

SECTION VII: EMPLOYER'S REQUIREMENTS

A.02: GENERAL PROJECT REQUIREMENTS AND DOCUMENTATION FOR SUBSTATION & TRANSMISSION
LINE

A.02

General Project Requirements and Documentation for Substation & Transmission Line

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1. TRANSPORTATION SITUATION

1.1 ROADS TO THE SITES

The main roads in the Port Moresby region are paved/asphalted and in a good condition. The site areas can be easily reached by vehicles. Prior police approval will be required for transportation of abnormal loads.

Construction roads will be required for the transmission line.

1.1.1 RAILWAY

No railroads exist in Port Moresby.

1.1.2 AIRPORTS

The airport of Port Moresby, Jacksons International, is of international standard and open for regular passenger and freight transportation.

1.1.3 HARBORS

A harbor is located within Port Moresby which is under the control of the PNG Ports Corporation. The main wharf has a length of 70m and a width of 12.2m. There are no wharf mounted cranes. Mobile cranes are available with a maximum stated lifting capacity of 20 tone containers. Prior advice and approval of the port authority is required before shipping heavier loads.

2. DOCUMENTATION

2.1 GENERAL

All information, documentation, calculations, drawings, schedules etc. have to be submitted within such periods or at such dates which are required to guarantee a smooth handling of the project without any delays. The Contractor is responsible for submitting all documentation, in accordance with a program as specified herein, allowing all participants sufficient time to check, assess, comment and approve the documents. The quality of the submitted documents must be in accordance with acceptable international practice to allow a speedy checking procedure. Documents not fulfilling these requirements will be returned to the Contractor without comments for improvement and resubmission.

The following types of documents are to be considered for the Contract:

- Correspondence (i.e. letters, faxes and e-mails)
- HSE procedures and protocols
- QA/QC procedures
- Baseline schedule and schedule revisions

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- Drawings and diagrams (design, manufacturing, detail, preliminary, construction, as-built)
- Approval files for major and key equipment
- Design calculation sheets, technical data sheets
- Factory test records
- Site test records
- Inspection and testing programs, and procedures
- Training program
- Reports, minutes of meetings
- Operation, maintenance instructions and manuals.

It is of the utmost importance that all documents are exchanged between the Contractor, the Employer and the Project Manager in an organized manner in strict accordance with these procedures and the Contract Documents.

All documentation in electronic format shall use standardized software compatible with **Microsoft Office 2010 or better**. Upon request, all documents shall be handed over by the Contractor in the electronic format in which the document has been prepared.

2.2 BIDDING STAGE

The drawings issued by the Project Manager with the Bidding Documents and forming part of the documents for bidding purposes are intended to be descriptive of the character of the works and are to be used in conjunction with the requirements of the specification, but shall in no way limit the responsibility of the Contractor to supply all plant equipment, materials and services necessary to provide a complete and functional complex. Any omission from both drawings and the Specifications or express reference to any detail or work necessary and obviously intended shall not relieve the Contractor of his responsibility to include such detail or work in his supply.

When measurements are affected by conditions already established, the Contractor shall take and be responsible for field measurements notwithstanding any information set forth on the Specifications and/or drawings.

The Specifications and drawings portray the basic layout of the scope of works and the Bidder shall incorporate these requirements into his Bid drawings.

With regard to the interconnections to and the extensions of existing installations supplied, the drawings and descriptions included in this scope shall be assumed to be descriptive to the extent necessary for bidding purposes.

The Bidder shall submit together with the Bid drawings, diagrams, graphs, curves and such information necessary to understand the Bid from a technical, financial and administrative point of view.

General drawings and information

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- Technical schedules, price schedules, performance guarantees, technical schedules, completely filled in
- Time schedule for engineering, manufacturing, erection/installation, testing, commissioning and reliability test run
- All information asked for in the various sections of the Specifications
- Descriptive catalogues for principal plant components
- Space requirements for construction site and equipment
- Spare parts storage and supply policy
- Documents for proof of compliance

Drawings and information for electrical equipment

- Single line diagrams for all electrical systems
- Documents for proof of compliance

Drawings and information for protection and control

- Technical schedules, description and manufacturers catalogues for important equipment and systems (e.g. protection relays, control elements, alarm annunciation, etc.)
- Preliminary layout drawings of control rooms and electronic rooms
- Description of communication and SCADA equipment

2.3 CONTRACTING STAGE

The preparation and compilation of the Contract documents shall be performed by the Contractor under the direction of the Project Manager.

The quantities of document types which will be required to be submitted by the Contractor are specified in the Sub-clauses below.

The cost of reproducing the Contract documents shall be deemed to be included in the Contract price.

2.4 DETAIL DESIGN AND MANUFACTURING STAGE

2.4.1 GENERAL

The Contractor shall prepare and submit for approval drawings, documents, calculation sheets, diagrams, graphs, curves and all such information necessary to verify that the goods they intend to manufacture comply in every respect with the requirements of the Contract.

All documents submitted for approval shall be in a computerized format.

The documents required for design, construction, installation, operation and maintenance of the entire plant shall be submitted by the Contractor in good time so as to permit the plant as a whole to be erected in compliance with the specified timetable. The Contractor shall submit drawings, documents and all such

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information which are necessary to verify that the goods they intends to manufacture comply in every respect with the requirements of the Contract.

The documents shall be submitted within the specified time scale calculated in weeks after Award of Contract. Details shall be agreed according to the approval procedure for drawings and documents above.

2.4.2 IDENTIFICATION ON DRAWINGS

The Contractor shall use the plant/equipment identification schedule and the Employer's numbering system.

The documents required for design, construction, installation, operation and maintenance of the entire plant shall be submitted by the Contractor in good time so as to permit the plant as a whole to be erected in compliance with the specified timetable.

The Contractor shall distribute, within the time as outlined in the subsequent paragraphs, documents for approval to the Project Manager/Employer in the number as laid down in the Contract or as the Employer or Project Manager may reasonably require.

Each of these designs includes relevant texts, calculations, technical data, drawings, etc. All technical and other documentation (not General Project or Conceptual Design and Preliminary Design) shall be submitted to the Employer/Project Manager for approval forming an integral part of the above design.

After Contract signature the Contractor shall prepare technical documents for manufacturing of equipment and submit it to the Project Manager/Employer for approval. Any manufacturing work carried out prior to such approval will be at the Contractor's own risk and expense. On the basis of these documents and testing programs, Factory Acceptance Test shall be performed.

After Contract signature the Contractor shall prepare technical documents on the basis of which the installation and civil engineering works will be executed (main design, detailed project design) and submit to the Project Manager/Employer for approval. Only after having received the approval start of installation and civil works are permitted.

On the basis of these documents and testing programs, site acceptance test, technical inspection and trial operation, preliminary taking-over will be performed.

The most important documents to be submitted for approval are listed below. These documents shall be submitted sufficiently in advance so that corrections and amendments desired by the Project Manager/Employer as well as any necessary resubmission of the documents will not result in any delays with respect to the guaranteed timetable. The Project Manager/Employer reserves the right to request from the Contractor additional documents as may be required for proper understanding and definition of the design and engineering of the plant.

