SECTION M7 - CONSTRUCTION PROCESS CONTROL

OBJECTIVE

To define the procedures required for various process during the construction stage of the project. It is to be note that these procedures should be applicable only in the absence of any Client's requirement which should be documented in the Project Quality Plan

RESPONSIBILITIES

1. Project Manager/Assistant Project Manager

The Project Manager shall ensure that the management of project is carried out to meet Client's requirements and ensure that the projects are completed within the contract period. He shall attend the Consultants and Site meetings and work closely with the Client, Architect, other Consultants and Main Contractor to resolve any construction problems that are related to M&E services and monitor the progress of M&E works on site.

2. Site Staff

The Site Staff shall be the Client/Company's representative on site and shall be responsible for inspection of Contractor's works and witnessing Contractor's tests in accordance to the design intent (including environmental considerations).

He shall be authorised to direct and co-ordinate all site matters within the guidelines as directed by the Project Manager.

In the event that there is no Site Staff, the Project Manager shall resume the duty of Site Staff.

PROCEDURES

1. Programme of Works

At the commencement of the Contract, the Project Manager shall request that the Contractor submits the proposed programme of work.

The Project Manager shall review the Contractor's programme of work and ensure that the programme of work:-

(i) Indicate clearly the sequence of operations required to complete the Works.

(ii) Show the commencement and completion dates of each section of the Work.

(iii) Include the schedule for the Testing and Commissioning.

The Contractor's programme of work shall be used in accordance with Clause 5 on Site Monitoring.

2. Review/Approval of Contractor's Submittal

The Contractor's submittal for review/approval may be in the form of shop drawings, documents for selection of material/equipment or samples.

At commencement of Contract, the Project Manager shall ensure that all contractors are advised of the procedure for submission of shop drawings, documents and samples. Where relevant, agreed format/forms for review of submission and status report of the submission shall be used

The Project Manager shall ensure that the comments on shop drawings, documents for selection of material/equipment or samples are limited to the scope of technical work under the terms of commission with the Client.

In the absence of any specific Client's requirements which are documented in the Project Quality Plan, the following procedures shall be applied:-

2.1 Shop Drawings

Shop drawings refer to the drawings prepared by Contractors showing details of Contractor's proposals and intents for execution of works. The drawings are dimensioned working drawings showing all details of the plant, materials, pipes, ducts, trays, trunkings, conduits, etc. to be used.

The Project Manager shall receive, review and return the Contractor's shop drawings.

The Contractor's shop drawing shall be reviewed and commented based on the project requirements. All comments made shall be indicated on the drawing itself and may be confirmed in writing where deemed necessary. The 'Shop Drawing Review Status Stamp' shall be used on all shop drawings to indicate the status of drawings after the review.

All shop drawings returned shall be properly recorded together with the comments made on the drawing.

A summary of the shop drawing submission status shall be maintained by the Contractor and submitted to the Project Manager for record in the respective services file.

2.2 Equipment/Materials Selection

The Project Manager shall receive, review and return the Contractor's documents for selection of major equipment/materials.

The Project Manager shall ensure that the Contractors submit supporting documents, certificates from suppliers or certification bodies, and calculations where applicable, to substantiate their selection criteria for the major equipment/materials.

All comments made on the equipment/materials shall be confirmed in writing by the Project Manager. Copy of reviewed documents shall be kept by the Project Manager in the respective services file.

A summary of the equipment/materials selection status shall be maintained by the Contractor and submitted to the Project Manager for record in the respective services file.

2.3 Samples

Contractors are normally required to submit samples of material, equipment and typical installation for review by the Project Manager prior to installation. All samples reviewed and accepted for installation shall be kept in the 'Sample Room' on site.

A summary of the samples submission status shall be maintained by the Contractor and submitted to the Project Manager for record in the respective services file.

3. Contractor's Request For Deviation

Contractor's Request for Deviations refers to the Contractor's application for deviations from Specification where the alternative materials or equipment that fail to meet the specified requirements or environmental considerations or make/brand offered in the tender are proposed.

The Project Manager shall ensure that the Contractor is advised of the procedure for Request of Deviation at the commencement of the Contract.

