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# Quality Management Plan

**15 October 2021, Version 1**
**South Sudan Enhancing Community Resilience and Local Governance Project (ECRP)**

Funded by: World Bank
Implemented by: IOM South Sudan

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| Document status | V1 | |

## Introduction

IOM has developed this quality management plan as a living document. The final purpose of this document is to establish guidance to deliver quality Products.

## Executive Summary

Quality Control and Quality Assurance is fundamental to the works and services undertaken by IOM and shall be practiced by all personnel of the Organization in their daily activities. Quality is enhanced by working systematically, according to formalized procedures, designed to prevent or eliminate errors from occurring. It is the responsibility of ECRP Project Managers to ensure that these procedures are implemented consistently and effectively, and that they are reviewed regularly to reflect the requirements of the Contracts throughout the duration of work.

It is the responsibility of the Project Management unit (PMU) to constantly monitor the implementation of the Quality and Assurance Plan to establish and put into practice necessary systems and procedures, and ensure adherence to the Quality Management Strategy through regular auditing.

This Quality Management (QM) Plan forms the basis for assessing and maintaining the quality of ECRP Refurbishment and Construction Works. IOM acknowledges that Quality Assurance / Quality Control (QA/QC) within the QM plan is a result of joint efforts amongst the contractor, IOM, Project Management Unit (UNOPS-PMU), and Government of South Sudan.

The process of getting a quality product starts with engaging the right and capable contractor for the job, having contractor's clearly defined QC systems, support and supervision during the construction period and signoff of all contracts by the Project Manager within IOM. This plan addresses QA and QC throughout the project stages.

## Project Context and Background

ECRP (Enhancing Community Resilience and Local Governance Project) is providing training to boma and payam level development committees which have prioritized infrastructure for selected payams in eight Counties and two Administrative Areas. The works will be carried out by IOM in 10 "ECRP Project Locations" which are:

1. Wau County
2. Raja County
3. Pariang County
4. Rubkona County
5. Leer County
6. Baliet County
7. Fashoda County
8. Renk County
9. Maban County
10. Pibor Administrative Area

The scope of the project will include:

1. New construction and rehabilitation of water supply infrastructure
    a. Drilling and Equipping of Boreholes
    b. Hand Pump Installations
    c. Water Tank Stands and Towers
    d. Water Points
    e. Mechanical Plumbing Works
2. New construction and rehabilitation of reinforced concrete buildings and facilities
    a. Ventilated Improved Pit (VIP) latrines
    b. School buildings
    c. Community health centre buildings
    d. Community market sheds
    e. Other similar single-storey community building structures
3. Surface water management infrastructure (using labour-intensive construction methods)
    a. Haffirs
    b. Drainage channels
    c. Dykes
4. Footbridges (Pedestrian water crossings)
    a. Small-scale footbridges for wet season pedestrian crossings
5. Community Access Roads (using labour-intensive construction methods)
6. Other Community infrastructure

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# 1. Project Objectives:

ECRP aims to improve access to basic infrastructure and strengthen community institutions in selected counties through four key components: 1) community infrastructure and services; 2) local institution strengthening; 3) project management and learning; and 4) contingency emergency response.

The overall project objective is to improve access to basic infrastructure and strengthen community institutions in selected counties. Community institutions refers to the two units of local government closest to the citizen, at the Boma and Payam levels. Boma Development Committees (BDCs), Payam Development Committees (PDCs), and the communities they serve are the project's primary beneficiaries. Technical assistance will also be offered to county offices so that they may play a constructive role in the project at Boma and Payam levels. The project includes both hardware and software components, which mutually reinforce the potential of reaching the development objective of the ECRP, improved access to basic infrastructure and strengthened community institutions.

Component 1 will develop infrastructure enhancing public services in local communities in accordance with local priorities in the selected counties. Selection and prioritization of infrastructure sub projects and services will be identified through consultative processes led by local government bodies. Further, sub project prioritization will be validated through local service mapping to avoid duplication, to maximize available resources, and to ensure the needs of marginalized groups are considered.

Local labour will be prioritized in the infrastructure construction or rehabilitation to the greatest extent possible. Training and on-the-job capacity building will be provided, thus ensuring that local communities retain the knowledge and understanding necessary to assure functionality and long-term sustainability of the infrastructure built during this project. ECRP will prioritize the inclusion of social groups facing marginalization or barriers to participation as appropriate (e.g. women, youth, returnees, ethnic minority groups, people with disabilities etc.) and ensure equitable access to daily wage labour opportunities.