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The drawings and documents to be prepared and submitted for approval during this stage are listed below and elsewhere in the contract and comprise of the following, but are not limited to:

2.4.3 REQUIREMENTS

- Reports/documents as stated in the relevant paragraphs
- List of new sub-contractors/sub-suppliers as replacement, if any
- Outline drawings
 - drawings of the equipment indicating overall dimensions with minimum required distances to neighboring equipment, weights, anchoring and connection details, and erection working space
- Layout drawings
 - General assembly drawings showing details to demonstrate fully that all parts will conform to the provisions and intent of the Contract Documents and to the requirements of their installation, operation, and maintenance. These drawings shall show in a true scale all necessary components the equipment is made from, and components shall be identified by means of a legend
- Equipment approval files for major plant components, verifying that the equipment prior to procurement and/or manufacturing is in line with the key data of equipment offered and contracted
- Cabling
 - Cabling from terminals of equipment A to equipment B shall be documented with cable lists, indicating as a minimum:- cable no., description of function, starting and ending point (of each wire), cable type, cable length, numbers, cross sectional area of wires, and available spare wires
- Calculations/design criteria
 - In addition to the drawings or whenever the contractual documents may require, the Contractor shall submit appropriate calculations for determining the main design criteria, clearly indicating the principles on which calculations are based. Conceptual design studies shall accompany the Contractor's solution whenever deemed to facilitate the understanding thereof
- Detailed design system documents for installation/erection of OPGW and underground optical cable
- Fiber-optical equipment drawings, Fiber-Optical route plans
- Detailed design system documents for installation/erection of HV cable, if required
- Proposed inspection and testing programs
- Testing documents/report of results of all tests of the equipment not foreseen to be tested
- Training program

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- Operating and maintenance manuals with description of all equipment and facilities and detailed operating and maintenance instructions
- As-built-documents (as-built design) including drawings of all equipment
- Spare part lists

2.4.4 TIME SCHEDULES, WORK PROGRAMS

- Detailed time schedule for design, manufacture, supply, assembly and commissioning broken down for the principal plant components and all construction works, stating dates for completion of any preparatory work from others which may be necessary. **The schedules shall be prepared in Microsoft Project 2010 or better.**
- Detailed erection, design, installation and commissioning schedule All information necessary to permit a satisfactory erection, assembly, and commissioning of the equipment. Detailed instructions for the erection of the equipment shall be submitted together with reduced size copies of applicable drawings showing the erection sequence. The instructions and drawings shall include information on handling and slinging the major pieces of equipment, erection tolerances, and special precautions to be taken in installation and during testing and commissioning tests.
- Detailed program for commissioning **the schedules shall be prepared in Microsoft Project 2010 or better.**
- Complete list of documents with proposed submission deadlines.

2.4.5 ELECTRICAL ENGINEERING

The documentation must be an integral part of the designs, instructions, programs, testing reports etc.

- Electrical single-line diagrams
- List of loads
- Cable lists including cable cross section drawing
- Standard circuit diagrams for all different kinds of electrical consumers
- Circuit diagrams for all individual electrical equipment
- Lists of equipment and devices
- Earthing plans with calculations
- Lightning protection plans with details of measuring locations and reports of measurements taken following commissioning
- EMC concept with coordinated overvoltage protection
- Arrangement drawings
- Power and lighting installation plans
- General arrangement drawings of the required cable trays, cable laying plans
- Dimensioned drawings and erection drawings for transformers, switchgear etc., including frontal and plan views

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- Dimensioned drawings of switching cubicles, etc., including equipment configurations
- Calculation of mechanical stresses of switchgear due to arcing faults
- Short circuit calculation and determination of protection relay settings for protection and auxiliary electrical supplies
- Protection setting calculation
- Protection and metering diagram
- Insulator strings, conductor fittings
- Statistical calculations of all gantries
- Drawings of gantries for switchyard

2.4.6 CONTROL AND PROTECTION SYSTEM ENGINEERING

The documentation must be an integral part of the designs, instructions, programs, testing reports etc.

- Control system architecture showing all components
- Layout drawings central control room showing spatial distribution of desks and panels
- Layout of electronic rooms showing spatial distribution of cubicles and racks
- Detailed dimensions of desk, panels and cubicles
- Layout of modules within cubicles
- Description for all functional group controls
- Engineering drawings
- Internal connection diagrams, external connection diagrams, terminal connection diagrams, combined schematic and circuit diagrams
- Instrument loop diagrams
- Instrument hook-up drawings
- List of recorders/selector switches
- Instrument list
- List of annunciation
- List of alarms, trips and status indications
- Protection relays setting calculations
- Protection relay constellation drawings.

2.4.7 CIVIL ENGINEERING

The civil documentation is an integral part of the design, instructions, programs, testing's reports, etc. and contains but is not limited to the following items:

- Scaled general site plans of the substations showing buildings, installations, traffic routes, limits of the site, access to the sites, etc.

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- Architectural arrangement drawings, building itemized layout plans, with plans and all relevant sections at scale of 1: 100/ 1.50, foundation drawings, the raised areas and suspended ceilings, elevations, escape ways, insulations, etc.
- Structural drawings of all structures and outdoor foundations at scale 1:50.
- All structural and other civil calculations including loading data, foundations, frames, heat losses, rainwater quantities, etc.
- Detailed arrangement plans for external plants and works, with equipment foundations, roads, parking, access and maneuvering areas, channels and culverts, paved areas and landscaping
- Underground service drawings with ducts and pipes and appertaining equipment.
- Sewage and rainwater drainage systems including the discharge systems from the sites.
- Layout of all external works including internal and external fences.
- Diagrams, drawings and calculations for heating, ventilation and air conditioning systems.
- Approved topographical and geotechnical survey reports.
- Calculations and reports for the site leveling and grading works.
- As built drawings of all substation parts.
- Temporary site organization plans of the Contractor, including the site offices of the Employer/ Project Manager.
- All other documents and information indicated by the Employer/ Project Manager as necessary for the realization of civil works (e.g. time schedules, method of works, quality insurance, etc.).

2.5 CONSTRUCTION STAGE

2.5.1 DOCUMENTATION FOR FINAL ERECTION CHECKS

The documentation for final erection checks comprises check sheets for all components and section of works.

The check sheets shall contain the following minimum information:

- Designation of the substation
- Designation of the part of plant or works, subject to the check
- Reference to the "as built" documents of the respective part of plant or works
- Table of all checks to be performed for the respective part of plant or works
- Results of the checks and deficiencies
- Date of rectification of the deficiencies and sign-off of acceptance by the Employer

The above documentation shall be approved by the Project Manager prior to the start of the final erection checks.

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2.5.2 AS-BUILT DRAWINGS AND DOCUMENTS

Documents of the work as completed, the "as built" documents, shall be prepared by the Contractor and forwarded to the Employer/Project Manager for approval.

All as-built documentation shall represent the latest situation on the plant and shall include all changes, corrections and modifications after commissioning and energizing. After approval they shall be returned to the Contractor for distribution in the required amount to the Employer/Project Manager.

These documents shall be in sufficient detail to enable the Employer to maintain, dismantle, reassemble, and adjust all parts of the work.

