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JAPAN INTERNATIONAL COOPERATION AGENCY(JICA)

SCIENCE AND TECHNOLOGY COMMISSION OF
SHANGHAI MUNICIPAL PEOPLE'S GOVERNMENT,
PEOPLE'S REPUBLIC OF CHINA

DETAILED DESIGN OF SHANGHAI PUDONG INTERNATIONAL AIRPORT FINAL REPORT

VOLUME III
TENDER DOCUMENT(2 OF 3)

PART IV SPECIFICATION

SEPTEMBER 1997

NIPPON KOEI CO., LTD.
NIKKEN SEKKEI LTD.

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VOLUME III TENDER DOCUMENT

GENERAL CONTENTS

Note) The dotted portion is included in this book.

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VOLUME III
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PART IV-1
SPECIFICATION
FOR
AIRSIDE CIVIL WORKS

SEPTEMBER 1997

NIPPON KOEI CO., LTD.
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PEOPLE'S REPUBLIC OF CHINA
SHANHAI MUNICIPAL PEOPLE'S GOVERNMENT

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CHAPTER 1. DESCRIPTION OF THE WORKS

1.1 GENERAL

1.1.1 The Project is the first phase construction of Pudong International Airport Project. The Project will be implemented in accordance with the master plan and phasing constructions. There will be 4 parallel runways in the master plan. It is ultimately designed to accommodate 75 million of passengers and 5 million tons of cargo and mail annually. In phase 1 the airport is designed to meet the demands of the passenger volume in 2005, with a runway of 4,000 m in length and a terminal building of 200,000 m^2. The construction work started in mid 1996 with soil improvement works and will be completed by the end of 1999. The airport will be put into service in 2000.

1.1.2. The Airside Civil Works includes construction of (1) Runway, (2) Runway strip, (3) Taxiway, (4) Apron, (5) Drainage facilities including pumping stations and regulating ponds, and (6) Appurtenant facilities including airfield service road, perimeter fences, and blast fences.

(1) Runway

The runway will be 4,000 m long and 60 m wide. The pavement will be basically of 45 cm thick concrete structure.

(2) Runway strip

The runway strip will be 4,120 m long and 300 m wide, and be sod- or seed-faced.

(3) Taxiway

Four types of taxiway will be constructed: parallel (29 m wide),end-access (31.5 m wide), intermediate-access (34 m wide), and rapid-exit (29 m wide).

(4) Apron

The apron area will be 940,000 m^2, and be divided into: passenger terminal apron (28 spots), open spots (11 spots), cargo apron (8 spots) and maintenance apron (18 spots).

(5) Drainage facilities

Storm water drainage system will be divided into two areas (A and B). Each Area will be equipped with open channels (masonry and concrete-lined), box culverts, and a regulating pond with a pumping station.

(6) Appurtenant facilities

The appurtenant facilities include perimeter roads (12,000 m), inspection roads (4,200 m), perimeter fences (16,000 m), and blast fences (1,420 m).

1.1.3 The full extent of the Works is described in the Specification and Conditions of Contract and shown on the Drawings, but briefly, comprises the following items.

SCOPE OF CONSTRUCTION WORKS

	Major Work Items	Approx. Work Quantity	Remarks
Part I	Airside Civil Works		
A.	Earth Works		
	- Excavation	1,300,000m^3	
	- Embankment	2,600,000m^3	
	- Sandmat stabilization	1,500,000m^3	
	- Landscaping	1,850,000m^2	Sodding or seeding
B.	Pavement Works		
	- Runway pavement	290,000m^2	45cm thick concrete pavement
	- Taxiway pavement	600,000m^2	45cm thick concrete pavement
	- Apron pavement	940,000m^2	45cm thick concrete pavement
C.	Storm Water Drainage Facilities		
	Area A		
	- Open channels (masonry)	5,000m	
	- Open channels (U-shape)	6,200m	concrete-lined
	- Box culverts	3,000m	concrete-lined
	- Regulating pond	one set	Storage capacity : 36,500m^3
	- Pumping station	one set	Capacity 10m^3/sec
	Area B		
	- Open channels (masonry)	6,100m	
	- Open channels (U-shape)	4,500m	Concrete-lined
	- Box culverts	3,200m	Concrete-lined
	- Regulating pond	one set	Storage capacity : 37,500m^3
	- Pumping station	one set	Capacity 10m^3/sec
D.	Appurtenant Facilities		
	- Perimeter roads	12,000m	5cm thick asphalt pavement
	- Inspection & maintenance roads	4,200m	5cm thick asphalt pavement
	- Perimeter fences	16,000m	Steel-bar net, brick wall
	- Blast fences	1,420m	

1.2 DRAWINGS AND SPECIFICATION

The Specification which forms a part of the Contract Documents comprises two sections: a general provision and a special provision. Each section is divided into

chapters. Section 1 which consists of 14 chapters covers preliminary and general common matters relating to the Work. Section 2 which is composed of 6 chapters specifies the directions and requirements of completing each category of the Work by chapters as follows:

Chapter 1	General
Chapter 2	Earthwork
Chapter 3	Pavement Works
Chapter 4	Drainage Works
Chapter 5	Regulating Pond and Pump Station
Chapter 6	Appurtenant Works

The Drawings which form a part of the Contract Document are incorporated in nine parts of Volume 4 shown following. Drawing numbers are alphabetically prefixed by facilities/work divisions and enumerated.

DWG No. 1-C series	General and Earthwork
DWG No. 1-F series	Ground Improvement Work
DWG No. 1-D series	Drainage System and Regulating Pond
DWG No. 1-B series	Pump Stations (Civil Works)
DWG No. 1-A series	Pump Stations (Architectural Works)
DWG No. 1-E series	Pump Stations (Electrical Works)
DWG No. 1-M series	Pump Stations (Mechanical Works)
DWG No. 1-P series	Pavement Works
DWG No. 1-R series	Appurtenant Works

The Specification and Drawings shall be read in conjunction with the several documents forming the Contract and shall be taken as mutually explanatory of one another. The Engineer shall explain any ambiguities or discrepancies as provided for in the Conditions of Contract.

1.3 DEFINITIONS

1.3.1 Airside

Airside means the aircraft movement area of the airport, adjacent terrain and buildings or portions thereof, access to which is controlled.

1.3.2 Landside

Landside means the area of the airport and buildings to which the non-travelling public has free access.

1.3.3 NOTAM

A NOTAM means a notice to airmen issued in accordance with Annex 14 of the Convention of International Aviation, containing vital information of any kind in respect of temporary alteration to the normal operation requirements of any portion of the movement area of the airport.

1.3.4 Others

For other definitions, reference shall be made to the Conditions of Contract and also to Annex 14 of the Convention of International Civil Aviation (hereinafter referred to as Annex 14), a publication of the International Civil Aviation Organization.

CHAPTER 2 DESCRIPTION OF THE SITE

2.1 LOCATION OF THE SITE

The Project is located at the Yangzi river right bank area stretching over Jiangzhen, Shiwan, and Zhuqiao townships. The Project site is about 30 km east of the center of Shanghai city, and 40 km straight away from Hongqiao International Airport. The site is flat land developed from original tideland and now is used as rice field.

2.2 EXTENT OF THE SITE

The Site comprises the areas shown on Drawing No._____.

2.3 ACCESS TO THE SITE

2.3.1 General Access

Access to the Site for the Purpose of this Contract shall be limited to the locations either shown on the Drawings or agreed with the Engineer prior to the commencement of the Works on Site. The Contractor is required to provide adequate staff and gates to control the access at these locations and shall submit details of all matters relating to security for the approval of the Engineer prior to the commencement of the Works on Site.

2.3.2 Haulage of Plant and Materials

The Contractor shall be required to arrange for the haulage of plant and materials over public roads adjacent to the Site with the appropriate local authorities and comply with all local regulations and by-laws and minimize inconvenience to the public. Details of all such arrangements shall be submitted to the Engineer for approval.

2.4 POSSESSION OF THE SITE

The Contractor shall be given possession of the Site, or of any parts thereof, as and when required for the purpose of the Contract.

2.5 USAGE OF THE SITE

2.5.1 General

a) Except where otherwise shown on the Drawings, the Contractor shall be required to make his own arrangements to obtain land necessary for his workshops, stores, offices, accommodation and the like. Those areas of the Site which have been reserved for such purposes are shown on Drawing No._____.

b) The Contractor shall not use any portion of the site for any purpose not connected with the Works unless the prior written permission of the Engineer shall have been obtained.

2.5.2 Public and Access Roads

a) The Contractor shall ensure that his vehicles and the vehicles of his employees brought to the Site for the purpose of or in connection with the Contract are not parked on or adjacent to any public roads or on any right of way or, except with the prior express permission of the owner, on any private property.

b) The Contractor shall maintain access for the inspection, operation and maintenance of any plant or works belonging to the Employer which lie within the Site or elsewhere and which are affected by the Contractors operations.

CHAPTER 3 RESPONSIBILITIES FOR THE DESIGN

3.1 GENERAL

The design of the Works is generally the responsibility of others, however, detailed design of designated items of Plant, equipment and systems to the approval of the Engineer, shall be undertaken by the Contractor.

3.2 RESPONSIBILITY FOR THE DESIGN

3.2.1 Contractor's Responsibility

Notwithstanding any approval by the Engineer it shall be clearly understood by the Contractor that, whether the detailed design is by the Contractor or his Subcontractor(s) he shall remain wholly and solely responsible for the design of those Works specified within his obligations and shall consequently bear the responsibility for:

a) The design of the Works specified and performance of all professional services in accordance with approval from the Engineer or other recognized and appropriate engineering bodies. Applying the best technical knowledge and professional standards, be fully responsible for all recommendations made, plans and documents prepared, and bear any additional engineering costs resulting from unsatisfactory or careless performance which might reasonably have been prevented or foreseen by qualified professional staff;

b) Exercising all reasonable skill, care and diligence in the discharge of his duties to be performed and always act in the best interest of the Employer;

c) All liability in respect of the specified design work and undertakes to indemnify the Employer and its staff from any judicial or extra judicial claims, damages, liabilities and expenses, including costs of defense of suits, arising from any breach of copyright or violation of literary property or patented invention, article or appliance done by the Contractor or his Subcontractor(s).

3.2.2 Failure by the Contractor

Failure on the Contractor's part to :

a) design the Plant or equipment for the duties it is intended to perform,

b) design the Plant or equipment for the space(s) and openings allowed by the Drawings provided by the Engineer

c) pass information to the Engineer to enable him to complete his design responsibilities, or

d) pass correct and accurate information

which leads to unacceptable Plant or equipment, supports, foundations, and the like, or modifications to the Engineers design and or additions to the building or services system will result in the Contractor bearing all costs, direct, indirect or consequential to such failure and for all remedial works required.

3.2.3 Ownership of the Design Work

All plans, drawings, reports, engineering specifications, similar materials and calculations etc. made under this Contract shall be considered as privileged information and upon completion of the Services become the property of the Employer, it being understood, however, that the Contractor or his Subcontractor(s) may retain copies of said plans and other documents for its records, provided that such material shall not be used by the Contractor or his Subcontractor(s) for any purpose without prior written approval of the Employer.

3.3 TEMPORARY WORKS

The Contractor shall be responsible for the general and detailed design of all temporary works required by his methods of operation, and for obtaining any approvals required by any statutory or other authority and complying with any approval application procedures. The Contractor shall submit all drawings and calculations to the Engineer in accordance with the requirements of the Contract and shall be responsible for the construction and the maintenance of the temporary works designed by him.

CHAPTER 4 STANDARDS

4.1 GENERAL

The standards, codes of practice and the like to be applied to the detailed design and construction of the Works shall be those shown and described in the Specification and shown on the Drawings. Where no such standard, code of practice or the like has been shown or described, the Contractor shall, after obtaining the approval of the Engineer, apply the latest such standard, code of practice or the like in general use in the People's Republic of China or such higher standards or codes as are applicable and acceptable to the Engineer.

4.2 ALTERNATIVE STANDARDS

If the Contractor wishes to use alternative standards he shall submit these to the Engineer for approval. Approval to use alternative standards may be given provided that they are equal or higher than those specified. If the standard, or standards, are in a language other than the English language, a technically correct English translation shall also be submitted. Submittals shall be made sufficiently in advance for the Engineer's approval and before the standard is applied to any part of the Works.

4.3 AVAILABILITY

Two copies of all standards, codes of practice and the like referred to in the Contract Document shall be provided for the sole use of the Engineer, by the Contractor prior to the manufacture, construction or fabrication of the parts of the Works concerned. Where such standards, codes of practice and the like are not available in the language of the Contract, the Contractor shall provide a detailed translation of such documents in the said language.