The Project Manager shall review the alternative materials or equipment proposed by the Contractor appropriately to ensure that they are fit for purpose, of appropriate quality and does not deviate from environmental requirements as specified in the statutory and regulatory requirements and code of practices.

After the review, the approval or rejection to the requests shall be recorded in the respective services files. The Project Manager shall grant or recommend acceptance of deviation only in accordance with the authority levels agreed with the Client, which shall be recorded.

In the absence of any specific Client's requirements which are documented in the Project Quality Plan, the following procedures shall be used for processing of Contractor's Request For Deviations:

3.1 Submission

The Contractor shall formally submit Request For Deviation for consideration in the event that:-

(i) The alternative material or equipment which deviates from the Specification is proposed due to design (including environmental) or cost considerations.

(ii) During installation, it is found necessary to offer alternative material or equipment due to site conditions.

Each Request For Deviation received shall be recorded in the Register of Request For Deviation.

3.2 Review

The Project Manager shall only consider a Request For Deviation provided it is supported by documentation, where applicable, showing that the offered alternative material or modification does not reduce the fitness for purpose of the system or affect the safety and reliability of the equipment or installations or cause major environmental impacts.

Where the Request For Deviation may affect various project team disciplines, the documents giving details shall be circulated to all interested parties. The design changes shall be dealt with in accordance to Section M4 : Design Change Control where relevant.

3.3 Approval

At the commencement of the Contract, the authority levels for accepting Request For Deviation shall be determined and agreed with the Client. The authority levels confirmed shall be recorded.

Where a Request For Deviation is found acceptable by the Project Manager following a review, copy of the Request for Deviation shall be forwarded with recommendations to the Client for approval, as appropriate.

On receipt of approval from the Client, a copy of the completed request shall be returned to the Contractor. Copy of the Request For Deviation shall be recorded in the Project Files.

Details of acceptance or rejection of the Request shall be recorded in the Register of RFD.

3.4 Authorisation To Proceed

Following approval of a Request For Deviation on a Project, the authorisation for the Contractor to undertake the alterations shall be in accordance with Clause 7 on Contract Variations.

3.5 Amendment To Documentation

When approval of a Request For Deviation initiates alterations to a Specification, documents or drawings, the Project Manager shall ensure these amendments are undertaken and circulated to all interested parties, in accordance to Section M4 : Design Change Control.

4. M&E Technical Meeting

The Project Manager shall organise M&E Technical Meeting together with the Main Contractor and all M&E Sub-Contractors at least once a month. The meeting shall be chaired by the Project Manager.

Client's representatives and Architect shall be invited but their attendance is not compulsory. The minutes of the meeting shall be circulated to the Client's representative and the Architect as well as all attendees.

5. Site Monitoring

The Project Manager / Site Staff shall use the necessary Personal Protective Equipment provided by the main contractor / Company in accordance to the site EHS requirements prior to the site monitoring.

The Project Manager/Site Staff shall monitor Contractor's progress of work closely based on the Contractor's programme of work and Contractor's progress reports.

Site monitoring shall be recorded in:-

(i) Inspection/test records of significant items or sections of installations, either on client's prescribed forms, or on contractor's forms or ACE's forms.

(ii) Minutes of Site Meeting.

When measurements are to be taken during the construction process, the Project Manager/Site Staff shall ensure that:-

(i) The instrument used are calibrated

(ii) The Contractor use the instrument correctly

(iii) Where practical, the serial number of the instrument is to be recorded for traceability

6. Non-Conformances

The Site Staff shall report non-conformances to the Contractor and Project Manager via Site Memo. The Site Staff shall be responsible for ensuring that corrective action is taken and carried out during the subsequent re-inspection as necessary. Inspection forms shall be used to record the non-conformance items, consequent action taken and the final clearance.

The Site Staff shall maintain records of inspection forms and copies of records shall be kept in the respective project files.

The Site Staff shall also feedback to the main contractor when deviations from site environmental requirements are observed.