The records and drawings shall include drawings of all equipment, cabling etc. as finally installed and approved by the Project Manager, diagrams, graphs, plans, lists, manuals etc. including a detailed table of contents and all the necessary installations such as replacement parts, operating instructions etc. These documents shall be provided also in the electronic format as agreed with the Employer/Project Manager.

The Contractor shall accept and incorporate an Employer's numbering system in the "as built" documents if requested without extra costs.

All "as built" documents include all drawings the Contractor submitted for approval and information and as a minimum:

- Single line drawings
- Protection diagrams
- Earthing plan
- Outline drawings
- Layout drawings
- Wiring and connection diagrams
- Calculations
- Technical data sheets
- Cable lists
- Line profile drawings
- Insulator strings, conductor fittings
- Statical calculations of all steel structures and foundation
- Drawings of all foundations
- Any other relevant drawing as requested by the Employer / Project Manager
- All shall be updated with the modifications made at site until acceptance of the works

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For extensions and/or modifications in substations "as built" documents shall include also the original existing electrical equipment and original existing building parts which were subject to extension and/or modification by the Contractor.

In addition to hard copies, the Contractor shall submit each "as built" document as an AutoCAD or AutoCAD-compatible file, recorded on CD-ROM.

The "as built" documents shall be set-up in an orderly way (in files, with table of contents on the back and inside, and register) and subject to the Employer's/Project Manager's approval.

All final records and drawings shall be in the English language.

2.6 COMMISSIONING STAGE

2.6.1 COMMISSIONING DOCUMENTATION

The commissioning documentation shall comprise at least the following documents:

- A list of tests to be performed during cold and hot commissioning and during energization
- A sequence of how the tests shall be performed
- A description of the tests, arrangement of the test equipment including the definition of testing equipment to be used during the tests, and detailed test protocols indicating clear pass/fail criteria
- Form sheets with the test results to be filled in during the tests
- A list of test equipment including technical details to be used

The approval of the documentation shall be a prerequisite for the start of commissioning tests.

2.7 DOCUMENTATION FOR TAKING-OVER

The documentation for taking over shall comprise the following documents:

- Certificate for final erection checks including the deficiency list and open deficiency items
- Certificate of commissioning with the test results of the commissioning tests
- Deficiency list during the tests
- Agreed tests and procedure for the tests after completion
- Form for the Taking Over Certificate
- Financial status of all works including Variation Orders

The approved and complete documentation shall be a prerequisite for the issuance of the Taking Over Certificate.

2.7.1 OPERATION AND MAINTENANCE INSTRUCTIONS, MANUALS

The Contractor shall furnish to the Employer complete operation and maintenance manuals and separate operating instructions. The price of these documents is deemed as being included in the turnkey contract.

General requirements

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The operation and maintenance manuals to be provided by the Contractor shall be site specific and shall contain a detailed description of the equipment and components written in such a way as to enable the Employer to operate, maintain, dismantle, reassemble and adjust all parts.

The instruction manuals contents shall conform to the table of contents and be as comprehensive and precise as possible. Every attempt shall be made to use material specific to the Contract. Nomenclature or reference to any one item shall be consistent throughout the manual.

The operation and maintenance manuals shall be accurate and easy to understand and shall be presented in such a manner that the contents can be used for instructing the Employer's personnel in the operation, service, maintenance and repair of the installations and their individual component.

Tables, lists, graphic presentations and explanatory diagrams should be used as far as possible for easy understanding.

Instruction and maintenance manuals shall be supported in form of CD format. Moreover, a complete equipment list and spare parts list are to be supplied on CD. Reader software shall be supplied on the CD. An indexed electronic link between the index and the contents shall be provided.

The information provided shall be complete for main and auxiliary equipment and systems provided by the Contractor. Information that does not contribute to the understanding of the design, operation and maintenance of the equipment shall be excluded from the instruction manuals, where appropriate.

Draft instruction manuals shall be submitted latest three months before start of commissioning of the respective substation. One original document shall be submitted at first, which will be reviewed by the Project Manager/Employer. After approval the number of copies as specified below of the final operation and maintenance manuals shall be provided.

Use shall be made of drawings, diagrams, pictures or actual photographs when they add to the understanding and clarity of the text.

All material shall be free from stamps commonly used for identification of customer, order number, etc.

Precautions and warnings relative to the safety of personnel and equipment shall be included where required.

The operation and maintenance manuals and instructions to be provided by the Contractor in respect of plant supplied by him shall be supplied bound folders as agreed with the Project Manager and shall contain at least the following information:

- Table of contents, each volume shall contain the complete table of content. The content in the respective volume shall be marked.
- List of illustrations
- Operation instructions

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- Maintenance tasks required on the equipment supplied and their periodicity, and a suggested periodic maintenance schedule
- Details of fault-finding procedures

The documentation for operation and maintenance of I&C equipment shall be unified in structure, design, cross references, etc. even if the documents are supplied from different subcontractors.

The maintenance manuals shall contain a complete and accurate description of the plant, its assembly and dismantling as well as of all components and accessories. A list giving clearances, fits and tolerances, temperatures, etc. is required.

If it shall emerge during the erection, commissioning test after completion or warranty period of the equipment that the operation and maintenance instructions or operating instructions are inadequate or faulty and after obtaining such data only available after commissioning and proper setting the Contractor shall carry out and supply the necessary corrections and supplements.

All amendments to documents shall be made by the Contractor free of charge. Drawings, which have been revised shall be resubmitted.

The Operation and Maintenance Manuals shall comprise the following main information:

- General description of the substation system and system components
- Functional description of the substation system, containing system capacities, adjustments etc.
- Technical data and characteristics of each component included in the operation manuals of the components
- Test certificates of equipment's and materials of the tests performed in the manufacturer's workshops
- Final erection documentation
- Commissioning documentation and
- Taking-over documentation including spare parts

The maintenance manuals shall be divided into several sections dealing with different maintenance activities.

a) Maintenance instruction

A maintenance schedule shall mention the inspection and maintenance intervals laid down separately for each individual equipment or part, the exact description of the operations to be carried out as well as the necessary spare parts and materials.

This section will be divided into two subsections:

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1. Preventative maintenance, which will indicate the periodic inspections required, the inspection procedure, the routine cleaning and lubricating procedures, the routine safety checks, calibration checks and the like.
2. "Trouble shooting guide". For repair and adjustment, it will describe the inspection, removal, and replacement of parts; electrical, fluid or mechanical circuit tracing; repair, adjustment, calibration and commissioning procedures.

The Contractor shall set out in these instructions the intervals of exchange of equipment to be replaced in the course of operation (expressed in no. of operation cycles, or years of service). The necessary dismantling/erection instructions shall be given in detail.

b) Spare parts: The Contractor shall provide a complete list of all parts used for the project and recommended stock levels, including any spare parts recommended for regular replacement as part of the preventative maintenance scheme. The Contractor shall mention how and where additional spare parts can be ordered specifying for each part the ordering number, the name, address, telephone and fax number as well as the e-mail address of the manufacturer or supplier.

Arrangement

The operating and maintenance instruction manuals shall be suitably bound within a hard cover. All documentation forming part of the manuals shall be of a uniform size except where pull-out or folding charts are provided. All printed matter shall utilize a uniform type and size. Wherever possible, use shall be made of photographs, exploded diagrams and other pictorial aids to assist operating and maintenance procedures.