The abbreviations used to describe these standards, codes of practice and the like are:

INTERNATIONAL STANDARDS

-ASHRAE : American Society of Heating, Refrigeration and Air Conditioning Engineers

-AISC : American Institute of Steel Construction

-AASHTO : American Association of State Highway and Transportation Officials

-ACI	:	American Concrete Institute Standard
-ANSI	:	American National Standards Institute
-API	:	American Petroleum Institute
-ASTM	:	American Society for Testing and Materials
-AWS	:	American Welding Society
-AWWA	:	American Water Works Association
-BS	:	British Standards
-FAA	:	Federal Aviation Administration, USA
-IEC	:	International Electrotechnical Commission
-ISO	:	International Standards Organization
-JASS	:	Japanese Architecture Standard Specification
-JEM	:	Japanese Electrical Manufacturers Association
-JIS	:	Japanese Industrial Standard
-MSS	:	Manufactures Standardization Society
-NEC	:	National Electrical Code
-NFPA	:	National Fire Protection Association Codes and Standards
-NEMA	:	National Electrical Manufacturers Association

CHINESE STANDARDS

-DBJ	:	Shanghai Standard Ground Treatment Code
-GB	:	National Construction Materials Specification
-GBJ	:	Reinforced Concrete Construction and Testing Standard

-JGJ or JC/T	:	National Architectural Administration Standard
-JTJ	:	Standard Specification for Testing and Construction of Highways
-JT	:	Ministry of Communications Standard for Construction Materials
-SDS	:	Earth Work Testing Standard
-TJ	:	Construction Survey Standard

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CHAPTER 5 GOODS, MATERIALS AND WORKMANSHIP

5.1 MATERIAL

5.1.1 Definition of Material

Goods and materials are all those goods, materials, fixtures, fittings, ancillary items and the like which are manufactured or processed at locations other than the Site and which are delivered to the Site for incorporation in the Works, and are referred hereinafter as material.

5.1.2 Quality of Material

Material shall be of the best quality and suitable in all respects for its intended purpose, and shall comply in all respects with the standards of quality and performance shown on the Drawings or in the Specification.

5.1.3 Sources of Material

All material for incorporation in the Works shall produced in an eligible source country as defined in the Japanese OECF Guidelines Governing Open International Tendering for Goods and Services. Details of the requirements are outlined in Appendix 1. The Contractor will be required to submit a declaration in the format included in Appendix 1.

5.1.4 Materials and Equipment Procurement Schedule

a) Within 84 days from the Engineers notice to commence the Contractor shall prepare and submit a schedule of all material to be used for the Construction of the Works.

An updated schedule shall be submitted to the Engineer one week before the date of each Monthly Progress Meeting and shall include, but not be limited to, the following information:

1) material and description of material
2) manufacturer/country
3) date material submitted for approval
4) approval status and ref.
5) approve/eject date and ref.
6) programmed delivery date
7) delivery days from date of firm order

8) ordered date
9) expected delivery date
10) actual delivery date
11) quantity required/quantity delivered.

b) The schedule shall also include raw materials, such as cement and aggregate, which are critical to the progress of the Works.

5.1.5 Unspecified Materials

Where materials are not specified but described by shapes, sizes or weight on the Drawings then the Contractor shall, if required by the Engineer, provide whatever samples, certificates and testing as are reasonably necessary to demonstrate the materials proposed to be of the best quality of their respective kind and suitable in all respects for their intended purpose.

5.1.6 Specified Materials

Where materials are specified by a standard then the Contractor shall, if required by the Engineer provide whatever samples, certificates and testing as are reasonably necessary to demonstrate the materials proposed conform to that standard, or an equal and approved standard.

5.1.7 Proprietary Materials

When proprietary materials are referred to in the Specification or on the Drawing by the use of manufacturers names and suffixed "or similar approved" such description is intended to establish the type and quality of the materials required. In providing materials from the named manufacturer the Contractor shall if required by the Engineer provide samples to verify colour, availability and the like. Where the Contractor proposes to source the materials from a manufacturer other than the named manufacturer he shall if required by the Engineer provide whatever samples, certificates and testing as are reasonably necessary to demonstrate the materials proposed are equal in all respects to the material of the named manufacturer.

5.1.8 Specified Proprietary Materials

Where materials are referred to in the Specification or on the Drawings by the manufactures name, catalogue and suffixed "and no other" then that specific material shall be used and the Contractor shall provide samples to verify colour availability and the like.

5.2 EQUIPMENT

5.2.1 General

All systems Plant and equipment incorporated in the Works designed by the Contractor shall be to the highest standard of the respective kinds and suitable in all respects for the intended purpose, whether operating in a composite system or serving a part of another system. The Contractor shall if required by the Engineer provide whatever certificates, results of factory tests and performance data as is reasonably necessary to demonstrate the suitability of the Plant, equipment and systems.

5.2.2 Equipment and Tools

All equipment and tools provided under the Contract shall be new and of best quality and suitable in all respects for their intended purpose, and shall comply in all respects with the standards or quality and performance as specified.

5.3 APPROVAL

5.3.1 General

a) All materials, Plant, equipment and systems shall meet or be greater than the quality or performance specified and only those materials Plant and equipment as have been approved as stated following shall be incorporated in the Works.

b) It is the responsibility of the Contractor to submit to the Engineer for approval details of the materials, Plant and equipment, including spare parts lists and special tools he proposes to provide timeously such that the construction programme (Ref. Clause 14.1 Conditions of Contract), is not affected by the time required for sourcing of materials and the Engineer's approval. No claims whatsoever for an extension of time to the Time for Completion shall be considered for the late submission of materials and the like for approval.

c) Once materials, Plant, equipment, spare parts and special tools submissions have been approved no further proposals or changes to the source country or manufacturer for the same or similar materials or the like will be considered by the Engineer.

5.3.2 Approval Forms

The Contractor shall prepare and submit for the approval of the Engineer, pre-prepared approval forms for submission of materials, Plant and equipment. The

form shall be item specific and include appropriate columns to enable data transfer to the material procurement schedule required by 5.1.5 of this Division.

5.3.3 Stage Approval

Approval shall be given in the following stages:

a) Preliminary Approval

Approval in principle only of the type of materials, Plant or equipment and the possible source. For planning and programming purposes the Contractor shall allow a minimum period of 14 working days for the Engineer's preliminary approval of each material, Plant or equipment submission.

b) Detailed Approval

Where complete details of manufacturer, source country, delivery date(s), dimensions, shop drawings, colour performance, quality and the like are submitted together with the test results and samples if required, to enable the Engineer to select and approve particular materials, Plant or equipment which may then be ordered and brought to Site. The Contractor shall allow a minimum period of 28 working days, from the issue of the complete details for the Engineer's review, approval or further instructions for each material, Plant or equipment submission.

c) Construction Approval

Where materials, Plant or equipment having received detailed approval are brought to Site and are incorporated in the Works in accordance with the Specification, standards, codes of practice and the manufacturers instructions if applicable. Notwithstanding any inspection by the engineer of materials Plant or equipment delivered to Site it shall remain the responsibility of the Contractor to ensure all materials, Plant or equipment are approved and conform to the specified requirements (Ref. Clause 39.1 Conditions of Contract).

d) Final Approval

Final approval shall only be given by the issue of the Defects Liability Certificate (subject to the provisions therein) when all tests required under the Contract as to the performance of materials, Plant, equipment and goods and the systems into which they have been incorporated shall have been satisfactorily carried out.

5.3.4 Withdrawal of Approval

Notwithstanding any approval previously given, the Engineer may at any time, reject any material, Plant, equipment or systems which have deteriorated, become contaminated, be incompatible with other parts of a system, fail to give the required performance or in any way be found to be unsuitable for the Works. All costs associated with removal, repair, replacement, resubmittal for approval and the like shall be borne by the Contractor.

5.3.5 System Approval

If within a system, all materials, Plant or equipment having been approved as aforesaid, have not deteriorated, been damaged, been contaminated or the like but the system fails to give the performance or output required under the Contract, the Engineer may reject the system. The Contractor shall investigate the cause of failure and propose remedial measures for the Engineer's approval. All costs of such measures shall be to the Contractor's account if, in the Engineer's opinion the Cause of such failure is due to the Contractor's action or lack thereof.

5.4 SAMPLES

5.4.1 Samples Retained

The Contractor shall provide and make allowance in his rates for the provisions of all samples in such numbers, types and sizes as specified or instructed by the Engineer. Where samples are submitted and approved they shall be suitably marked as such and retained in the Engineers office or Site for comparison with materials and equipment delivered. The Engineer may instruct that a photographic record be kept for specific samples.

5.4.2 Identification

All samples shall be clearly and permanently labeled by the Contractor using an appropriate method. The general form and content of the labels shall be agreed with the Engineer.

5.4.3 Ownership

On the issue of the Defects Liability Certificate for the whole of the Works, the ownership of the samples shall revert to the Contractor, and he shall be responsible for their removal from Site.

5.5 TRANSPORT, STORAGE AND INSPECTION

5.5.1 Transport and Storage

All materials Plant or equipment, if manufactured or assembled off-Site must be properly and securely packed in order to prevent damage during transport to Site. The Contractor shall ensure that adequate storage on Site is available before the materials Plant or equipment arrives and shall properly store and protect the materials Plant or equipment to prevent damage and/or deterioration. Air-conditioned or other controlled environment storage shall be provided for materials, Plant or equipment that is to be incorporated in the Works in an air-conditioned or other controlled environment.

5.5.2 Inspection Off Site

Where materials, Plant or equipment is fabricated at locations remote from the Site of the Works and transported to Site, the Contractor shall provide full facilities for off-Site inspection by the Engineer and or Employer, including, where necessary, transportation furnished offices, hotel accommodation and meals for such period as the inspection requires. Where the transport of the fabrication is a significant exercise, such as a sea-tow, the Contractor shall provide whatever reasonable facilities are required by the Engineer in order for the material, Plant or equipment to be monitored during the transport exercise.

5.5.3 Inspection on Arrival

When material Plant or equipment arrives on Site it shall be inspected by the Contractor for damage and/or deterioration. Where the material, Plant or equipment is packed in such a way that the opening of the packing, for inspection could be harmful, the Contractor shall inspect such packing for any signs of damage. Each case will be treated on it's merits and in no circumstances will the action taken relieve the Contractor of his responsibilities under the Contract.

5.6 WORKMANSHIP

a) The specified standards, codes of practice and the like shall be applied in the construction of each respective kind of work to the dimensions tolerances, grades, lines and levels specified and or shown on the Drawings. As such all labour and craftsmen shall be experienced and capable in their respective skills and all Plant, equipment and special tools calibrated and operated to meet the manufacturers performance specification.

b) The Contractor shall include in his rates and prices in the Preliminary and General section unless specifically provided for elsewhere, to demonstrate the capability of his construction resource to achieve the requirements of the Specification in undertaking trial mixes and trial runs and providing sample panels as instructed by the Engineer. The trials and samples shall be undertaken in addition to any specified tests and shall include but not necessarily be limited to:

1) PQC mixes and pavement laying
2) Bituminous mixes and Asphalt laying
3) Compaction trials
4) Thermoplastic making
5) Plate and pipe welding to qualification procedures
6) Brickwork
7) Plastering, internal and rendering external

c) In the event that any trial mixes, runs or sample panels fail to meet the specified standards the trials or panels shall be repeated using different methods, Plant, equipment and or personnel. Only those methods using Plant, equipment and personnel which are deemed successful and approved by the Engineer shall be employed in the Construction of the Works.

d) The Contractor shall ensure that his Subcontractors observe and comply with the conditions of this Clause.

e) It is the responsibility of the Contractor to submit proposals for undertaking the trials and providing the sample panels timeously such that the construction programme (Ref. Clause 14.1 Conditions of Contract), is not affected by the time required for trials and the Engineer's approval. No claim whatsoever for an extension of time to the Time for Completion shall be considered for any delays in completing the trials and securing the Engineers approval.

5.7 SUBCONTRACTORS

5.7.1 General

a) Subcontractor means any person named in the Contract as a Subcontractor for a part of the Works or any person to whom a part of the Works has been subcontracted with the consent of the Engineer and the legal successors in title to such person, but not any assignee of any such person.

b) For planning and programming purposes, the Contractor in requesting approval for each Subcontractor shall allow a minimum period of 14 days from the date of submission for the Engineer's review, approval or further instructions.

5.7.2 Eligible Source Country

Subcontractors shall be nationals of an Eligible Source Country or shall be incorporated and registered in, and controlled by nationals of an Eligible Source Country as defined in Appendix 1.