7. Outstanding Works

During construction stage, the Site Staff shall compile and forward the outstanding works to the Project Manager and Contractor for schedule to complete and monitor the progress of rectification via Site Memo. The Site Staff shall be responsible for ensuring that the rectification is carried out during the subsequent re-inspection as necessary. Inspection forms shall be used to record the outstanding items, consequent action taken and the final clearance.

8. Progress Payment Evaluation

The Project manager shall ensure that the format for the Progress Payment Valuation form is in accordance with the Client's requirement where applicable. The Site Staff shall check the validity of work done claimed by Contractor and submit a mark-up copy of the actual work done evaluation report to the Project Manager for review and payment recommendation. The Project Manager shall prepare the Progress Payment Valuation form for issuance to the Architect/Quantity Surveyor.

The Project Manager shall agree with the Quantity Surveyor the date on which the Progress Payment Valuation form is required to be submitted and be recorded in the Project Quality Plan.

8.1 Progress Payment Valuation Form

The Client's requirements shall be established with regard to the format for presentation of the monthly Progress Payment Valuation form.

In the absence of any specific requirement, the standard Progress Payment Valuation form shall be used.

8.2 Interim Claims for Payment

Interim Claims for payment are submitted by the Contractor, normally on a monthly basis and should show the following details:-

(i) Value of Unfixed Materials.

(ii) Value of work completed.

(iii) Variations to the Contract (where applicable)

A payment claim that exceeds the value of Contract work ordered shall not be considered.

8.2.1 Unfixed Materials

The claim for unfixed materials on site shall be supported by an itemised schedule of the materials with prices.

Obvious over-stocking of materials on site shall be verified. Reasons considered acceptable would be e.g. imminent price rises, bulk purchases, anticipated delivery problems etc.

The nominated project team members shall note the following:-

(i) Verification of unfixed materials may be made by visual inspection of the Contractor's stores on site.

(ii) Verification to be made by Contractor submitting copies of the relevant delivery notes.

Claims for materials held off-site (e.g. at place of manufacture or Contractor's premises), shall only be accepted, subject to the following.

(i) It is permitted to claim under the Contract.

(ii) Submission of documents confirming the holder of the materials has adequate Insurance Cover.

(iii) Prior approval has been obtained in writing.

(iv) The materials have been obtained in writing.

(v) The Materials have been inspected, certified as being accepted and labelled for delivery to the site.

(vi) All other conditions stipulated in the Conditions of Contract are compiled for delivery to the site.

8.2.2 Work Completed

The Site Staff shall maintain a current record of the Contractor's progress against the agreed Contract Payment of Works.

8.2.3 Variations To The Contract

The Project Manager shall not include and certify variation claims made by the Contractor for variations to the works in the Progress Payment Valuation, unless these have been approved and agreed by the Client.

The Progress Payment Valuation form shall be signed by the Project Director or the Project Manager if authorised by him.

The Project Manager shall ensure that all Variation Orders are approved by the Client to facilitate finalisation of the Account. The Final Valuation shall be issued taking into account the outstanding and defective works.

Copies of all Contractors' interim claims for Payment and Progress Payment Valuation shall be retained in the Project 'PP' Files.

9. Contract Variations

The Project Manager shall ensure the authority levels for initiating variations are agreed with the Client/Architect and recorded. He shall ensure the Client/Architect's authority is received and recorded before initiating an instruction for the variation to the works to proceed. The details of all variations on a contract shall be recorded and filed in the appropriate Project 'VO'' File.

At the commencement of the contract, the Client/Architect's specific requirements for the authorisation of variations to the works shall be agreed and recorded in the Project Quality Plan that:-

(i) Establish if the Client/Architect requires to approve all variations and costs before work is undertaken.

(ii) Establish if the Client/Architect requires to delegate responsibility to ACE for authorising, without prior approval, minor variations to the works to an agreed limited value.

(iii) Obtain the Client's requirements with regard to the format for preparation of Draft Variation Orders (DVO). In the absence of any specific requirements, and with the Client's agreement, the standard Draft Variation Order form shall be used.

(iv) Establish if Engineer's Instruction to be issued by ACE for Architect to formalise with an Architect's Instruction on the variation works to be carried out.