Cross section/exploded views indicating complete lists of parts, drawing references and gauge settings, together with setting dimensions, tolerances, bolt tightening torque, calibration, levels and alignment data, lubrication data and history, site repairs, modifications history, works/site test results.

All information included in the manuals should be specific to the materials supplied under the Contract. Information which is only typical should not be used in its existing form.

Information should always be precise, particularly references to time intervals which should be clearly defined and not given as 'occasionally' etc.

2.8 DOCUMENT PREPARATION AND SUBMISSION

The Contractor shall prepare all necessary documents giving full and complete information to enable the Employer/Project Manager to properly consider the design of the work.

Documents originated by any of the Subcontractors shall fulfill all specified requirements and standards. Prior to the submittal of those documents, the Contractor has to verify with regard to measurements, size of members, material and details to make sure that they conform with the requirements and the intent of

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the Technical Requirements. Documents of the subcontractors shall be submitted by the Contractor not by the subcontractors.

Documents shall be submitted to the Employer/Project Manager in such a sequence that the information required by the Project Manager for examination purposes corresponds with the progress and sequence of the works.

The Contractor shall ensure that all documents for approval are forwarded to the Employer/Project Manager in such a way as to allow sufficient time for examination by them.

The Contractor shall also ensure that documents are submitted early enough to allow amendments to be made and re-submission for approval is conducted without delaying the delivery and installation program or the guaranteed completion dates of the Works.

The Contractor shall submit for approval a documents list indicating the dates the documents will be submitted for approval. This list will be updated periodically (monthly) as to indicate the status of document approval.

The list shall include the document number and the estimated submission date.

All documents prepared or furnished by the Contractor shall be marked with the title of the work, certified by the Contractor and Subcontractor respectively, and shall be transmitted to the Employer/Project Manager. Each transmittal of documents shall be accompanied by a Document Transmittal Sheet (DTS) indicating the titles and numbers thereof.

At monthly intervals, or as agreed upon otherwise, the Contractor shall submit copies of their complete document lists, having incorporated the updated schedule as mentioned above, and the latest transmittal sheets.

These lists shall clearly indicate the actual status of every document and design document, i.e. for information only, for approval, resubmitted for approval, approved or as-built.

Modified documents shall bear the revision field and a revision date, and the nature of the modification shall be clearly stated, no matter if it was already approved, approved on condition, revised or not approved.

All documents shall bear the approved contract references and title block as agreed with the Employer/Project Manager.

As a minimum the following information shall be included in the title block:

- The Contractor's name
- The Subcontractor's name, where applicable
- The Employer's name
- The Project name

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- The name of the Project Manager
- Brief description of the contents of drawings
- Drawing and revision number
- First date and revision dates
- Scale and scale bar (where applicable)
- Space for the Employer's drawing number

All drawings shall be plotted in and shall show the scales of the metric system, and all descriptive wording shall be in the English language.

All drawings and other documents submitted by the Contractor shall be of one of the following sizes that conform to the international standards specifications ISO 216:

Size	Dimension in mm: of trimmed drawing (finished sheet)
A 0	1,189 x 841 maximum
A 1	841 x 594
A 2	594 x 420
A 3	420 x 297
A 4	297 x 210

All the above formats shall be folded to size A 4 with margin for binding.

The following scales shall be used:

For reductions: 1 : 2.5; 1 : 5; 1 : 10; 1 : 20; 1 : 50; 1 : 100;
1 : 200; 1 : 500; 1 : 1000; 1 : 2000; 1 : 2500

For enlargements: 2 : 1; 5 : 1; 10 : 1

In addition to the sizes mentioned above, horizontally extended sizes are permissible, e.g. for circuit diagrams, wiring diagrams and route plans; these shall have the following dimensions:

- Height: 297 mm
- Length: a multiple of 210 mm

The quality of original drawings, master prints, blue-prints and of all other copies, irrespective of the method by which they have been produced, must be such that no damage whatsoever, such as partial or complete illegibility, can occur as a result of extreme climatic conditions.

For drawings a paper grade weighing no more than 80 g per square meter shall be used throughout.

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Logical and graphical symbols as well as abbreviations used in the drawings shall be identified in a legend. Abbreviations shall be described in their full text.

The drawings released for construction must contain all information necessary for the execution of the works.

Drawings shall be to scale and fully detailed with the maximum size of DIN A0 (840 mm × 1190 mm). Important dimensions shall be given and the material of which each part is to be constructed shall be indicated.

Drawings shall be black lines on a white background with revisions clearly marked.

Drawings of this Contract shall be prepared in the English language.

Documents approved shall not be changed without written permission of the Employer /Project Manager.

The Contractor shall be responsible for any discrepancies, errors or omissions in the documents and other particulars supplied by him, whether such documents and particulars have been approved by the Employer/Project Manager or not.

Where such errors or omissions are discovered later, they shall be made good by the Contractor at his expense irrespective of any approval of the Employer/ Project Manager.

If during the contract period the Contractor is required to increase the size of any foundations etc. from that shown on his Bid drawings to accommodate the finally approved arrangement of the works provided under the Contract (with due allowance for access, lay-down, maintenance etc.), then such increases shall be deemed to be included in the Scope of the Contract.

The Project Manager and the Employer shall have the right at all reasonable times to inspect at the factory of the Contractor all documents of any portion of the Works. If requested, the Contractor shall submit design calculations and shop drawings.

The Contractor shall, within the times hereinafter provide drawings showing the manner in which the plant is to be assembled with all information relating, unless otherwise agreed, only to the works, required for preparing suitable foundations, for providing suitable access for the plant and any necessary equipment to the point on site where the plant is to be erected and for making all necessary connections to the plant (whether such connections are to be made by the Contractor under the Contract or not).

Any expenses resulting from an error or omission or from delay in delivery of the necessary documents and information shall be borne by the Contractor.

		Weeks after effective date of Contract	
Document	Purpose	Preliminary	Final
General			

SECTION VII: EMPLOYER'S REQUIREMENTS

A.02: GENERAL PROJECT REQUIREMENTS AND DOCUMENTATION FOR SUBSTATION & TRANSMISSION LINE

Current list of drawings	I	4	every 1 month
Progress reports	I	-	every 1 month
Quality assurance program	A	-	6
Health, safety and environment plan	A		8
Weekly progress report	I	-	every week
Erection and installation progress reports	I	-	every 1 month
List of subcontractors/ manufacturers	A	8	12
Type test certificates with the Bid and the documents for approval	A	8	12
Proposed inspection and testing programs including test procedures	A	8	16
Detailed program for commissioning including commissioning documentation	A	-	12 weeks ahead of start
Report of results of all tests	A	-	4 weeks after the performance of each test and as part of the O+M Manuals
Training program	A	-	24
Operating and maintenance manual with description of all equipment and facilities	A	-	3 months ahead of start of commissioning
Detailed operating and maintenance instructions	A	-	2 months ahead of start of commissioning
As-built documentation including drawings of all equipment	A	-	4 weeks before taking over
Spare part lists	I	-	10
Payment schedule	I	-	Every 4 weeks
Time scheduling			
Overall time schedule for design, manufacture, supply, assembly and commissioning broken down for the principal plant components and all construction works, stating dates for completion of any preparatory work from others which may be necessary	A	with Bid	12
Detailed erection, installation and commissioning schedule	A	4	Update every month
		Weeks after effective date of Contract	