5.7.3 Subcontractors Capable of Maintenance

a) During the period for construction of the Works the Employer will investigate the availability of maintenance services for specialist installations Plant and equipment incorporated in the Works. In seeking approval for the appointment of a Subcontractor the Contractor shall ascertain and submit with his request for approval details of the Subcontractors maintenance capabilities and his proposed materials and equipment suppliers. The details shall include but not be limited to:

1) capability to respond to emergency callouts
2) pro forma maintenance contracts
3) materials and workmanship warranties or guarantees
4) performance ratings of all Plant and equipment
5) details of spares retained in stock
6) statement of previously installed systems during last 15 years

b) Any agreement reached between the Employer and any approved Subcontractor, supplier etc. will be out with this Contract and any such agreement will not relieve the Contractor of his obligations and duties under this Contract.

5.8 QUALITY MANAGEMENT SYSTEM

5.8.1 General

a) The Contractor shall prepare and maintain a Quality Assurance Programme which is developed as appropriate to conform with BS 5882 or equal approved.

b) Within this programme the Contractor, his Subcontractors and each supplier of safety related items shall operate a Quality Management System which complies with ISO 9001. The quality system shall include quality plans prepared and maintained in accordance with the guidelines in BS 5750 Part II or equal approved.

c) The Contractors Quality Management System shall have appropriate certificates to cover the scope of the Works. The certificates shall be issued by a third party certification body which holds accreditation to the NACCB (now UKAS) or equal and whose scope and category of accreditation are appropriate to the scope of Works.

5.8.2 Audits

a) The Employer and the Engineer reserve the right to inspect and audit the management system or any activity or document produced by the Contractor or his Subcontractors and to carry out any investigations which are necessary to determine the quality and standards of performance of the work undertaken by the Contractor. The Contractor shall make available any documents relating to the Works for inspection by the Employer or the Engineer.

b) The Engineer shall be informed of the Contractors audit programme which shall be updated on a six monthly basis, the Employer and or the Engineer shall be given the right to attend any audit that takes place either on or off Site.

c) The Engineer shall be included on the distribution list for all controlled copies of all Quality Management System documentation including procedures and work instructions.

5.8.3 Quality Control

a) The Contractor shall include in his rates and prices to provide such materials as may be directed by the Engineer for quality control testing. Each Part of the Specification identifies the quality control tests required by that part, where no tests are specified the tests required shall be consistent with maintaining the standards required as instructed by the Engineer.

CHAPTER 6 CONSTRUCTION PROGRAMME AND PROGRESS

6.1 PROGRAMME OF WORKS

6.1.1 General

a) The programme (Ref. Clause 14.1 Conditions of Contract) shall be computer generated and based upon the application of established programming procedures such as Critical Path Analysis (CPA) or Programme Evaluation and Review Techniques (PERT) and shall include networks and bar charts at summary level for the whole of the Works and detailed level for each section of the Works. The activities of all Subcontractors, procurement of long lead items, key events, milestones, interfaces with others, dependencies and critical path(s) shall be clearly identified. The Engineers consent given under Clause 14.1 shall be withheld until such time as the detailed programme demonstrating satisfactorily the Contractors intent for completion of the Works within the prescribed construction period is complete.

b) The software used shall be Microsoft Project, Primavera, Open Plan or other similarly approved proprietary product and shall have sufficient data installed by the Contractor to allow the constant monitoring of progress, incorporation of changes, the forecasting of completions by section and for the whole of the Works and the development of any further programme instructed by the Engineer under Clause 14.2 of the Conditions of Contract. A licensed copy of the software used by the Contractor shall be made available to both the Employer and Engineer.

c) The programme shall be resourced to show graphically and numerically monthly and cumulative labour and staff profiles, including Subcontractors and the projected value of Works by activity in both local and foreign currencies. The values shown shall reflect the anticipated amounts of the Engineers Interim Payment Certificates excluding the advance payment and repayments.

6.1.2 Contents of the Programme

In addition to showing the activity reference, the earliest start, latest start, earliest completion, latest completion, duration and float for each activity, the programme shall show, amongst other things:

a) the dates by which the Contractors design drawings are to be submitted to the Engineer for approval;

b) the dates by which Construction Drawings are to be submitted to statutory and other authorities for approval, and the dates by which such approvals are required;

c) the dates by which requests for approval of material shall be submitted;

d) the dates by which requests for approval of Subcontractors shall be submitted;

e) the dates and periods allowed for the design of important temporary works, including the temporary facilities required during renovation works;

f) the quantities and productivities used to calculate the duration of all activities;

g) computer-generated resource histograms showing the daily and cumulative requirements for the various categories of staff, artisans, labour and equipment necessary to complete the Works in accordance with the programme;

h) in the case of a sequential requirement for possession of Site, the areas involved, the dates upon which possession will be required and the expected duration of such possession;

i) those activities whose progress is likely to effect the activities of other contractors; and

j) those activities whose progress is dependent upon the progress achieved by other contractors.

6.1.3 Submission Requirements

The Contractor shall submit for approval within the time stated in the Appendix to Tender, four copies of the programme, together with four copies of all supporting documentation. Revised programmes requested under Clause 14.2 of the Conditions of Contract shall also be submitted in four copies.

6.2 PROGRESS OF WORKS

6.2.1 Monitoring of Progress

Progress against the Clause 14.1 (Conditions of Contract) programme will be monitored by the Engineer and to this purpose the following shall be required.

a) Contractor's Monthly Report

Within 7 days from the month ending the Contractor shall submit in 4 bound volumes (2 original plus 2 copies), a monthly report for the previous month. The monthly report shall includes as a minimum requirement:

1) actual activity progress verses anticipated activity progress, demonstrated by "Time Now" section programmes;

2) total cumulative actual progress verses total cumulative planned progress, demonstrated graphically;

3) the materials and equipment procurement schedule;

4) financial and programme summary showing percentage complete by value/time;

5) information required by the Contractor from the Engineer;

6) summary of claims made by the Contractor with values;

7) plant and labour on Site at the end of the month, demonstrated numerically and cumulatively graphically;

8) summary of variation orders issued by the Engineer with values;

9) any other information required by the Engineer or Engineer's Representative;

10) Subcontractors on site;

11) narrative description of the moths major activities highlighting achievements/failures;

12) progress photographs of Sections of work in hand;

13) accident/safety consideration aspects;

14) meteorological data for the month as specified.

One week before the Monthly Progress Meeting the Contractor shall submit four copies of the "Time Now" programmes together with four copies of the supporting documentation, duly updated to reflect the progress to date.

b) Meetings

The Engineer shall call weekly and monthly meetings to examine actual progress as against the agreed programme. Senior site management of the Contractor shall attend these meetings to discuss and agree, the actual progress, delays to the Works, means of overcoming these delays (if any) and any other problem(s) arising from the construction of the Works. The Contractor shall submit, at these meetings, a summary of the work he proposes to carry out during the following week/month.

c) Other Meetings

Other progress/programme/coordination meetings will be called as often as necessary to examine and discuss particular parts of the Works or other matters.

6.2.2 Project Execution Plan

The Contractor shall, when required by the Engineer give detailed statements of how he intends to control the risk of, proceed with, assure the quality or make safe any part of the Works, or all of the Works. If any aspect of the Works is deemed to be unsatisfactory, the Engineer shall require the Contractor to review his method statements in order to complete the Works as specified and within the Contract period.

6.2.3 Progress Photographs

The Contractor shall supply to the Engineer technically perfect colour photographs to depict the progress and maintain a record of construction throughout the Works. Generally 100 photographs shall be taken from ground locations in the areas of the contractors current operations twice monthly in the directions instructed by the Engineers. In addition 10 aerial photographs shall be taken at least monthly. Generally, ground photographs shall be taken from a tripod-mounted camera and shall be in a 35mm format or, and aerial photographs, in a 2.5" x 2.5" format. Wherever possible, slow-speed high-resolution film shall be used, and clarity and depth of focus are the principle objectives. The Contractor shall provide the original negatives and six prints of each negatives of not less than 10,000mm2 picture area.

The negatives and two sets of prints shall be housed in a good-quality photograph album suitable for record purposes, of the remaining four sets of the prints two shall be stored in photo wallets and selected photographs from two sets incorporated in the Contractor's month report. The Engineer shall determine which, if any, of the photographs are to be reproduced at the larger size 25 x 20cm, and shall advise the Contractor accordingly.

Reproduction at the larger size shall generally not exceed 15% of the original ground and aerial shots and shall be provided in 4 prints each. The copyright of all photographs is retained by the Employer. All photographs shall be clearly identified giving the Project Name, the number of the photograph, the date taken and the view depicted.

6.3 AS-BUILT DRAWINGS

a) The Contractor shall prepare As-Built Drawings covering the whole of the Works. As-Built Drawings shall be based on the Contractor's fabrication drawings and the Construction Drawings and shall be in a form and contain information approved by the Engineer.

b) Amendments and changes to the Construction Drawings shall be recorded on a set of Construction Drawings kept specifically for this purpose. The Contractor, on completion, shall produce a final, complete set of As-Built Drawings depicting accurately the location, dimensions and nature of the completed Works. The Drawings shall also show the sequence, dates and test results of significant structural concrete works and concrete and asphalt pavement works. Additional annotations and notes shall be in the English language and printed clearly in the same format as the original Drawing annotations.

c) Soil strengths and characteristics of soils for foundation works and pavement works shall also be shown. It is noted that copies of the As-Built Drawing shall be incorporated in the Operation and Maintenance Manuals.

d) The following are to be provided:

1)	Full size (A1) paper print	3 sets
2)	Reduced size (A3) paper prints from above	5 sets
3)	Reproducible copies A1 and A3	1 set each
4)	Microfilm	1 set

e) Draft copies of d) 1) for all As-Built Drawings shall be issued progressively such that the final issue in A3 size d) 2), for any Section or the whole of the Works for incorporation with the Operation and Maintenance Manuals has been approved by the Engineer prior to and as a prerequisite to the issue of the Taking-Over Certificate. No claim whatsoever will be considered for an extension of time to

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the Time for Completion due to the Contractors late submission of As-Built Drawings for approval. The reproducible drawings shall be properly filed in new, vertical drawing filing cabinets provided by the Contractor. The A1 size paper copies shall be bound as separate, appropriately titled volumes selected additional A1 or A3 size paper copies will be required in frames with a clear plastic cover for fixing to plant room walls.

6.4 SHOP DRAWINGS

The Contractor shall prepare and submit to the Engineer, for approval, shop drawings as required by the Specification or when instructed to do so by the Engineer.

The shop drawings shall be submitted in a format and scale to be agreed with the Engineer on site. The drawings must show, clearly, all the details of the works as required or instructed and shall be fully annotated in the English language and dimensioned.

The shop drawings shall be submitted complete with any relevant Specification, calculations and any other necessary relevant information.

The Contractor shall submit 3 copies each of all shop drawings to the Engineer in sufficient time for the Engineer to review and approve or reject the drawings, having due consideration as to when the particular works are to be carried out. For planning and programming purposes the Contractor shall allow a minimum period of 28 days for the Engineers review, approval and or further instructions in respect of each shop drawings submission.

When a shop drawing is approved, the Contractor shall submit one further copy of the drawing to the Engineer to be retained for record purposes.

Should any of the shop drawings be rejected then the Contractor shall make the necessary amendments and resubmit them to the Engineer for approval. The Contractor is responsible for amending and resubmitting the shop drawings until they are approved by the Engineer.

Work in respect of items requiring the production and submission of shop drawings shall not commence until the shop drawings have been approved by the Engineer. Any works commenced prior to such approval shall be at the Contractor's risk.

The Contractor will be held liable should the Works be delayed by late or inadequate submission of shop drawings or by abortive work caused by work being done in advance of approval of the shop drawings.

The cost of preparing, submitting and resubmitting, where necessary, the shop drawings shall be borne by the Contractor.

Approval by the Engineer of the shop drawings, shall not relieve the Contractor of any of his responsibilities under the Contract.

CHAPTER 7 CONTRACTOR'S SITE ESTABLISHMENT

7.1 OFFICES, YARDS, WORKSHOPS ETC

7.1.1 Contractor's Responsibility

a) The Contractor is entirely responsible for the provision, erection, maintenance and removal on completion of the whole of his offices, yards, workshops, stores, housing labour camp, services, recreation facilities and the like.

b) Where provision has been made for the Contractor to establish all or any part of his offices, yards, workshops and accommodation on Site, the locations and areas so assigned have been shown on Drawing No. .

c) Where the Contractor intends to use the assigned areas, he shall submit to the Engineer for approval detailed plans of his intended site establishment, including arrangements for access, drainage, sewerage and the containment of pollutants.

d) Should any area on the Site allocated to the Contractor for his use be insufficient for his purposes, it shall be the responsibility of the Contractor to provide such additional area outside the Site at his own cost.

7.1.2 Security

a) The Contractor is responsible for the security of his offices, yards, workshops, storage areas, work areas and the like, and shall provide whatever walls, fencing, gates, guards and access-control measures as are necessary to provide such security.

b) Where there are other contractors on Site, the Contractor shall ensure that all security arrangements are properly coordinated.