(v) Establish the appropriate course of action for the Contractor to proceed with the variation to the works, on receipt of an Architect's Instruction (AI)

9.1 Cost of Variations

If time permits, the Contractor should be instructed to submit detailed costs of any proposed variation before an AI for the work is issued. The Contractor shall submit the time implication, if any.

The Contractors' costs for undertaking variations to the works shall be based on their Schedule of Unit Rates, where applicable or substantiated by supplier's quotation or other documentation.

The Contractor's costs for variation shall be checked by the Project Manager for validity and accuracy and confirmed to the Client/Architect in writing with a recommendation for acceptance or otherwise.

There may be circumstances where, due to time constraints, a variation to the works must be undertaken before detailed costs and time implication can be submitted by the Contractor. A DVO for these works without substantiating costs may only be issued in these circumstances.

In such cases the cost of the works shall be obtained as soon as possible.

9.2 Engineer's Instruction

Unless otherwise agreed, EI shall only be issued on receipt of an instruction from the Client/Architect which shall be recorded.

With the Client/Architect's approval, the standard Engineer's Instruction format shall be used.

The details of each EI issued on the Project together with the associated costs shall be recorded on the Contract Value Summary form. This form shall be kept in the 'CC' file and the Project Manager shall ensure an up-to-date Contract Value is available at all times.

9.3 Architect's Instruction

Unless otherwise agreed, AI shall only be issued on receipt of an instruction from the Client/Architect which shall be recorded.

With the Client/Architect's approval, the standard Architect's Instruction format shall be used.

The details of each AI issued on the Project together with the associated costs shall be recorded on the Contract Value Summary form. This form shall be kept in the 'CC' file and the Project Manager shall ensure an up-to-date Contract Value is available at all times.

9.4 Architect's Direction

Architect's Direction (AD) shall be issued for variation which has no cost and time implication but can constitute cost reduction.

10. As-Built Drawings

The As-Built Drawings prepared by the Contractor shall show clearly and accurately the general scheme and details of the work installed and completed, particularly the hidden or covered items that are not readily accessible.

After completion of project, the Contractor shall submit draft As-Built Drawings to the Project Manager for comment/approval.

The Project Manager/Site Staff shall check that the draft As-Built Drawings are accurate and complete in accordance with the Specifications. The Project Manager shall return the drawings with the comments to the Contractor for amendment.

After the As-Built Drawings have been approved by The Project Manager, the Contractor shall submit the necessary sets of the final drawings in reproducible transparencies, in diskettes/CD Rom and paper prints as required under the Contract.

11. Operating and Maintenance Manuals

Operating and Maintenance Manuals prepared by the Contractor shall provide the owner of the building the complete understanding of each system and shall enable him to undertake the following operation and maintenance functions:

(i) Start, operate and shut-down the systems.

(ii) Operate the system safely.

(iii) Operate the systems correctly to maintain the design intent of the systems.

(iv) Undertake essential maintenance work.

After completion of project, the Contractor shall submit draft Operating and Maintenance Manuals to the Project Manager for comment/approval.

The Project Manager shall check the accuracy and completeness of content of Operating and Maintenance Manuals and shall return the manuals with the comments to the Contractor for amendment.

After the Operating and Maintenance Manuals have been approved by the Project Manager, the Contractor shall submit the necessary copies of the final manuals as required under the Contract.

The Project Manager shall ensure that one copy of all Operating and Maintenance Manuals for a project are retained in the office in accordance with Section S6 : Archive Control.

12. Maintenance Period

During the Maintenance Period, the Project Manager shall ensure that all defects under the liabilities of the Contractor are rectified accordingly. Prior to recommendations for release of the Retention Monies, the Project Manager shall ensure that all defects issued to the Contractor are signed off by the Client's representative, where appropriate, to signify satisfactory rectification by the Contractor.

REFERENCE

Form M7.A - Shop Drawing Submission Status Format

Form M7.B - Material Sample Review Format

Form M7.C - Request for Deviation

Form M7.D - Register of Request for Deviation

Form M7.E - Draft Variation

Form M7.F - Sub-Contract Value Summary