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Document	Purpose	Preliminary	Final
Complete list of documents with proposed submission deadlines	I	4	8
Data and calculations			
Design data	A	6	10
Performance calculations	I	8	10
Design calculations	A	8	16
Structural calculations	A	8	16
Diagrams and graphs			
Electrical single line diagrams	A	-	6
Principle functional diagrams, interlocking diagrams	A	8	12
Protection relay calculation and relay setting diagram including functional description	A	12	16
Circuit diagrams for all electrical circuits including interlocking	I	12	15
Drawings and plans			
Layout drawings including equipment location	A	with Bid	16
Arrangement drawings including indication of dismantling and sectional views	A	8	12
Sectional and detail drawing of all components	I	8	12
For all lifting operations (repair, maintenance, etc.) a lifting plan	I	8	12
Steel structure calculations	A	8	12
Workshop drawings for steel structures including the details	A	12	14
Arrangement drawings for MV and HV cables	A	8	12
Drawings of cable routing	A	8	12
Arrangement drawings of control and relay rooms including arrangement of instruments on cubicles	A	12	12
Communication arrangement and installation drawings (descriptions)	A	8	12

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		Weeks after effective date of Contract	
Document	Purpose	Preliminary	Final
Drawings and Information for civil planning purposes			
Detailed foundation drawings	A	10	14
Load	A	8	12
Steel structure assembly drawings	I	8	16
Lists and schedules			
Drawing lists regularly updated	I	8	Updated four weeks
Schedules of Factory Acceptance Test	A		1 month ahead

Purpose:

A: for approval

I: for information only

2.9 DRAWINGS AND DOCUMENTS APPROVAL PROCEDURE

2.9.1 GENERAL

All information, documents, also including calculations, drawings, schedules etc. must be submitted within such periods or at such dates which are required to guarantee a smooth handling of the project without any delays.

The sequence of submission shall be such that information is available for timely approval/review of each document when it is received. The Contractor is responsible for submitting all documents allowing all participants sufficient time to review, assess, comment and approve the documents. The quality of the submitted documents must be in accordance with acceptable international practice to allow an expeditious checking procedure. Documents not fulfilling these requirements will be returned to the Contractor without comments for improvement and resubmission.

Approval will be given by the Employer/Project Manager within two weeks after receipt of such documents. Any manufacturing work carried out prior to such approval will be at the Contractor's own risk and expense. If the Employer/Project Manager fails to approve or comment on the documents submitted by the Contractor within the above period, the Contractor may proceed with the fabrication, after such period is elapsed.

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The Contractor shall be responsible for any discrepancies, errors, mistakes, omissions or deficiencies in the documents or the material and equipment as supplied by him subsequently, whether such documents have been approved or not.

Each document for which no approval is required shall be clearly marked "For Information Only" on the Documents Transmittal Sheet. The Employer/Project Manager may, however, decide to treat such document as sent for approval, if deemed necessary.

Each document sent for approval shall be clearly marked "For Approval" on the Documents Transmittal Sheet. The Project Manager may, however, decide to mark such document "Not Subject to Approval", if deemed necessary.

The Contractor must in no case distribute any document without either one of the above mentioned marks or the mark "Approved". Documents distributed without these marks may be regarded as non-existent.

The Project Manager reserves the right to ask the Contractor to submit additional copies of drawings and other documents for approval to the Project Manager's head office. If the documents are found according to the requirements the Project Manager will return one copy to the Contractor stamped and approved. If the documents are found not fulfilling the contract requirements the Project Manager will return one copy stamped "Not Approved" to the Contractor with comments marked thereon and the drawing shall be amended and resubmitted for approval. The Employer shall receive details of the comments sent to the Contractor.

When submitting drawings for approval, including any drawing prepared by a sub-contractor, the Contractor shall certify in each case that they have examined such drawings and that they comply with the requirements of the Contract.

For the purpose of this clause the term drawing shall include diagrams, schedules, performance curves etc.

Approval of a drawing by the Project Manager will imply that:

- General arrangement and layout drawings and key diagrams have been examined and appear to be in accordance with the basic design concept of the contract and meet the technical requirements of the Specification
- Other drawings of plant and equipment have been examined in relation to compatibility of the items and equipment with the Specification and in respect of interconnections with other items, equipment or systems
- Any approval given by the Project Manager shall not relieve the Contractor of his responsibility under the Contract

The Project Manager will normally not require to receive copies of detailed manufacturing drawings or calculations, but the Contractor shall make these available, if so requested.

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Drawings are to be submitted and distributed according to the following table:

Item	Sender	Description	Recipient	Copies
1	For approval	Contractor	Project Manager	Employer
2	Reviewed	Project Manager	Contractor with comments/status	Employer copy of transmission
3	Approved for construction	Contractor	Project Manager	Employer Project Manager site

Any such drawing or document serving the purpose of information will not be stamped "Approved", but "Seen by the Engineer" only.

Upon receipt of approval by the Project Manager, the Contractor shall arrange for the revision column of the drawings to be marked "Approved by the Engineer on (date)" and revise the issue letter or number.

The Contractor shall ensure that drawings are submitted early enough prior to the date required for approval to permit amendments to be made and the drawings re-submitted for approval without delaying the program deliveries or the guaranteed completion dates of the works.

If during the Contract period, the Contractor is required to increase the size of any buildings, foundations etc. from that shown on his Bid drawings to accommodate the finally approved arrangement of the works provided under the Contract (with due allowance for access, lay-down, maintenance, etc.), then such increase shall be deemed to be included in the scope of the Contract.

2.9.2 APPROVAL STAGES OF DRAWINGS

The first drawings which shall be submitted by the Contractor for the approval of the Project Manager shall be the site layout drawings, single line diagrams, general arrangement drawings and main equipment drawings.

These general drawings shall contain also the not rehabilitated parts of the plants and facilities.

After obtaining approval from the Project Manager the detailed design of the individual specialties (mechanical, electrical, civil etc.) may be completed and submitted for information and/or approval to the Project Manager.

2.9.3 CATEGORIES OF APPROVAL

As far as documents submitted for approval by the Contractor and reviewed by the Employer and Project Manager are concerned, the Contractor will be notified about the results of the review by returning one copy of the document marked by stamp with one of the following categories:

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- "Approved" - AP
- "Approved with Comments" – AC
- "Not Approved" – NA
- "Seen by the Engineer" - SE

The notification "Approved" authorizes the Contractor to commence or to proceed with the manufacturing or construction in compliance with his contractual obligations.

In this case the Contractor shall distribute the concerned document without delay stamped with "FOR CONSTRUCTION".

If such document is modified for any reason afterwards, it is understood that the previous notification of the Employer /Project Manager is automatically null and void.

The Contractor is obliged to immediately notify the Employer / Project Manager of the existence of such further modification, to delete the pertinent remark "Approved by the Employer /Project Manager on...." from the original and such document shall undergo the above mentioned procedure once again.