7.1.3 Reinstatement of Site

On completion of the Works, the Contractor shall:

a) remove from Site all his equipment, workshops, stores, offices, accommodation, and the buildings, except those required to discharge his obligations during the Defects Liability Period;

b) demolish and dispose of all foundations, ramps, inspection pits and the like;

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c) seal off service connections;

d) clear the Site of all debris and waste material of any kind;

Once the Contractor's obligations with regard to the Defects Liability Period have been discharged, the remaining site establishment shall be removed forthwith and the area reinstated as described above.

7.2 TEMPORARY SERVICES

7.2.1 Electrical Power for Construction and Testing

a) The Contractor is responsible for providing and shall include all costs for reticulating and maintaining all necessary electrical power required for the construction and testing of the Works and the power required for offices and accommodation. Should the Contractor wish to make arrangements for power to the supplied in whole or in part from any national electrical generating or distribution company or government organization, he shall in addition, provide standby power-generating equipment which can be brought on line within 10 minutes, in the event that such a power supply fails.

b) The Contractor is responsible for liaising with all relevant authorities with regard to the electrical supplies, reticulation, removal, clearing away and making good to all temporary connections on completion to the satisfaction of the relevant authority and the Engineer.

7.2.2 Water for Construction and Commissioning

a) Water Supply

1) The Contractor shall provide water required for the construction and testing of the Works, including a continuous supply of clean water required for offices and accommodation. Should the Contractor wish to make arrangements for water to be supplied in whole or in part from any national or local water supply company or government organization, he shall in addition, in the event that such a water supply proves inadequate or fails, immediately take action to provide water for domestic purposes by providing suitable sterile containers or using sterile water tankers to transport water.

2) Water to be supplied for domestic purposes shall not constitute a health hazard, and shall be subject to frequent testing. The Contractor shall arrange for weekly testing of both the water at source and the water at the point of

use and at such locations and times as the Engineer shall instruct. The test shall determine the presence of parasites, the level of pathogens, the type and concentration of dissolved solids, and the presence of any other contaminants. The test results shall be returned directly to the Engineer and shall be accompanied by a certificate from the testing laboratory which includes a narrative assessment of the quality of the water and its suitability for domestic purposes.

3) The Contractor is responsible for liaising with all relevant authorities with regard to water supplies, reticulation, removal, clearing away and making good to all temporary connections on completion to the satisfaction of the relevant authority and the Engineer.

b) Potable Water Supply

1) Potable water is that which is safe and suitable for drinking without receiving any further form of treatment.

2) Except where the Contractor can demonstrate by regular testing of the water using an approved laboratory that the piped supply of domestic water at the accommodation units and office taps is consistently potable, then he is to supply potable water bottled by a reputable and registered water supply company.

7.3 TEMPORARY ACCESS ROAD

7.3.1 Provision

a) The Contractor shall provide all temporary access roads and haul roads required for the construction of the Works, notwithstanding that only a portion of such roads may be separately identified in these documents. The Contractor may not use the finished pavement of roads which are port of the Permanent Works for the purpose of access or as haul roads except with the approval of the Engineer, whose approval will be withheld if the roads are likely to suffer any significant deterioration by being so used. In no circumstances will vehicles with single-axle loadings of greater than 8,000kg be allowed to use such roads or any part thereof.

b) The Contractor is to submit to the Engineer, for approval, details of his proposed access and haul roads including:

1) the construction of all proposed roads;

2) the location and geometry of all proposed roads;

3) details of drainage;

4) measures for duct control;

5) traffic-control measures at intersections with public roads;

6) measures for cleaning vehicles before entering public roads; and

7) anti-erosion measures and the stockpiling of topsoil for use in rehabilitation.

7.3.2 Removal

Immediately a road is no longer required, the area affected by the road, including all side drains, cut-off drains, mitre drains and culvert outfalls shall be rehabilitated where and as directed by the Engineer. This will be achieved by the filling in of any drainage channels, the grading of the area to match existing contours, the ploughing and disc harrowing of the compacted roadway in a direction at right angles to the fall of the road, the creation of grass-seeded erosion berms where appropriate, and the replacement of topsoil. Particular care is to be extended to the prevention of erosion, and the avoidance of silt deposition in natural waterways.

CHAPTER 8 CONSTRUCTION PLANT

8.1 CONCRETE MIXING PLANT

8.1.1 General Plant Requirements

a) Aggregates and or stones shall be provided with sufficient storage space for each size and shall be stored in separate stockpiles readily accessible for sampling. The storage yard shall be kept neat, and orderly.

b) The plant used for the preparation of concrete mixtures shall generally comply with the performance test requirements of BS 3963. In addition, the batch and truck type concrete mixers shall conform to the requirements of BS 1305 and BS 4251 respectively.

c) The mixing plant shall be of sufficient capacity and coordinated to produce concrete of the required quantity and quality as and when required during the various stages of the Works.

d) Any plant proposed by the Contractor shall be approved by the Engineer prior to the commencement of its use for Works under this Contract.

e) All references in this Division to BS numbers shall mean that standard, or an equal standard approved by the Engineer.

8.1.2 Concrete Mixers

a) Mixers shall conform to the requirements of BS 3963 and shall be of sufficient mixing capacity to provide the required output without overloading.

b) The contractor shall submit with his tender details of the mixers he proposed to use, stating the manufacturer's name, type of mixers and estimated outputs. In addition the following technical information shall be included:

1) technical description of the plant, including recommended methods of erection, maintenance and operation control.

2) the results of tests carried out on prototype mixers in accordance with the BS.

3) minimum mixing time recommended for all the mixes specified.

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4) time required for charging and discharging

5) estimated theoretical output in terms of unit time for all the mixes specified.

6) capacity

7) method of addition of air entraining agent

8) type of water measuring device

9) any other information required for the production of a consistently uniform concrete of the quality required by this Specification.

The use of a mixing plant other than that approved will not be allowed.

When pavement quality concrete is specified the mixer and the batching plant shall be within the proximity of the Site boundary in a location to be approved by the Engineer.

The Contractor shall state with his tender whether or not he proposes to set up his mixers and batching plant on the site or to use a static plant outside the site. If he opts for the latter, he shall give information regarding the location of the plant and outline the arrangements he has made for their exclusive or shared use for the duration of the Contract paying particular attention to the requirements of Clause 8.1.4.

The weighing mechanism of each batching plant shall be checked by either its manufacturer or an independent testing authority, who shall certify its compliance with the tolerances given in Clause 8.1.3. The Contractor shall submit the test certificate to the Engineer prior to start of mixing. Further checks shall be made and the certificates passed to the Engineer at the end of each month during mixing and whenever a mixer is resited or disturbed.

The Contractor shall check the calibration of the water measuring devices and air entraining agent dispenser prior to start of mixing and at weekly intervals during mixing. The results shall be passed to the Engineer.

8.1.3 Batching and Mixing of Concrete

Concrete shall be mixed in approved static mixers in accordance with Clause 8.1.2. The proportion of each constituent in the mix by weight, shall be that approved by the Engineer in accordance with Specification _____ allowance being made as detailed below for the weight of free water in the aggregate.

The allowance made for free water in aggregates shall be determined, on representative samples from each of the aggregate stockpiles in accordance with Part 109 of BS 812, or with the approval of the Engineer, by any other method. Regular determinations shall be made before mixing starts each day and afterwards at 4 hourly intervals until mixing stops for the day. Additional determinations shall be made when mixing restarts after rain has stopped production.

Following each determination of free water in the aggregates the precise quantity of added water required to make up the total proportion of mixing water approved shall be calculated.

Aggregates from each stockpile and the cement content shall each be proportioned separately by weight to the tolerances given in Clause 4.5 of Part 3 of BS 5328. When the cement is delivered in bags, proportioning by weight of all constituents shall be based on the incorporation of whole bags.

The added water content calculated as detailed above may be measured by either weight or volume to the tolerance given in Clause 4.5 of Part 3 of BS 5328. All mixing water shall be added to each batch in the approved static mixing plant. Mixing within the approved static mixer shall continue for at least 60 seconds after the addition of mixing water. The total mixing time shall be agreed following trials with the mix to be used and mixing shall be carried out for this period.

When a delay of 30 minutes or more occurs during concrete production, mixing shall not restart until the mixer and handling plant has been thoroughly cleaned out.

Mixing shall be carried out by an experienced operator.

8.1.4 Time Allowed for Concreting

The total time taken either:

a) from the addition of water to the dry lean mix to the completion of the layer (including placing curing membrane if applicable) or

b) from the addition of water to the bonded concrete mix to the finishing of the slab including placing the initial curing membrane.

Shall not exceed 90 minutes.

The Contractor shall at the time of tender furnish a method statement showing how compliance with the above requirement can be achieved using his proposed equipment. The statement shall include details of a sequence of operations

commencing with addition of water at the mixer and finishing with final texturing of the concrete surface giving estimated times for each operation and an estimated overall time. The estimates given shall be verified on site using the actual concreting equipment during the laying of the trial area.

A record shall be kept by the Contractor of areas of concrete which fail to meet this requirement. The record shall be submitted daily to the Engineer. Only a qualified acceptance of the concrete in these areas will be given. Before final acceptance is given, the Contractor shall cut out and replace the concrete in these areas if directed to do so by the Engineer.

8.2 BITUMINOUS MIXING PLANT

8.2.1 General Plant Requirements

a) General

1) Sufficient storage space shall be provided for aggregates of different sizes, which shall be kept separately until they have been delivered to the cold elevator feeding the drier. The storage yard shall be neat, orderly, and the separate stockpiles readily accessible for sampling.

2) The plant used for the preparation of the bituminous mixtures shall conform to all the requirements under this Clause, except that the scale requirements shall only apply where weight proportioning is used. In addition, batch mixing plants shall conform to the requirements under Clause 8.2.2, and the continuous mixing plants shall conform to the requirements under Clause 8.2.3.

3) The mixing plant shall be of sufficient capacity and coordinated to produce bituminous mixtures of adequate quantity and quality as, and when, required during the various stages of the Works.

4) Any plant proposed by the Contractor shall be approved by the Engineer prior to the commencement of its use for Works under this Contract.

b) Plant Scale

1) Scales shall be accurate to 0.5 percent of the required load. Poises shall be designated to be locked in such positions so as to prevent any unauthorized change in their positions.

2) In lieu of plant and truck scales, the Contractor may provide an approved automatic printer system to print out weights of the material delivered, provided the system is used in conjunction with an approved automatic batching and mixing control system. Such weights shall be evidenced by a weigh ticket for each load.

3) Scales shall be inspected for accuracy and sealed as often as the Engineer may deem necessary.

4) The Contractor shall have in spare sufficient weights for testing the scales.

c) Equipment for the Preparation of Bitumen

1) Tanks for the storage of bitumen shall be equipped to heat and hold the bitumen at the required temperatures, accomplished by approved means, so that flames will not ignite the tank.

2) The circulating system for the bitumen shall be designed such that proper and continuous circulation of the bitumen is ensured during the period of operation.

3) Provisions shall be made for measuring the quantities of and sampling of the bitumen in the storage tanks.

d) Feeder for Drier

The plant shall be provided with accurate mechanical means for feeding the aggregates uniformly into the drier so as to obtain a uniform product at a constant temperature.

e) Drier

The plant shall include drier(s) which agitates aggregate continuously during the heating and drying processes.

f) Screens

Plant screens, capable of screening all the aggregates to the specified sizes and proportions and having normal capacities in excess of the full capacity of the mix, shall be provided.

g) Bins

1) The plant shall include storage bins of sufficient capacities so as to provide an adequate supply to the mixer operating at a full capacity. The bins shall be so arranged to ensure separate and adequate storage of the appropriate fractions of the mineral aggregates.

2) When filler or hydrated line is required in the mix, they shall be stored dry in separate bins and the plant shall be equipped to feed such materials into the mixer.

3) Each bin shall be provided with overflow pipes or chutes of such sizes and at such locations so as to present backup of the materials into other compartments or bins.

4) Each bin shall be provided with an outlet gate which shall cut off the supply quickly and completely in order to prevent any kind of spillage.

5) Bins shall be so constructed that samples may be obtained readily and shall be equipped with appropriate devices which indicate the position of the aggregates in the bins at the lower quarter points.

h) Bitumen Control Unit

Satisfactory means, either by weighing or metering, shall be provided to obtain specified amounts of bitumen in the mix and to check the quantity or the rate of flow of the bitumen into the mixer.

i) Thermometric Equipment

1) An armoured thermometer of an adequate range shall be placed in the bitumen feed line at a suitable location near the charging valve of the mixer unit.

