphalt Concrete
- Asphalt Treated Base

(6) Category - 6 (Lump Sum Item)

The method of measurement and payment shall be as set out in the respective payment clause for each of the following items for which payment is by lump sum.

- Cable Connection Works
- Auxiliary Drainage Pump System
- Clearing of Garbage
- Coffering and Dewatering
- Contractor's Site Office and Facilities
- Control Panel for Auxiliary Drainage Pump
- Demolition of Existing Revetment
- Door
- Drawings
- External Works
- Felling and Grubbing of Trees
- Fuel Tank and Accessories
- Garage
- Generator System
- Grounding
- Inspection and Test
- Ladder
- Local Switch
- Main Control Panel
- Maintenance Tools
- Management Office
- Mobilization and Demobilization
- Pipe Connection Works
- Piping System
- Precast Concrete Panel
- Precast Concrete Panel including erection
- Precast Prestressed Concrete Beam including tensioning and erection
- Pump Control Building
- Relocation of Existing Utilities
- Roof Sealing
- Spare Parts
- Staff House
- Surveying
- Tree Planting
- Windows