The notification "Approved with Comments" authorizes the Contractor to commence or to proceed with the manufacturing and construction in compliance with his contractual obligations, subject to all corrections noted on the document have been done and incorporated into the document and after they have made sure once again that the work and/or equipment at this stage is in full compliance with the Employer/Project Manager's requirements. After correction, the document shall be resubmitted for approval within one month from the date of the precedent "Approved with Comments" - remark, clearly indicating reasons and details of the revision.

The notification "Not Approved" indicates that the document must be revised and resubmitted for approval before proceeding with the manufacture.

The notifications "Approved", "Approved with Comments" or "Not Approved" shall, however, be understood as result of sample checks only.

During the preliminary stage of his design work, the Contractor may submit once to the Employer /Project Manager documents for information and general review, being basis for eventual design meetings. At the latest when quality, completeness and conformity with the contractual documents have reached a satisfactory level, the Contractor shall submit these documents for approval. Each of such documents will be reviewed and checked by the Employer/Project Manager as to reach the status "Approved", see above.

Prior to starting any work, the Contractor shall have in hand copies of the pertinent documents being approved, and issued for Construction and shall supply the required number of copies to the Employer and Project Manager at site one week prior to the start of the relevant work.

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The Employer /Project Manager may order the interruption of the execution of any work for which the Contractor cannot present approved documents at site. Such an interruption shall not relieve the Contractor from executing his contractual obligations and shall not serve as admission for claiming an extension of construction time.

2.9.4 SUBMISSION FOR APPROVAL

All documents submitted for approval shall be accompanied by a Documents Transmittal Sheet (DTS).

A sample of DTS is enclosed as **Appendix 1**.

The DTS number and submission date is to be indicated on each copy of document sent for approval.

The status (i.e.: "Approved", "Not Approved", "Approved with Comments", "Seen by the Project Manager" will be stamped by the Employer/Project Manager on the documents covering page.

The DTS shall include the following:

- Document distribution
- Date of issuance
- Date of receipt (not mandatory to be filled out)
- Emitter internal references
- Signatures and stamp of the Emitter
- Title of the documents
- Numbering of the documents according to the procedure agreed, with a specific version number well identified
- Purpose of the document: for information (FI), for approval (FA) from Employer/Project Manager, for returned document after approval from Employer/Project Manager (RET)
- Status of approval (variable part is to be updated by the Employer/Project Manager as described in Categories for Approval
- Date of Employer /Project Manager decision related to the status
- Signatures and stamps of authorized Employer / Project Manager
- Comments and remarks

Copies of signed DTS will be sent to the Contractors.

2.10 DOCUMENT DISTRIBUTION

Unless expressly otherwise mentioned under various clauses of this contract, the following document distribution shall be followed by the Contractor:

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	For the Employer		For the Project Manager	
	H.O.	Sites	H.O.	Sites
Contract Documents	3		1+1*	3
Contract Documents in A5 size	3		1+1*	3
Correspondence	1	1	1*	1
Documents				
• For approval (and re-submission)	3	-	3+1*	1
• Approved drawings for Construction	2*	1	1+1*	3
• As built design	3**	1	1+1*	3
Progress reports	3	3	2+1*	2
Breakdown reports	3	2	1+1*	1
O & M Manuals and Operating instructions				
• Draft	1	1	1+1*	1
• Final	2	4	1+1*	1
Close out report	2	2	1*	1

* including one soft copy on CD-ROM

** including two soft copies on CD-ROM

The Contractor shall supply and submit free of costs any further copies, if and when reasonably required by the Employer/Project Manager.

2.11 PHOTO DOCUMENTATION

As soon as work commences on site the Contractor shall provide digital color photographs of the works. The Project Manager reserves the right to select the positions from where the photographs shall be taken. Up to 30 photographs per month shall be provided in electronic format (CDs) and printed version on paper. Each photo shall bear a description, a serial number and the date when taken.

The Contractor shall also provide from time to time as and when required by the Project Manager, further photographs of the works to record or illustrate specific events.

2.12 CORRESPONDENCE

General

All correspondence addressed to the Employer and the Project Manager shall be written in the English language.

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All correspondence shall be numbered in accordance with a procedure to be agreed with the Project Manager.

The Contractor's site manager and discipline Engineers shall be fluent in spoken and written English.

All correspondence shall be addressed to the Employer with copy to the Project Manager in accordance with the table of Clause 14.10.

All correspondence shall be prepared codified and numbered in accordance with the procedure to be described by the Project Manager and according to instruction by the Employer.

In addition to the requirements of the Conditions of Contract, all meetings and discussions with the Project Manager shall be in English and the Contractor shall engage English speaking supervisors only.

All correspondence shall bear the date of issuance, in the format dd.mm.yyyy.

Letters and documents shall be of such quality that allows easy photocopying and in A4 format.

For the purpose of classifications, correspondence of any type dealing with a mixture of various subjects is not allowed. Separate documents shall be prepared for each major technical and commercial topic to expedite the distribution to the various discipline engineers.

All correspondences shall be prepared, codified and numbered in accordance with the following procedure.

Project	Sender	Recipient	Consecutive number
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Through a monthly review of the correspondence logs, it shall be ensured that all correspondence was received and is followed-up properly. For any correspondence, letters or fax shall normally be used. Documents/drawings for approval shall be submitted by letter.

Email may, in exceptional cases, be used to speed up the procedure by sending documents attached to the message. Additional information shall be avoided in the message. A document having been sent by email shall be considered as valid document only after submission of the original letter/document or by confirmation with a specific returned message.

A classification system of documents (all such documents which are not correspondence i.e. drawings, reports, etc.), including drawings, shall be applied, whose purpose it is to identify by a number each document and each drawing of a project, giving thus full information about the content of the document and facilitating reference, filing and follow-up.

The Contractor shall propose his classification system, fulfilling the quality assurance standards (such as ISO 9001), subject to approval by the Employer/Project Manager.

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3. PROJECT CONTROL AND REPORTING

The scope of contract control services to be performed by the Contractor shall include, but not be limited to, functions as described under the following major headings:

- Preparation of project controls procedures
- Project planning and scheduling
- Project work breakdown structure
- Project progress measurement
- Progress certification and invoicing
- Progress reporting
- Health, Safety and Environmental reporting
- Environmental Management Plan

The Contractor shall use computer systems to the maximum extent possible for the project control services listed above. Such systems shall be capable of electronic interface between Contractor home offices and construction site locations and Employer/Project Manager.

The Contractor control services requirements and systems described hereafter are provided for guidance and establishment of minimum project requirements.

The Contractor may use its own in-house systems, providing that Employer/Project Manager requirements as stated in Employer/Project Manager's Contract controls procedure, are met.