2) The plant shall also be equipped with an approved thermometric instrument placed at the discharge chute of the drier to indicate the temperature of the heated aggregates.

3) The Engineer may require the replacement of any thermometer with an approved temperature-recording apparatus for better regulation of the temperature of the aggregates.

j) Dust Collector

The plant shall be equipped with an approved compartment to collect dust to

waste or return the dust uniformly to the hot elevator in amounts as directed by the Engineer.

k) Truck Scales

Bitumen mixtures shall be weighed on approved scales, furnished by the Contractor, or on public scales, all at the Contractor's expense. The scales shall be inspected for accuracy and sealed as often as the Engineer deems necessary.

l) Safety Requirements

1) Adequate and safe stairways to the mixer platform and sampling points shall be provided and guarded ladders to other plant unit shall be placed at all the points where accessibility to the plant operations is required.

2) Accessibility to the top of the truck bodies shall be provided by a suitable device to enable the Engineer to obtain sampling and mixing temperature data.

3) Adequate means shall be provided to raise and lower the scales for the calibration, sampling and other similar equipment between the ground level and mixer platform.

4) All gears, pulleys, chains, sprockets, and other dangerous moving parts shall be thoroughly guarded.

5) Ample and unobstructed passage shall be maintained at all times in and around the truck loading area.

6) The mixing area shall be kept free of drippings from the mixing platform.

8.2.2 Specific Requirements for a Batching Plant

a) Weigh Box or Hopper

1) Equipment shall include a means for weighing accurately aggregates of different sizes in a weigh box or hopper of an ample size to hold a full batch of aggregates without the need for hand raking or running over.

2) The weighing box or hopper gate shall close so tightly that no material is allowed to leak into the mixer while a batch is being weighed.

b) Control of Bitumen

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1) The equipment used to measure the amount of bitumen shall be accurate to within plus or minus 0.5 percent.

2) The bitumen bucket shall be of a non-tilting type with a loose sheet metal cover. The length of the discharge opening or spray bar shall be not less than three-fourths the length of the mixer and shall discharge directly into the mixer. The bitumen bucket, its discharge valve(s), and the spray bar shall be heated adequately.

3) Steam jackets, if used, shall be drained efficiently and all the connections shall be so constructed that they will not interfere with the efficiency of the operation of the bitumen scales.

4) The capacity of the bitumen bucket or indicator dial shall be not less than 15 percent in excess of the quantity of the bitumen used in any batch.

5) The plant shall have an adequately heated, quick-acting non-drip, charging valve located directly over the bitumen bucket.

6) The flow of bitumen shall be automatically controlled so that it begins when the dry mixing period is over and the whole amount of bitumen required for one batch shall be discharged in not more than 15 seconds after the flow has begun.

7) The size and spacing of the spray-bar openings shall provide a uniform application of the bitumen for the full length of the mixer.

8) A section of the bitumen line between the charging valve and spray bar shall have a valve and an outlet for a controlling meter when a meeting device is substituted for the bitumen bucket.

c) Mixer

1) The batch mixer shall be of an approved type capable of producing a uniform mixture within the job mix tolerances. If the mixer box is not enclosed it shall be equipped with a dust hood to prevent the loss of dust.

2) Clearance of the blades from all the fixed and moving parts shall not exceed 25cm.

d) Control of Mixing Time

1) Mixer shall be equipped with an accurate time-lock to control the operation of a complete mixing cycle. The time-lock shall lock the weigh-box gate after the charging of the mixer and keep it locked until the completion of the cycle. It shall, also lock the bitumen bucket throughout the dry mixing period and the mixer gate throughout the dry and wet mixing periods.

2) The dry mixing period is defined as the interval of time between the opening of the weigh-box gate and the introduction of bitumen.

3) The wet mixing period is the interval of time between the introduction of bitumen material and the opening of the mixer gate.

4) Timing control shall be flexible and with settings of 5-second intervals or less throughout a 3-minute cycle. A mechanical batch counter shall be installed as part of the timing device and shall be designed to register only completely mixed batches.

5) Setting of time intervals shall be at the direction of the Engineer, who shall then lock the case covering the timing device until a change is made in the timing periods. The Engineer shall retain all the keys.

8.2.3 Specific Requirements for a Continuous Mixing Plant

a) Aggregate Proportioning

1) The plant shall include means for an accurate proportioning of the aggregates of different sizes and shall have a feeder mounted under each compartment bin, equipped with an accurately controlled gate to form an office for volumetric measurement of the materials drawn from each compartment.

2) Accurate scales shall be provided to weigh such test samples.

b) Synchronization of Aggregate and Bitumen Feeds

1) Satisfactory means shall be provided to allow a positive interlocking control between the flow of aggregates from the bins and the flow of bitumen from the meter or other proportioning device.

2) This control shall be by an interlocking mechanical means or any other positive method satisfactory to the Engineer.

c) Mixer

1) The plant shall include an approved continuous mixer adequately heated and capable of producing a uniform mixture within the job mix tolerances and shall be equipped with a discharge hopper with dump gates to permit a rapid and complete discharge of the mixture.

2) Paddles shall be adjustable for the angular position of the shafts and shall be reversible to retard the flow of the mix.

3) The mixer shall have a manufacturer's plate giving the net volumetric contents of the mixer at regular heights inscribed on a permanent gauge.

4) Charts showing the rate of feed per minute for each size of aggregate used shall be provided.

CHAPTER 9 SITE SURVEYS AND SOIL INVESTIGATION

9.1 SITE SURVEYS

9.1.1 General

a) Drawing No. _____ shows the areas where the survey works are to be carried out. Principal points including the permanent bench marks and references points for the original coordinate system have been shown on the Drawing.

b) It is required that the Contractor shall carry out an "In Survey" including traverse survey, centre line survey, profile levelling, cross section survey and existing services survey at the various locations shown on the Drawing to cover the extent of the Works. All survey and level information shall be transposed to drawings of the site and submitted to the Engineer for his approval. If satisfied as o the accuracy of the In Survey and the drawings, the Engineer and the Contractor shall sign the drawings which shall constitute the record before construction.

c) All survey works shall be undertaken under the direct control of personnel qualified in their respective survey discipline and approved by the Engineer.

9.1.2 Survey Areas

a) The type of surveys required for the different areas, where the works shall be executed are shown on Drawing No._____.

b) It shall be noted that traverse survey shall be carried out, as and when required, during the execution of the survey works mentioned herein.

9.1.3 Method of Survey Works

The Contractor shall submit to the Engineer his proposals for the method of carrying out the survey works, which shall be undertaken in accordance with accepted international standards. No work shall commence until the Engineer has approved the proposals. The Contractor shall take into consideration the following when carrying out the survey works.

a) Coordinate System

The basic points of the airport coordinates to be used for the initial topographic surveying are located at the intersection points with the runway center line and

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the north and south ends of the runway, and coordinates are designated as follows:

North End Point	South End Point
P 200+0	P 300+0
H 200+0	H 200+0

b) Traverse Survey

1) All measurements shall start and end at a permanent bench mark.

2) Triangle survey adopting a traverse method shall be applied to establish the starting point of each survey area.

3) All horizontal angles shall be measured three times in both the clockwise and counter clockwise directions and the adopted angle shall be the mean of the six readings.

4) Distance measurements shall be made twice. The mean of the two measurements shall be adopted as the measured distance, only if the two values do not differ from each other by a tolerance given in the said Standards.

5) Angular and linear error of closure shall not exceed the limit stipulated in the above mentioned standards.

c) Levelling Survey

1) Levelling survey shall start and end at a permanent bench mark.

2) The tolerance error of misclosure shall not exceed 10 x square root of D, in mm, where D is the loop distance in km.

3) The accuracy of the instrument shall be within the manufacturers specified tolerance.

d) Centreline survey and Profile Levelling

1) The Contractor shall install pegs, nails or markings to facilitate the location of the starting points and levelling at 20m intervals along the centreline of the survey area.

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2) The elevations of these points and any encountered changing points, pavement edges and structures along the centreline shall be recorded.

e) Cross Section Levelling

1) Cross section levelling shall be carried out perpendicular to the direction of the established centreline of any survey area at 20m intervals along the centreline.

2) Along the perpendicular direction to the centreline, levels shall be picked up at intervals of 20m and at every changing point, edge of pavement, boundary between rigid and flexible pavements, any other existing structure such as drainage, fences, roads etc. and any natural feature such as gullies, sinkholes, eroded areas, swamps streams etc. shall be reflected on the prepared drawings.

f) Compiling and Mapping

1) The field data shall be compiled and processed in the manner described herein below.

2) The field note books duly typed and signed by the field supervisor shall contain the following items:

- Names and coordinates of permanent bench mark used as reference points for the linkage and principal points.
- Levelling calculation of the misclosure between the initial and the last principal points.
- Name and type of instrument used.
- Measured length of the polygon.
- Method of angle calculation and correction for the polygon.
- Location map and description of any new bench marks shall be supplemented to the submitted drawings.
- All field sketches and calculation results.
- The coordinates and elevations of all the critical points and grade elevation at survey points encountered or established during the

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execution of the survey works, including the starting and ending points of the survey areas.

3) The work results shall be processed to show all levels, contours at 50cm intervals and field data and plotted on A1 size drawings using the following scales:

- Layout plan : Scale 1:2,500
- Profile : Scale Vert. 1:50, Hor. 1:1,000
- Cross Sections : Scale Vert. 1:50, Hor. 1:1,000
- Others as directed by the Engineer

g) Submission of Work Results

1) Within two weeks of completion of the field works, three blue print copies of each drawing shall be submitted to the Engineer for checking and approval, before the final submission of the whole set of drawings containing five blue print copies and the original polyester film of each drawing.

2) Five copies of the field notes specified in sub-clause (f), herein above, shall be neatly bound in a folder and submitted.

9.2 SOIL INVESTIGATION

9.2.1 General

A soil investigation shall be carried out on Site to prove the design assumption concerning the quality of the oils under the pavements and elsewhere.

9.2.2 Subcontractor

a) The Contractor, immediately on Award of the Contract, shall submit to the Engineer the names of three suitably experienced and qualified firms specialized in sub-soil investigations. Full details of the firms, their personnel and equipment shall be submitted together with their experience and expertise.

b) The Engineer shall select and approve the most suitable specialist firm and the Contractor shall employ that firm as his Subcontractor.

c) The Subcontractor shall be responsible for providing all drilling equipment including platforms, casings, bits and all other equipment for drilling, testing, plate bearing tests as well as tools, materials and the like necessary to carry out

the Subcontract Works. He shall provide all labour and supervision and, addition, a full time soils technician or engineering geologist who shall be in attendance to direct the detail work and to keep a detailed site record of the Works and findings. He shall also be able to take directions or instructions from the Engineer. All boreholes, test pits and any other area dug out for testing shall be backfilled on completion to the satisfaction of the Engineer.

9.2.3 Location of Boreholes and Tests

The location of boreholes, plate bearing tests and modified California Bearing Ratio (CBR) tests shall be as stated and shown on Drawing No._____ or as directed by the Engineer. The Contractor, or the Subcontractor, shall be responsible for ascertaining the elevation of the ground at these points in relation to the initial survey carried out by the Contractor. The location and levels of bulk sampling will be as directed.

9.2.4 Field Work

a) Mechanical Borings

1) Boreholes shall be drilled to a maximum depth of 30m as shown on Drawing No._____, or other such depths as may be instructed by the Engineer.

b) Standard Penetration Test shall be conducted at each 1m level below the existing ground level. Undisturbed soil samples shall be obtained where possible at 1.5m, 2.5m and 10m depths and bulk samples at every differing soils type.

c) Plate Bearing Test

Plate Bearing Test shall be carried out to determine and confirm the design criteria shown on the Drawings for each element of the Works.

d) Modified CBR Test

1) Modified CBR tests shall be conducted as instructed by the Engineer.

9.2.5 Laboratory Tests

Tests on bulk samples obtained from mechanical borings and test pits shall be carried out at a suitably equipped laboratory approved by the Engineer and in accordance with the relevant standards listed in the Specification. Testing shall comprise physical and engineering property tests.

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a) Physical Property Tests

Physical property tests shall include, but shall not be limited to, the following tests:

1) Moisture Content.

2) Specific Gravity.

3) Sieve Analysis and Sedimentation.

4) Atterberg Limits.

5) Classification and Description.

b) Engineering Property Tests

Engineering property tests shall include, but shall not be limited to, the following tests:

1) Consolidation Test.

2) Triaxial Shear Strength Test (Undrained).

9.2.6 Recording and Reporting

a) Site Record

A detailed Site Record of all Works and findings shall be kept by the Subcontractor. This will include, but shall not be limited to, the following information:

1) The description, type and date of test carried out.

2) Details of equipment used.

3) Times of starting and stopping of drilling operations.

4) Type and details of casing used.

5) Ground Water Levels.

6) Details of strata penetrated.

7) Details of plant, labour and materials used.

8) Samples taken and the like.

b) Borehole Logs

The Subcontractor shall, within one week of completion of any borehole, submit to the Engineer, two copies of the draft borehole log showing:

1) Ground elevation of the top of the borehole.

2) Coordinates of the borehole.

3) Equipment and materials used.

4) Type of casing, diameter and elevation installed.

5) Type of strata penetrated and elevations relative to datum of any changes in the strata.

6) Elevation of ground water levels.

7) Tests undertaken and samples recovered at depths relative to datum.

8) S.P.T. results.

9) Size and depth of the borehole.

10) Any other pertinent information.

c) Test Results

The Subcontractor shall, within two weeks of extruding the samples, submit to the Engineer, two copies of the draft test results including:

1) Description, type and date of tests carried out.

2) Size, number and details of samples tested.

3) Any other pertinent information.

d) Soil Investigation Report

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1) Within two weeks of completion of the field works, the Subcontractor shall submit to the Engineer, through the Contractor, three copies of a draft report on the investigations. This report shall include, but shall not be limited to, all details of works and findings of the soil investigations including the result of all laboratory tests and the like. The Subcontractor's comments of the results and any problems encountered during the investigations shall also be included in the report.

2) Within one week of receiving the Engineer's comments on the draft report, the Subcontractor shall submit to the Engineer, through the Contractor, ten copies of the final report incorporating the Engineer's comments.

CHAPTER 10 SETTING OUT INFORMATION

10.1 SETTING OUT INFORMATION

In accordance with Sub-Clause 17.1 of the Conditions of Contract, the points, lines and reference levels to be used for the setting out of the Works shall be as given on Drawing No._____. As soon as possible after the Award of the Contract the Contractor shall formulate proposals for his control of setting out the Works for approval by the Engineer.

CHAPTER 11 QUARRIES, BORROW PITS, STOCKPILES AND DISPOSAL AREAS

11.1 SCOPE OF WORKS

This Clause gives guidance on the acquisition of quarries and borrow pits, construction of access roads, stockpiling at the quarries and within the airport boundary, if any, provision of land and obligations accruing thereof, site clearance, removal of topsoil and overburden, safety and public health requirements.

11.2 DEFINITIONS

11.2.1 Quarry

A quarry shall mean an open surface working from which stone is removed by drilling and blasting for use in the Works.

11.2.2 Borrow Pit

A borrow pit shall mean a site from which material, other than stone, is removed for use in the Works. A borrow pit shall be that selected by the Engineer or alternatively it may be one proposed by the Contractor and approved by the Engineer.

11.2.3 Stockpile Area

A stockpile area shall mean an area where material such as topsoil, fill material, gravel or aggregate or materials recovered from demolitions are stockpiled prior to use in the Works.

11.2.4 Disposal Area

A disposal area shall mean a site upon which surplus or unsuitable materials arising out of the Works are dumped. Surplus or unsuitable material shall be dumped on the Site only as instructed by the Engineer. In general all surplus or unsuitable materials shall be disposed off Site in locations sourced by the Contractor which are acceptable to any local authorities concerned.

11.3 GENERAL REQUIREMENTS

11.3.1 Sources of Material

a) The Contractor shall investigate and select the sources of aggregates for cement concrete, stone for bases and subbases, bituminous mix courses, chippings for surface dressings and rockfill. Such sources shall be designated as quarries and are defined in Clause 11.2.1.

b) The sources of natural materials such as fill material for the construction of embankments, and gravel for subbase, base, surfacing and shoulders shall be designated as borrow pits and are defined in Clause 11.2.2

c) The Contractor shall verify that his sources of materials proposed are capable of providing materials that meet the requirements of Volume 2 Part 2 of the Specification and the quantities indicated in the Bill of Quantities. In seeking the approval of the Engineer for the proposed sources the Contractor shall include with his submission for approval:

1) quantities to be provided from each source
2) technical and physical analysis of the materials and test results determining these properties
3) methods by which the quality of materials at each source will be assured
4) mode of transport and route to Site

11.3.2 Provision of Land

a) Any acquisition of quarries and quarry-related stockpile areas shall be the responsibility of the Contractor. The location and size of the quarries and related disposal and stockpile areas proposed by the Contractor shall be subject to the approval of the Engineer. The Engineer's approval may be withheld if the quarry and related spoil or stockpile area, or access into them, in the opinion of the Engineer.

1) will have a detrimental effect on the environment,

2) would be very difficult to exploit,

3) would not meet the quantity requirements or the Specification requirements,

4) has excessively thick layers of overburden,

5) would require an access road which is excessively long,

6) covers too large an area,

7) would constitute a danger to the public,

8) is further from the Site than a source of suitable material at hand.

b) The Contractor shall inform the Engineer in writing not later than 60 days after the Engineer's Order to Commence (Clause 41.1 of the Conditions of Contract) of all quarries, related spoil and stockpile areas that the Contractor will require for the whole of the Works. Prior to the submission of the written notice, the Contractor shall set out each quarry and related spoil and stockpile area with concrete beacons clearly identifying the areas required for working areas, stockpile areas, blasting safety zones and access routes. The Contractor's written notice shall include the following for each quarry and related stockpile and spoil areas:

1) A plan at 1:500 scale in ink on a stable transparent material giving details of:

- plot boundaries, district, location, registration, section and number for each plot,
- owners' names and addresses, and if appropriate, Identity Card numbers,
- local details such as buildings, fences, graves, types and areas of cultivation and services, all agreed with the land owners, and
- areas to be used for working areas, stockpile areas, lasting safety zones etc.

2) Cadastral maps covering the areas to be acquired.

3) Details of the proposed access road route.

c) Where borrow pits, available for inspection at the time of Tender, are identified by the Engineer, the Contractor shall satisfy himself as to the quality and quantity of material available before providing the information required in this Clause. Should such investigations reveal that there is insufficient suitable material for the use for which the borrow pit was intended, the Contractor shall immediately inform the Engineer in writing and the Engineer shall either direct that the borrow pit be extended or that a new borrow pit used.

d) The Contractor shall be responsible for any delays in the land acquisition which occur due to any of the above information being incorrect and the 60 day period for land acquisition shall not be extended by the period of any such delay.

e) when a quarry, borrow pit, disposal or stockpile area has insufficient suitable material or area for the use for which it was intended the Contractor shall propose in writing that either an existing quarry, borrow pit, disposal or stockpile area be extended or that a new quarry, borrow pit, disposal or stockpile area shall be used. The approval and acquisition of such new or extended quarries, borrow pits, disposal or stockpile areas shall be in accordance with all the above provisions of this Clause for the acquisition of the original quarries, borrow pits, spoil or stockpile areas.

11.3.3 Entry upon Land

a) The Contractor shall, before entering upon any land provided by the Employer, satisfy himself that the legal rights of entry have been obtained.

b) Where it is necessary to agree levels for the calculation of quantities, the Contractor shall not enter the area until such levels have been agreed and the Engineer's approval obtained.

11.3.4 Safety and Public Health Requirement

The Contractor shall comply with the Bye-laws of the Local Authority regarding the public health and safety in respect to the operation of quarries, borrow pits, stockpile or disposal areas, and in the absence of, or in addition to such Bye-laws, shall comply with the following conditions:

a) All areas being worked upon shall be drained and kept drained. Where a quarry or borrow pit has been excavated so that it will not drain naturally, it shall be kept pumped dry while being used.

b) The Contractor shall confine his operations solely to the areas provided and shall demarcate the boundary of the area and erect temporary or permanent fencing as instructed by the Engineer.

c) Where the height of any excavated face exceeds 1 metre, the Contractor shall provide, erect and maintain at his own expense stockproof fencing and gates to prevent unauthorized access to the top of the working face.

d) On completion of work all faces shall be neatly trimmed to a slope flatter than 1 in 4. Where this is impracticable or where the working face is to be left exposed, the edge shall be permanently fenced, as instructed by the Engineer.

e) On completion of the Works, temporary fences and all the temporary structures shall be demolished and removed, all latrine pits filled in and drained and the site topsoiled and left neat and tidy.

11.3.5 Access Roads and Traffic Control

The Contractor shall be responsible with regard to the construction and maintenance of access roads to quarries, borrow pits, disposal and stockpile areas and with regard to traffic operations thereon. Access roads within the airport boundary shall be as shown in the Drawings and the Contractors vehicles must at all times be kept away from the restricted areas within the airside which includes the runway strip, taxiway strip, runway ends and the apron.

11.3.6 Site Clearance and Removal of Topsoil and Overburden

a) Unless otherwise instructed by the Engineer, the Contractor shall clear the sites off all quarries, borrow pits, stockpile and disposal areas in accordance with the requirements of Specification Volume 2, Part 2.

b) All existing fences, trees, hedges and other features which the Engineer instructs shall not be removed or, otherwise dealt with, be protected as instructed.

c) Unless otherwise directed by the Engineer, the Contractor shall remove topsoil and/or overburden from the quarries, borrow pits, disposal and stockpile areas. The Engineer shall direct whether topsoil shall be stripped and stockpiled separately or shall be excavated and spoiled together with the overburden. If suitable, the Engineer may direct that the overburden be used in the Works. All relevant works shall be undertaken in accordance with the requirements provided in Specification Volume 2, Part 2.

d) On completion of the Works, in any quarry, borrow pit, disposal or stockpile area the overburden and/or topsoil which has not been used in the Works shall be pushed back, spread and landscaped over the area of the quarry, borrow pit, disposal or stockpile area. Where topsoil has been stockpiled separately it shall be pushed back and spread over the quarry, borrow pit, disposal or stockpile area after landscaping unless the Engineer has instructed that it be used for topsoiling in accordance with the requirements of Specification Volume 2, Part 2.

11.3.7 Mixing, Selecting and Stockpiling of Materials

a) Before the borrow pit is opened, the Engineer will instruct the Contractor as to the type of material to be excavated and the areas and depths to be worked on.

b) The Contractor may be required to mix the selected materials by bulldozing into the stockpiles and/or by face loading by shovel. The stockpiles shall be formed at least six weeks before the intended use of the materials which are to be treated and at least three weeks before the intended use of the materials which are not to be treated.

c) The Contractor shall ensure that oversized material, clay, humus or other inferior quality materials encountered in the workings are separated from the material proposed for use in the Works and such inferior quality material shall be removed to spoil.

d) A separate stockpile shall be used for each type and grading of material.

e) When removing material from the stockpiles, none of the underlying material shall be mixed with it, and generally at least the bottom 100mm layer shall be left behind.

f) Should any stockpile prove surplus to the requirements under this Contract, the Contractor shall spread the material over the area of the quarry or borrow it unless directed otherwise by the Engineer.

11.3.8 Limits of Stockpiling within Airport Boundaries

At the areas designated for stockpiling excavated materials and aggregates within the airport boundary, the following rules shall be observed:

a) Proposed areas for borrow, disposal and stockpiling of material within or outside the project site shall be as shown on the Drawings or advised by the Engineer.

b) All vegetation shall be removed from the site of the stockpile which shall be levelled, graded and drained, and if necessary the area shall be surfaced with gravel or other material approved by the Engineer.

c) At least the 100mm bottom layer of the aggregate shall be left behind to avoid contamination.

d) Stockpiles shall be built in layers of not more than 1m in thickness. Each layer shall be completely in place before the beginning of the next which is not to be allowed to 'cone' down over the underlying layer.

e) Stockpiles shall be about 2m high and levelled at the top to an even height with uniform side slopes for ease in calculating quantities.

f) Different grades of aggregate shall be stockpiled separately and the sites shall be located such as to ease hauling to the various mixing plants or permanent works.

g) After use the stockpile area shall be cleared, reinstated and left neat and tidy, all to the Engineer's satisfaction.

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CHAPTER 12 POLLUTION AND PROTECTIVE MEASURES

12.1 POLLUTION, NUISANCE AND CONSTRUCTION NOISE

12.1.1 Avoidance of Pollution and Nuisance

The Contractor shall take all statutory measures to prevent pollution. In addition, he shall prevent dust from the Site being deposited on adjoining property, and provide suitable washing and cleaning equipment to prevent his vehicles and equipment from depositing mud on public roads. All construction processes which generate dust shall be provided with suitable equipment for the extraction of dust. Where dust originates from the trafficking of roads, provision shall be made either for the roads to be regularly watered or for the spraying of a suitable dust-preventing membrane.

12.1.2 Construction Noise

a) The Contractor shall comply with the requirements of any local authority with regard to restricting noise level on Site.

b) The Contractor shall furnish such information as may be requested by the Engineer with regard to the noise levels of the Contractor's, or his Sub-Contractor's equipment or proposed equipment, and shall afford the Engineer all reasonable facilities (including the provision of a sound meter complying with BS 4197) to enable the Engineer to carry out such investigations as he may consider necessary in connection with noise emissions on and from the Site.