3.1 REPORTING

3.1.1 MONTHLY PROGRESS REPORT

By the **fifth working day of each month**, the Contractor shall transmit a written Progress Report to Employer/Project Manager covering all aspects of this project. It will include:

An executive summary describing the project global status, basically a table of figures and a short text including:

- Percentage of completion against scheduled completion (S-curve presentation shall be used)
- Financial status, actual released payments against scheduled payments in both tabular and S-curve graphical presentation
- Actual values of realized works
- Areas of concern and corrective actions

The main part of the report shall include:

- Main issues and events

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- All activities associated with design, material procurement, manufacture, works tests, shipping, mobilization, site erection, testing and commissioning
- Procurement progress, delivery details and forecasts including specific information on late deliveries likely to affect progress
- The arrival of material, the progress of manufacture and the date at which the equipment will be ready for transport
- Project execution detailed by activity, overall and discipline wise status of progress of project and comparison with planned progress
- All special occurrences (such as accidents, defects etc.), which will affect the date of completion in the manufacturer's works
- Current and future areas of concern and status of previously identified areas of concern
- Remedial actions recommended, correcting or reducing existing or potential problems and delays. Effectiveness of remedial action taken for earlier problems.
- Schedule status, highlighting the status of milestones, status of critical activities, along with schedule trend analysis indicating the actions proposed to be taken to ensure timely completion of Contract
- Number of contractual documents emitted by the Contractor and analyzed by the Employer/Project Manager
- Updated next three months documents submittal schedule
- Detailed project Master Plan Schedule under Microsoft Project. After contract signature the Contractor shall monthly update the schedule submitted with his Bid completed with required outages considering the Employer's need assuring a safe and continuous operation of the plant. The Contractor shall apply for outages two months in advance and the Employer may be entitled to negotiate the requests to meet his obligations towards a satisfactory power supply. However, the Employer is bound to grant outages to the Contractor as set forth in the methodology.
- QA/QC matters
- Prospects for the next two months
- Health, Safety and Environmental
- Security issues

3.1.2 REPORT FORMAT

The Progress Report shall also include two lists of action items:

One list shall be of action items that are currently pending.

The other list shall be of action items that were completed in the previous month.

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The Progress Report shall also include two correspondence logs for the last month, one for transmittals to Employer/Project Manager from the Contractor and one for transmittal to the Contractor from Employer /Project Manager.

Each log shall have the following information for each transmittal (in column format):

- Transmittal number
- Transmittal date
- Subject
- Author

At least **two months in advance**, the Contractor shall include additional information on their monthly reports:

- List of equipment concerned by the implementation and test
- Substation outages programs for equipment shutdown

3.1.3 WEEKLY PROGRESS REPORT

Weekly progress reports must be prepared and submitted by the Contractor with the start of the site construction activities.

The weekly progress report shall be submitted to the Employer/Project Manager on the first working day of the following week. The minimum contents shall be as follows:

- Brief narratives of the activities performed by each discipline, during the week with highlights on specific achievements
- Progress tabulation showing planned and actual progress by discipline and total (S-curves shall be used)
- Areas of concern and proposed corrective action
- Manpower and construction equipment loading charts
- Major activities planned for next week
- List of outstanding documents and correspondence requiring response by either Employer / Engineer or Contractor
- Sub-Contractor status

3.1.4 DAILY RECORDS (SITE DIARY)

The Contractor shall keep records on site about the daily worked quantities in form of a book (site journal).

The daily record shall indicate highlights of manpower and major construction equipment employed, material received, key milestone achieved and other major activities of the day.

Final form and content of this site journal will be according to the instruction of the Employer.

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The site journal shall be disclosed to the Employers site representative during their site visit and upon their request.

3.1.5 BREAKDOWN REPORTS

From the start of the warranty period until the end of the contract period the Contractor shall prepare incidental special reports upon the occurrence of events such as failure of equipment, extraordinary case of disturbance, accidents, collapse of the steel or concrete structures, trips on the of 132 & 66 & 11kV switchgear, any further remarkable incident, indicating in detail the failure and/or incident occurred, the reason for its occurrence and the consequences for the plant operation.

The Contractor shall furthermore describe the special activities carried out and his preventive measures to allow undisturbed future operation.

Each case shall be carefully and thoroughly investigated by the Contractor to define the reason for damage or reconcile contradictions. If needed, additional investigations shall be carried out by the Contractor upon instruction of the Employer/Project Manager.

The reports in each case shall be prepared with utmost speed and presented to the Employer/Project Manager for review and approval.

3.1.6 CLOSE OUT REPORT (FINAL REPORT)

The Contractor shall prepare a Final Report on the Contract, which shall be submitted to the Employer/Project Manager not later than one month after the Taking Over Certificates for the entire installation has been issued.

Format and content of the Close out Report will be communicated to the Contractor at the latest three months before taking-over but shall, as a minimum, cover the following:

- Contract definition
- Contractor's scope of works (contract value)
- Original and final overall contract value with detailed explanation for each deviation, if any
- Original and final schedule with detailed, item by item, explanation for deviations
- Problems occurred during project execution and detailed description of the performed actions
- Contractor's organization chart(s)
- Taking over certificate including deficiency list
- Performance test calculations and results
- Test certificates
- Inspection certificates
- Acceptance certificates
- All final engineering calculations bound in separate volumes

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This report shall be updated after issuing of Final Acceptance Certificate (FAC) at the end of the warrantee period.

3.2 MEETINGS

After the kick-off meeting following the commencement date of contract regular progress review and coordination meetings will be held between the Employer, the Project Manager and the Contractor. Further parties would attend the meetings, if needed.

The Employer/Project Manager may call for further meetings, if demand arises.

Attendance of the Contractor at all meetings is mandatory. Principally, all meetings shall be attended by responsible persons of the Contractor, who are authorized to give decisions on the contract matters.

In addition to the requirements of the Conditions of Contract, all meetings and discussions with the Project Manager shall be in English and the Contractor shall engage English speaking supervisors only.

3.2.1 MONTHLY PROGRESS REVIEW AND COORDINATION MEETINGS

Progress review meetings shall be held at weekly and monthly intervals starting with the commencement date and after the kick-off meeting.

Contractor progress reports shall be reviewed in detail at these meetings.

The dates shall be fixed well in advance on the Project calendar. The monthly management review meetings shall be held at the Project Management Unit (PMU)'s office or at the construction site, and shall be attended by Contractor senior management personnel.

The main topics for the meeting are summarized as follows:

- Progress of works
- Planned activities for the next period (month)
- Project administrative matters
- Technical matters
- Others

The Contractor shall prepare monthly presentation of the Contract status to date. The presentation should be prepared on slides or by using computerized software to be projected on an overhead projector.

The MOM will be prepared by the Project Manager and will be presented to the Employer and the contractor for review and signature. The Contractor shall pay particular attention to the records of all progress review meetings for actions agreed upon and the dates by which actions are required to be taken and the party responsible for carrying them out.

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3.2.2 WEEKLY COMMISSIONING COORDINATION MEETINGS

Weekly coordination meetings will be held in the Project Manager's office at the site office starting well ahead to the commissioning activities. During the meetings the construction, commissioning and testing works progress, short-term shutdown program, energizing program, as well as the coordination with other projects will be discussed.

4. HANDING-OVER OF DOCUMENTS, GOODS AND MATERIALS

All goods and material required to be handed over under this contract to the Employer other than the permanent works erected at site shall be received by the Employer by means of handing-over certificates.