12.2 CONTROL OF WATER

12.2.1 General

The Contractor shall take whatever measures are necessary to control any surface or sub-surface water which may be encountered on Site. Such measures may include damming and diversion works, pumping, dewatering and the like. Water accumulated on Site and contaminated by any industrial process or by-product shall not be discharged into any water course if such a discharge is likely to cause pollution or significantly increase the sediment loading in the water course. Where sub-surface water is present and the Contractor proposes to remove the water to facilitate construction, he must take full consideration of, and responsibility for, the effects of the removal of such water on adjacent structures. This requirement also applies where the Contractor's proposed working methods may increase the level of sub-surface water.

12.2.2 Water Disposal

a) Water used, developed or otherwise occurring within the Site shall be controlled and disposed of as necessary for the proper execution of the Works and the protection of the existing airport facilities.

b) Water disposal shall not damage any terrain, plant, trees, construction work, or existing or new structures. The disposed water shall not be led onto or across an established subgrade, subbase course, base course, bituminous mix course, road, parking area, planting, lawn, adjacent property, airport facilities, or other areas as directed by the Engineer.

c) Any existing or new storm water drain within or outside the Site may be used for water disposal but shall be maintained free from clogging or silting caused by such use.

12.2.3 Pumps

The Contractor shall furnish, install and operate such pumps or other devices, as may be necessary, to remove any seepage, storm water, sewage or construction water that may be found or may accumulate in the excavations.

12.3. CONTROL OF DUST

12.3.1 general

a) Dust shall be abated and minimized throughout the entire construction period., including working days, public holidays and weekends as required.

b) Extra or additional efforts shall be exercised to abate dust causing a nuisance in the vicinity of the existing buildings or premises within or outside the airport and to those living in the vicinity of the airport boundary.

c) Dust control equipment shall be made available and ready for use at all times. Dusty areas shall be wetted as often, and in extents, as necessary or as directed by the Engineer.

12.3.2 Dust Emitted from Bituminous Mixing Plant

Extensive dust emitted, especially from the bituminous mixing plant, shall be abated to the maximum extent to prevent any kind of obstruction to aircraft movements and nuisance to all other within or outside the airport.

CHAPTER 13 SAFETY MEASURES

13.1 SAFETY REGULATIONS

The Contractor shall implement and strictly follow the provisions for his safety plan from commencement until completion of the Works and any other safety standards in force as well as all applicable governmental laws, safety regulations and ordinances in the People's Republic of China in order to safeguard all within or outside the Site from the effects of any accident.

13.2 SAFETY AND HYGIENE PROGRAMME

13.2.1 General

The Contractor shall be wholly and solely responsible for the health, safety, and welfare of his workforce, the Employer's and Engineer's staff, Subcontractors and other persons on the whole of the Site and any other areas being used for the purposes of the Works.

13.2.2 Programme

Within 56 days of the date of the Letter of Acceptance, the Contractor shall submit for the approval of the Engineer a comprehensive and detailed statement of the programme he will adopt and the provisions which he has made for ensuring the safety of all those engaged on or about the construction of the Works or the supervision thereof. The safety programme shall include, but shall not be limited to, the following organizational and procedural matters:

a) the safety organization on Site, lines of communication, procedures in the case of accidents, contact locations, emergency procedures, training proposals and training reinforcement;

b) details of all medical facilities, their locations, means of access and the availability and level of medical facilities and treatment at each locations;

c) procedures for transportation, storage and use of gas, paint and other inflammable materials, work in enclosed spaces, work in excavations, work at heights, control of vehicles and equipment and loading, transporting and dumping materials;

d) safety procedures to reduce the risk of falls from working platforms, falls through or from roofs, falls from structural frameworks under erection, falls of materials

from heights, collapse of trench walls and the sides of excavations and the overturning of lifting equipment;

e) methods of ensuring and enforcing safe driving practices;

f) the provision and maintenance of hygienic living, eating and working conditions for his employees;

g) the provision, free of charge to his employees, of suitable prophylactics to combat malaria where this disease is endemic;

h) procedures for the use of grinding and cutting equipment, for isolating and controlling electrical circuits, isolating and controlling mechanical equipment, transporting, storing and using explosives, use of cranes and other lifting equipment;

i) the prevention of the formation of stagnant pools of water in the vicinity of housing and office accommodation;

j) the control or elimination of noxious insects or animals;

k) the spraying, at least once a year or as instructed by the Engineer, with a suitable insecticide of all buildings erected on Site;

l) the prompt and effective collection and disposal of all domestic and industrial waste generated on or about the Site by reason of the Contract.

13.3 VISITORS

The Contractor shall be entirely responsible for the control of visitors to Site and shall take such precautions as are necessary for their safety as may be agreed with the Engineer and the Employer. The Contractor shall keep a record of all visitors to the Site in a form to be agreed by the Engineer and shall submit details of all visitors to the Engineer on a weekly basis.

13.4 PROTECTION OF TEMPORARY WORKS

All temporary works shall be protected by way of barriers, lights, notices and the like. The Contractor shall ensure that all precautions are taken to safeguard the general public and operating staff from any dangers created by temporary works. All excavations and the like shall be protected by barriers at all times and floodlighted at

night. Warning and diversion signs concerning roadworks shall be suitably placed to give motorists ample warning. During the movement of heavy vehicles across roads or onto roads, men, bearing red flags, shall be in attendance to warn other road users and to generally control traffic in a safe manner.

13.5 PROTECTION OF EXISTING SERVICES AND STRUCTURES

a) Where the Works affect the existing services, the Contractor shall ensure that the services are properly supported and protected from damage to the satisfaction of the owners of the services, and the Engineer. This may involve the temporary or permanent relocation of the service. In addition, the Contractor shall protect underground services from the effects of heavy loads due to the movement of equipment or the transport or storage of material, and shall protect aerial services from damage by the movement of high vehicles or equipment.

b) All existing structures, services above ground, items of archeological, religious or social interest, permanent markers and the like liable to be damaged during the construction of the Works shall be protected by boarding up or similar method, to the satisfaction of the Engineer.

13.6 PROTECTION OF PERMANENT WORKS

The Contractor shall protect the Permanent Works from damage arising from all activities of Site. This shall include, but shall not be limited to protection against:

a) chemical staining of finish surfaces (for example, rust stains on concrete),

b) damage to arises,

c) ingestion of dust into equipment,

d) bleaching or fading of materials exposed to sunlight,

e) damage by weather,

f) vandalism, and

g) deterioration of materials due to improper storage.

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13.7 LIMITATION ON WELDING

Open-flame welding or torch-cutting operations shall not be permitted unless adequate fire and safety precautions are provided and have been approved by the Employer through the Engineer. All vehicles shall be parked and serviced behind the construction restriction line and/or in the area designated for the Contractor's Establishment.

13.8 FIRE PRECAUTIONS

The Contractor shall comply with the regulations of the Employer and any other controlling authority in force at the Site of the Works relating to the precautions to be taken against fire hazards.

CHAPTER 14 MISCELLANEOUS MATTERS

14.1 NOTICE AND SIGN BOARDS

The Contractor shall supply and, at locations to be agreed with the Engineer, erect two notice boards. In addition, the Contractor may for his own purposes erect two sign boards, not greater than $6m^2$ each. These may identify the Site, incorporate the Contractor's name and logo and those of his Subcontractors, and have adjacent direction signs. These sign boards shall be erected at locations agreed with the Engineer. No further notice or sign boards shall be erected, except with the prior consent of the Engineer and the Contractor shall ensure that his Subcontractors adhere to this requirement. All notice and sign boards shall be written in English. Notice or sign boards containing a warning or important information shall also be written in Cninese.

14.2 CONNECTION CHARGES

The Contractor shall arrange for payment of all service connection charges to electrical power, mains water supply, sewerage, telephones and the like arising from the Contract.

14.3 WEATHER RECORDS

The Contractor shall maintain throughout the period of the Works a record, conforming to recognized meteorological data collection standards, of weather conditions on Site. The record shall be issued to the Engineer with the monthly report and include, but shall not be limited to, the following:

a) maximum and minimum shade temperatures;

b) rainfall: duration and amount;

c) wind: direction and speed;

d) sunshine hours, cloud cover etc.;

e) any unusual weather conditions shall be specifically annotated.

14.4 OPERATING AND MAINTENANCE MANUALS

14.4.1 General

The Contractor shall provide 5 original, complete and comprehensive sets of Operating and Maintenance Manuals and 3 photocopy sets for each system, bound in hard covers. The manuals shall be compiled throughout the period for construction and submitted in as many drafts a necessary such that the final issue of the Manuals, for any Section of the Works or for the whole of the Works has been approved by the Engineer prior to and as a prerequisite to the issue of the Taking Over Certificate. No claim whatsoever will be considered for an extension of time to the Time for Completion due to the Contractor's late submission of the Operation and Maintenance Manuals.

14.4.2 Language and Format of Manual

The manuals shall be written clearly, in English and Chinese and contain all information required by the Employer's operating and maintenance staff. The manuals shall be in the format, indexed, divided into sections and bound in a manner approved by the Engineer such that the information can be located quickly and easily.

14.4.3 Contents of Manuals

The manuals shall contain, but shall not be limited to, the following:

a) Complete and accurate technical description of the systems and all equipment contained in the systems by either drawings or text or both. Manufacturers' technical literature shall be included as appropriate.

b) The designed performance rating of each system.

c) The function of each part of the system within that system, together with its designed performance rating.

d) Results of unit/equipment tests and or system commissioning signed by the Engineer.

e) Operating procedures from start-up to close-down with all intermediate stages, including emergency procedures.

f) Complete list of all modules, components and parts of all equipment within the system giving the original manufacturers' name, address, telephone/fax nos. and

part number and type. Names, address, telephone and fax numbers of Chinese firms able to provide these parts shall also be given.

g) Complete list of all equipment used to test the systems together with the name, address, telephone and fax numbers of the test equipment manufacturers.

h) Complete list of names, addresses, telephones and fax numbers (including after hours numbers) of all Contractors, Suppliers and installers of systems and equipment. This list shall also include the same information for service companies contracted to the Employer (if known).

i) Complete list of all consumables for each system, or suitable alternatives, with the name, address, telephone and fax numbers of the original supplier and the names, addresses, telephone and fax numbers of Indonesian firms able to provide these materials or alternatives.

j) The manufacturer's recommendations for routine preventive maintenance together with the manufacturers' recommended spare parts list for periods of 2, 5 and 10 years, with parts numbers etc., as in (f) above.

k) Step by step fault finding procedures for systems and equipment within systems together with all safety measures to prevent accidents to persons or equipment.

l) Comprehensive set of drawings of the system and equipment as installed. A3 paper copies of As Built Drawings shall be used for this purpose.

14.4.4 Availability of Information

It is acknowledged that final issue of the manuals cannot be completed until the system has been fully accepted. However, information which shall be contained within the manuals shall be required at various stages throughout the construction period. The Contractor shall allow for making such information available at the appropriate times.

14.5 SALVAGE OF MATERIALS

Where in the course of the demolition or renovation of existing facilities materials, fittings or fixtures can be economically salvaged or have been identified in the Specification as required to be salvaged and re-used in the Works, then they shall be carefully dismantled by the Contractor. Where such materials and the like are intended to be used in the Works the Contractor shall be responsible for their transport and safe storage. Where such materials and the like are not intended to be

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used in the works the Contractor shall transport them with due care to a place of storage on Site designated by the Engineer where they are to be handed over to the Employer for safekeeping.

14.6 SPARE PARTS

14.6.1 Provision

Based upon the proposed manufacturers recommendations the Contractor, unless specified otherwise, shall compile a comprehensive list of the spare parts included in his rates and prices and deemed (giving all pertinent information such as number required, manufacturer, supplier, part number, cost and so forth) necessary to run and maintain all fittings, fixtures, systems and equipment for a period of two years. Approval of the Contractor's proposed fittings, fixtures, systems and equipment will be subject to acceptance of the spare parts lists by the Engineer.

14.6.2 Availability

The list shall be submitted for the approval of the Engineer in such time as to ensure that the spare parts shall be available by the date of the Contractor's request for a Taking-Over Certificate for the Whole of the Works. Subcontractors supplying spares must give guarantees that suitable spares will be available for a period of 10 years after the issue of the Defect Liability Certificate.

14.7 SPECIAL TOOLS

Where special tools are required to operate or maintain any part of the Works, the Contractor is to supply two sets of such tools suitably cased or housed in purpose made wall mounted tool racks. Lists of special tools shall be based upon the equipment manufacturer's recommendations and subject to the approval of the Engineer.

14.8 TESTS ON COMPLETION

14.8.1 General

a) Where the Works or parts thereof are required to perform or function in a particular manner, then before the Contractor requests that they be taken over by the Employer they shall have been tested, commissioned and passed all performance verification checks to ensure that they perform or function in the

particular manner specified. Such tests shall include the operation of a system under the conditions expected to prevail during its normal operations. Where testing is required which exceeds normal operating conditions, or where particular testing is required, then this will be described in the appropriate parts of the Specification.

b) The sequence for testing which shall be complete prior to and as a prerequisite to the Engineer issuing the Taking Over Certificate shall be:

1) Testing: proof of operation in (generally) static conditions

2) commissioning: setting to work and adjusting as necessary in dynamic conditions
3) Performance Verification: measurement of controlled outputs against design outputs
4) Demonstration testing: equipment or system operation in differing modes

c) Testing shall be undertaken using temporary power supplies and the like reticulated by the Contractor. Commissioning, Performance verification and Demonstration Testing shall be undertaken using mains utilities, upgraded and expanded as required by the Contract.

14.8.2 Testing

a) Testing shall mean the proof of operation (generally) in static conditions of all Plant, mechanical equipment, materials and installed systems to the design requirements specified for tests and or the manufacturers test ratings. Where tests or specific test requirements are not shown in the Specification for particular elements of the Works the tests to be undertaken shall be those shown in the standards, codes of practice and the like, applicable to those elements of the Works.

b) The Contractor shall submit to the Engineer for his approval a complete programme for testing all Plant, mechanical and electrical equipment, materials and installed systems. Separate attachments to this programme shall be provided in a standard format identifying as a minimum requirement:

1) Plant, mechanical and electrical equipment, materials or installed systems to be tested
2) standard(s) applicable to the test to be undertaken
3) design test requirement
4) methods, equipment and personnel to be used for the test
5) appropriate notice issued to local and or airport authorities

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6) proposed test date and time.

Space shall be available on the form to record the test date, the results of the test and any comments, consumables used for the test, the Engineer's staff witnessing the test and the Engineers approval. Two copies of the completed and signed test record shall be issued to the Engineer within 5 days of completing the test. The original shall be retained by the Contractor for incorporation to the Operation and Maintenance Manuals.

14.8.3 Commissioning

a) Commissioning shall mean the setting to work calibrating, balancing, adjusting and measuring outputs of all Plant, mechanical and electrical equipment and installed systems against the designed performance outputs. Commissioning shall be carried out for all Mechanical, Electrical and Public Health works in accordance with the UK Chartered Institute of Building and Commissioning Codes, ASHRAE (series A, B, C, W) or equivalent as approved by the Engineer. All automatic controls, refrigeration, air navigation, conveying, hoisting, and other specialist systems shall be commissioned by, or with, the relevant manufacturer in attendance.

b) The Contractor shall submit to the Engineer for his approval a complete programme for commissioning all Plant, mechanical and electrical equipment and installed systems. Separate attachments to this programme shall be provided in a standard format to the requirement of 14.8.2 b) above, suitably amended for commissioning purposes.

14.8.4 Performance Verification

a) Performance Verification shall mean the measurement of speeds, flows, volumes, noise, outputs and the like to verify the performance of all Plant, mechanical and electrical equipment and installed systems against the specified performance during the specified range of conditions and over specified durations in each operating mode. Performance verification shall be undertaken following the guidelines given in 14.8.3 a) or as determined by the Engineer.

b) The Contractor shall submit to the Engineer for his approval a complete programme for performance verification of all Plant, mechanical and electrical equipment and installed systems. Separate attachments to this programme shall be provided in a standard format to the requirements of 14.8.2 b) above, suitably amended for performance verification purposes.

14.8.5 Demonstration Testing

Demonstration testing shall be undertaken as performance verification with additionally the Employers staff in attendance as part of the Contractors training obligation. All Plant, mechanical and electrical equipment and installed systems shall be operated over limited durations to demonstrate, fault finding techniques, emergency stop, start up procedures and normal operating modes in varying conditions. A record of all tests, procedures and the like demonstrated together with a record of the Employers staff in attendance shall be submitted to the Engineer.

14.8.6 Water Retaining and Conveying Structures

a) Structures such as tanks, channels and pipelines intended for the storage or conveyance of water or aqueous liquids shall be tested for water tightness once they have been completed. Such tests shall be required to demonstrate that the individual structures do not leak and that the system formed by the interlinking or connection of the structures also does not leak. Water testing, except where otherwise stated in the Specifications, shall consist of:

   1) filling the structures to be tested with water;

   2) leaving the water-filled structures to stand for 24 hours;

   3) topping the water level up to a set mark;

   4) leaving the water-filled structures to stand for a further 24 hours;

   5) measuring the reduction in level and calculating the loss of water.

b) The structures shall be considered to be watertight if the loss of water is less than 2% of the total volume of water required to fill the structures to the set mark.

14.9 CEREMONIAL OCCASIONS

The Employer may elect to celebrate the opening of the Works or a part thereof, or a particular stage in the Works, with an appropriate ceremony. The Contractor shall provide, to the extent that he is able, such assistance as the Employer may reasonably require.

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14.10 PUBLICITY

The Contractor shall not, by means of advertising, writings to and for publications, photographs, notices, bards or any other means, use the Works for publicity except with the expressed permission of the Engineer in writing.

14.11 INSURANCES

14.11.1 General

In order to permit preliminary works to commence, the Contractor shall, on receipt of the Engineer's Order to Commence, immediately arrange suitable insurances and shall submit to the Engineer cover notes showing that the appropriate insurances are in force. The Contractor shall submit, at the same time as the cover notes, statement(s) from the insurer(s) to the effect that the cover notes are, and the policies to be issued will be in accordance with the Contract and that all the requirements of the Contract are covered.

14.11.2 Approval

As the policies of insurance are issued the Contractor shall submit them to the Engineer for scrutiny prior to approval by the Engineer.

14.11.3 Responsibility for Maintaining Insurance Cover

The Contractor shall be wholly and solely responsible for keeping all policies in force and for paying all premiums and other charges necessary for effecting the insurance cover to the full extent required under the Contract.

14.12 OWNERSHIP OF SOFTWARE PROGRAMMES

The contractor is to ensure that the ownership of all programmes for operation of any equipment is vested in Employer.

14.13 INCOME TAX AND OTHER TAXES

The Contractor and his employees shall be liable for income tax and such other taxes, duties, contributions and other charges levied on all payments made to them as shall be payable in accordance with any National or State Statute, Ordinance, Decree or other Law of the People's Republic of China. The Contractor shall ascertain for

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himself all such liabilities and shall make due allowance in his rates which will be deemed to cover all such costs.

14.14 INTERFERENCE WITH WORKS

The Contractor shall not interfere in any way with any existing works, whether the property of the Employer or of a third party and whether the position of such works is indicated to the Contractor by the Engineer or not, except where such interference is specifically described as part of the Works, either in the Contract or in the Engineer's instructions.

14.15 RATES AND PRICES

The Contractor shall provide a detailed breakdown, including legitimate invoices or quotations, of any rate or price contained in the Contract Documents, when required by the Engineer so to do. Such breakdown will be for the purpose of this contract and shall not be made public.

14.16 TRANSLATION

14.16.1 General

The translation of documents, drawing annotations and other written text from English to Chinese or Chinese to English as specified or from any other language to English and Chinese, shall be undertaken by specialist translation companies who, notwithstanding any approval of the Engineer, shall certify and warrant the accuracy of the translation. All translated material shall be typed and bound in the format approved by the Engineer.

14.16.2 Contract Document

Upon award of the Contract the Contractor shall make arrangements with a company approved by the Engineer for the translation of the Agreement and all documents deemed to form and be construed as part of the Agreement, from English to Chinese. The translated documents shall be submitted to the Engineer for his approval with 90 days of the letter of acceptance, within 28 days of the Engineers approval the Contractor shall deliver to the Engineer 30 copies of all documents bound in the manner instructed.

14.17 ABBREVIATIONS

Throughout those documents, units of measures and terms are abbreviated and shall be interpreted as follows:

m	-	metre
m^2	-	square metre
m^3	-	cubic metre
mm	-	millimeter
mm^2	-	square millimetre
cm	-	centimetre
cm^2	-	square centimetre
N	-	Newton
kN	-	kiloNewton
N/mm^2	-	Newton per square millimetre
N/m^2	-	Newton per square metre
t	-	ton = kg x 10^{-3}
t/m^3	-	tons per cubic metre
kg	-	kilogram
kg/m^3	-	kilogramme per cubic metre
g	-	gram = kg x 10^{-3}
%	-	percent
°C	-	degree Celcius

APPENDIX 1

JAPANESE OECF GUIDELINES AND ELIGIBLE SOURCE COUNTRIES

Goods eligible for this project shall be those produced in eligible source countries as defined in Japanese OECF Guidelines for Procurement under OECF Loans as follows:

All countries and areas listed following

However, even if such goods contain materials imported from a country (countries) other than the eligible source countries (hereinafter referred to as "non-eligible source country"), such goods may be eligible if the imported portion is less than fifty percent (50%), on an item-by-item basis in accordance with the following formulae:

(a) When Chinese Suppliers are awarded the Contract concerned:

$$\frac{\text{Imported CIF Price + Import Duty}}{\text{Supplier's Ex-factory Price}} \times 100$$

(b) When the Suppliers of eligible source countries other than Chinese are awarded the Contract concerned:

$$\frac{\text{Imported CIF Price + Import Duty}}{\text{Supplier's FOB Price}} \times 100$$

APPENDIX 1

ELIGIBLE SOURCE COUNTRIES

CATEGORY I ORGANIZATIN FOR ECONOMC COOPERATION AND DEVELOPMENT (OECD)

United States of America
Canada
United Kingdom
France
West Germany
Italy
Belgium
Netherlands
Luxembourg
Sweden
Norway
Denmark
Iceland
Ireland
Austria
Switzerland
Portugal
Spain
Greece
Turkey
Japan
Finland
Australia
New Zealand

CATEGORY II DEVELOPING COUNTRIES

EUROPE
Cyprus
Gibraltar
Greece
Malta
Portugal
Turkey
Yugoslavia

NORTH OF SAHARA
Algeria
Egypt
Libya
Morocco
Tunisia

N. & C. AMERICA
Bahamas
Barbados
Belize
Bermuda
Cuba
El Salvador
Guadeloupe
Guatemala
Haiti
Honduras

SOUTH AMERICA
Argentina
Bolivia
Brazil
Chile
Columbia
Ecuador
Falkland Islands
Guinea (Fr)
Guyana
Paraguay
Peru
Suriname
Uruguay
Venezuela
Costa Rica
Dominican Republic

SOUTH OF SAHARA
Angola
Benin
Botswana
Burundi
Cameroon
Cape Verde Islands
Central African Republic
Chad

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N. & C. AMERICA
Jamaica
Martinique
Mexico
Netherlands Antilles
Nicaragua
Panama
St. Pierre & Miguelon
Trinidad & Tobago
Anguilla
Antigua
Cayman Islands
Dominica
Grenada
Montsarrat
St. Kitts-Nevis
St. Lucia
St. Vincent
Turks and Caicos
Virgin Islands

MIDDLE EAST
Bahrain
Iran
Iraq
Israel
Jordan
Kuwait
Lebanon
Oman
Qatar
Saudi Arabia
Syria
United Arab Emirates
Yemen
Yemen Democratic Republic

SOUTH ASIA
Afghanistan
Bangladesh
Bhutan
Burma
India
Maldives
Nepal
Pakistan
Sri Lanka

FAR EAST ASIA
Brunei
China
Hong Kong
Indonesia

SOUTH OF SAHARA
Comoros
Congo
Djibouti
Equatorial Guinea
Ethiopia
Gabon
Gambia
Ghana
Guinea
Guinea-Bessau
Ivory Coast
Kenya
Lesotho
Liberia
Madagascar
Malawi
Mali
Mauritania
Mauritius
Mayotte
Mozambique
Niger
Nigeria
Reunion
Rwanda
St. Helena
Sao Tome & Principe
Senegal
Seychelles
Sierra Leone
Somalia
Sudan
Swaziland
Tanzania
Togo
Uganda
Burkina Faso
Zambia
Zimbabwe

OCEANIA
Cook Islands
Fiji
Kiribati
Naura
New Caledonia
Niue
Pacific Islands T.T.
Papua New Guinea
Polynesia (Fr)
Solomon Islands
Tokelau Islands

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FAR EAST ASIA
Kampuchea
Korea (Rep.)
Laos
Macao
Malaysia
Philippines
Singapore
Taiwan
Thailand
Vietnam
Japan

OCEANIA
Tonga
Tuvalu
Vanuatu
Wallis & Futuna
Western Samoa