The handing-over certificates shall be prepared by the Contractor and signed by three involved parties, namely the Employer, the Contractor and the Project Manager for loose delivery of goods and material such as, but not limited to:

- Construction documents
- Consumables
- Chemicals
- Lubricants
- Spare parts
- As built drawings
- O&M manuals
- Special tools and handling equipment

The handing-over certificate and the receipt shall state clearly that all items have been received in a satisfactory condition as required under the Contract.

The Contractor shall be responsible for demonstrating the satisfactory condition of all items delivered to the Employer including the re-packing for storage on site.

4.1 OPERATIONS AND MAINTENANCE PROGRAM

The Contractor shall develop and appropriate maintenance program and supporting documentation (manual) that will guide the ongoing operations and maintenance of the Port of Moresby Upgrade Project. The Maintenance Program shall reflect an appropriate schedule of regular and routine maintenance requirements at required intervals, and all relevant guidance relating to material or parts replacement, execution of basic maintenance tasks, identification of outside providers where needed for particular expertise or infrequent maintenance. The Contractor should align the Operations and Maintenance Manual with its Training and Development Plan to ensure appropriate training is provided to PPL as part of the handover to the Financing Recipient.

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5. COMPUTER HARDWARE AND SOFTWARE

When computer hardware or software must be delivered under this contract, then the following clauses shall be applicable.

The version and model of the computer hardware and/or software to be supplied under this Contract shall be the latest model/version available at the time of commissioning and not that quoted in the Bid documents, at the time of the Bid.

The version and model availability, commercially, will be judged/based on the manufacturer's press notification.

If the installation/implementation of the hardware and/or software, as the case may be, is not successfully completed within the stipulated time schedule or six months, whichever is earlier, and if a higher model or version of the hardware and/or software becomes available in the market during this period, then the Employer has the right/option to order the Contractor to supply/upgrade to the latest available model/version of the hardware and/or software.

6. SURPLUS CONSTRUCTION MATERIAL

6.1 CABLE SCRAP AND SURPLUS MATERIAL

Cable scrap, surplus cables and surplus spare parts accumulated at site after completion of works are the property of the Contractor within the frame of lump sum contract unit prices.

They can be taken back or otherwise recycled at the discretion of the Contractor.

6.2 PACKING MATERIAL

Non-durable, one-way use packing material (wooden boxes, wooden shelves, wooden cable drums, etc.) shall be considered as included in the lump sum equipment prices. Therefore they have to be handed over to the Employer after completion of the works.

Durable and multiple use packing material (transport containers, steel cable drums, steel equipment transport boxes, etc.) remain the property of the Contractor.

They can be taken back or otherwise used at the discretion of the Contractor.

7. HEALTH, SAFETY AND ENVIRONMENTAL AND SOCIAL MATTERS

A high-level overview of health, safety and environmental matters is provided in this section. Further detail on HSE, environmental and social requirements (including preparation of plans that the Contractor is responsible for) is provided in Section VII. B. ES Requirements.

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7.1 HSE (HEALTH, SAFETY AND ENVIRONMENT) MANAGEMENT PLAN

The Contractor shall throughout the contract period (including the Defect Liability Period) establish and implement a HSE management plan according to IFC Guidelines and local legislation.

Environmental and social assessments have been conducted for the Project and the project environmental and social impact assessment is appended to the Feasibility Study.

Within this assessment (i.) an overarching project environment and social management plan (ESMP) has been prepared that covers expectations for (i.) health and safety, (ii.) social and (iii.) environmental management of the project.

The Contractor shall follow the HSE management plans and ESMP and prepare required sub-plans for the construction phase including a construction ESMP and COVID-19 Management Plan. This includes, additional to the Contractor's HSE policy and goals preparing a project-specific HSE plan which, after approval by Employer, shall undergo continuous implementation, with update and improvement as required during the project phases. The HSE targets within the plan shall be achieved by implementing a Health, Safety and Environmental Management System (HSEMS) during the construction phase.

In accordance with the ESMP, the Contractor shall nominate a person as being responsible for all HSE issues on construction site(s). The HSE Officer shall prepare monthly records of all HSE relevant incidences including all worker accidents and an employment record giving name and age etc. of workers employed shall be kept. The HSE Officer will be responsible for maintaining a high health and safety standard at the construction site including wearing of correct personal protective equipment e.g. helmets, ear protection devices, and ensuring that workers are belted during working at height etc. The HSE Officer will also be responsible for ensuring that workers are regularly trained in first aid, and receive training on project-specific tasks e.g. how to work under high voltage etc. This HSE officer will also ensure that all sub-contractors follow good HSE practice at the construction site(s). The HSE Officer will report monthly to the Client and to the Project Manager.

The implementation of the ESMP and HSEMS System and the follow up of measures as derived from the construction ESMP and land acquisition and resettlement plan (LARP) framework (detailed further in Section 7.2) will be regularly monitored by the PMU.

7.2 LAND ACQUISITION AND RESETTLEMENT

Land acquisition for the TL will be conducted by PPL and the Contractor will need to abide by any arrangements with landowners that are made. The Contractor will however be responsible for reaching any agreements for the temporary use of land, for example laydown areas, not covered under the PPL agreements.

A LARP framework is appended to the ESIA, within the Feasibility Study. The LARP framework follows the following principles:

SECTION VII: EMPLOYER'S REQUIREMENTS

A.02: GENERAL PROJECT REQUIREMENTS AND DOCUMENTATION FOR SUBSTATION & TRANSMISSION LINE

- Land acquisition will be avoided or at least minimized wherever possible
- Compensation for all losses will be fully provided prior to land occupation and start of construction works

7.3 COVID-19 MANAGEMENT PLAN

The Contractor shall develop a COVID-19 Management Plan which shall at a minimum, reflect the Contractor's approach to managing the delivery of the contract during the COVID-19 pandemic. This should identify the likely impacts to the Contract such as mobilization of key personnel or plant, logistics and other operational issues, and develop an appropriate management response to effectively deliver the Contract during the COVID-19 pandemic and minimize the potential for these impacts. The COVID-19 Management Plan should indicate where appropriate measures are reflected in other key Contractor documents such as COVID-19 specific measures to support Workplace Health and Safety on site, community engagement and grievance redress, personnel resourcing and workplans, and local content and industry participation plans.

SECTION VII: EMPLOYER'S REQUIREMENTS

A.02: GENERAL PROJECT REQUIREMENTS AND DOCUMENTATION FOR SUBSTATION & TRANSMISSION LINE

8. APPENDIX 1: FORM OF DTS

DOCUMENT TRANSMITTAL SHEET

Document Distribution

PPL_HO: Employers Head Office (number of documents)

PPL_SO: Employer's Site Office

CCE_HO: Site Supervision Consultant's Head Office (number of documents)

CCE_SO: Site Supervision Consultant's Site Office(s) (number of documents)

DTS ref.: Date: Signature: Stamp:	Received date:
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The following documents are enclosed with corresponding action:

FI - for Information only					FA - for Approval			
RET - approved document returned to EMPLOYER/Project Manager with "Approved" stamp on it								
Title	Reference number	FI	FA	RET	Status			
					NA	AC	AP	IN
		date	date	date				
		date	date	date				
		date	date	date				
		date	date	date				
		date	date	date				
		date	date	date				

Comments:

EMPLOYER or PROJECT MANAGER

signature and stamp

Status signatures