## 1.1. Project output(s) description, outcomes, standard and quality criteria

This project will deliver the following outputs:

**Infrastructure:**

- Design and construction of community infrastructure for ECRP
- Design review and approval from IPMG
- Design approval from the WB
- Procurement of Works
- Construction of works
- Training in Operations and Maintenance
- Handover of the building to the government and the beneficiary communities

**Standards / Quality Criteria**

The building structures shall meet the requirements of the ECRP Infrastructure Compliance Guideline, the International Building Code, the local building codes and other applicable engineering standards.

## 2. Quality Management Procedure

The ECRP Project Management Unit (PMU) will perform the central role in managing quality issues during the implementation of the project to ensure that the works are carried out to the high standard and the product is constructed / built in accordance with the prescribed specifications in the design and in compliance with the partner requirements, current South Sudan legislation and guidance. IOM as an implementing partner for ECRP Infrastructure in New Counties will ensure quality is met through this ECRP IOM Quality Management Plan.

**The Procedure will cover the following topics:**

### 2.1. Quality and Assurance Plan

This quality management plan shall guide quality planning, control and assurance activities within the Construction projects.

The Q&A plan forms are one part of the overall Quality Management System of the project. It describes how quality will be managed throughout the lifecycle of the project and provides a guide for personnel involved in the implementation of the project on how the quality requirements of the specifications are addressed. It also includes the processes and procedures for ensuring quality planning, assurance, and control are all conducted. It has been developed from the information detailed within the Contract Specification, Beneficiary Requirements and Agreement information.

The Q&A plan also provides guidance and direction for project personnel and IOM ECRP engineers to supervise the performance of necessary tasks to verify that the quality of the contractor's work complies with the condition of contracts, specifications, and drawings and that the works are documented clearly for traceability and future use.

The Q&A plan for the project will establish the activities, processes, and procedures for ensuring a quality product upon the conclusion of the project. The purpose of the plan is to:

- Ensure quality is planned;
- Define how quality will be managed;
- Define the roles and responsibilities of relevant parties in the project;
- Define quality assurance activities;
- Define quality control activities;
- Define acceptable quality standards;

The Project Q&A plan will be reviewed bi-monthly to ensure that:

- The objectives and requirements of the Project Q&A plan are still valid, and are being met;
- Forthcoming activities are reviewed and any necessary amendments to the Project Q&A plan are put in place before the relevant work begins;

- Q&A plan processes shall be reviewed to ensure continuing suitability and effectiveness;

### 2.2. Quality Control (QC)

The quality control approach will ensure the conduct of checks are in accordance with the QM Plan and to confirm that processes are being carried out effectively. A record of these checks by the contractor will be noted. Quality standards, measure of quality, inspections, use of templates and forms, definitions of types of quality methods and metrics to be employed in support of quality control.

To ensure the level of quality in its deliverables and work processes, the following key documents will be used as a basis to implement the quality management plan:

- **Construction Agreement:** General conditions of contract issued by IOM shall be used. This document is widely used by IOM offices globally and is adopted from the FIDIC contract model. Special Provisions (Conditions of particular Application) which may have an amendment to the General conditions of contract will also be used as a reference;
- **Technical Specification:** The Technical Specifications (general and particular) shall be included in the set of Contract Document and will be used as a basis for the implementation of QMP;
- **Design/Drawings and BOQ:** The Design/Drawings for each contract work package will be used to implement the QMP:
- **Project Quality Assurance and Control:** ECRP QA and QC Standard templates and forms in MS Word or Excel format;
- **Project Health and Safety Plan / Procedures** for all work packages detailed in the ECRP IOM Project Health and Safety Management Plan;
- **Social and Environmental Plan / Procedures** for all work packages in accordance with the Environmental and Social Management Plan;
- The **Quality Register** will be updated throughout to show quality control (quality check) activity dates and the results via the ECRP QA & QC standard forms
- Planned material intended to be used via **QC - Approval for Material** request submitted on the ECRP QA & QC standard forms
- The **Product Descriptions** will be used as a basis against which to quality check each product;

### 2.3. Quality Assurance (QA)

The focus in this project of quality assurance is on the processes used. Quality assurance ensures that project processes are used effectively to produce quality project deliverables. The aim of Quality assurance during construction is to ensure that the product is constructed / is built in accordance with the prescribed specifications. As such the products must fulfil requirements and must be fit for the purposes. Hence, Quality assurance throughout the life cycle of the project is very important to generally achieve the required quality, resilient and check:

- Fulfilment of requirements which includes:
    - Material requirements;
    - Process requirements;
    - Equipment requirements;
    - End-product requirements;

- Fitness for purpose which includes:
    - Comfort for the purpose;
    - Ability to serve till the end of life cycle at level of serviceability;

Generally, the quality assurance process will follow the following flow chart:

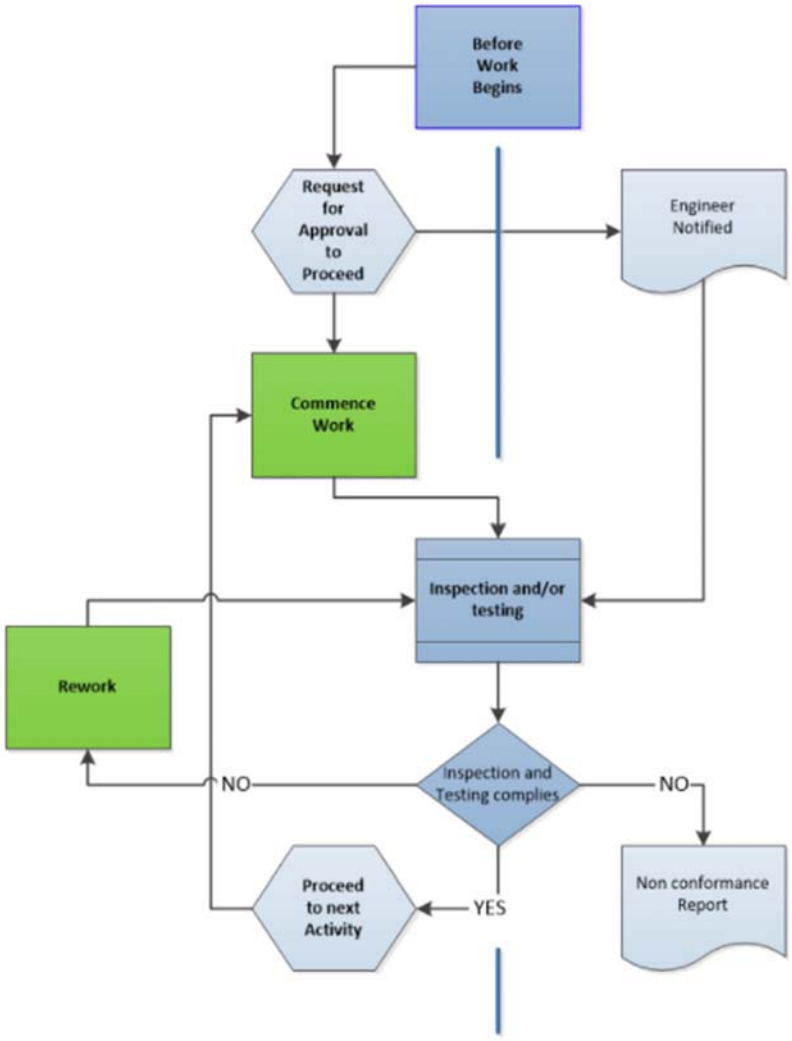


**Figure 1 Quality Assurance Process**

## 3. Scope of Q&A Plan

This Q&A Plan is intended for ECRP Project staff to ensure the quality of the delivered product in the ECRP Project in the Republic of South Sudan. This plan does not entail the contractual requirements of the Contractor.

The purpose of the Q&A Plan is to provide guidance and direction for project personnel to perform the necessary tasks to verify that the quality of the Contractor's work complies with the specification and drawings and that the works are documented clearly for transparency and QA auditing.

Contractors' compliance with the assessment of works the QA Plan entails will form the basis for payment of completed works.

The QA plan is pivoted around a process of being well prepared for a construction phase, implementing according to specification and drawings requirements, proving compliance and satisfying the Employer (IOM) that the final work is warranted for payment. This process is described in further detail below.

### 3.1. Preparatory Phase on site Meetings

Quality Control meetings will be held before each definable feature of work to ensure that the documentation is complete, materials are on hand, and the people who are to perform the work understand what they need to know about the feature of work. Both the actual contract specifications and those referenced in the contract specifications shall be in the Contractor's library and available to their Quality Control inspector(s). If the Quality Control inspector(s) does not have the required specifications, they cannot know or enforce these provisions.

Prior to the commencement of any actual works, the Contractor must submit a Request for Approval (RFA) form to the Project Engineer. This may entail approval of source material, mix design or of documents such as materials certificate, Work Plan (WP), Quality Control Plan (QCP), Health and Safety, Social and Environmental (HSSE) Plan, etc.

### 3.2. Initial Inspections

Quality Control inspections shall be conducted in a timely manner at the beginning of a definable feature of work. A check of the preliminary work will determine whether or not the Contractor, through their Contractor Quality Control organization and the craftspeople involved, thoroughly understands and is capable of accomplishing the work as specified.

The contractor shall submit the Approval to Proceed (ATP) form to the Project Engineer. This document serves to account for and recognize the checks and balances that must be in place before work can commence. An ATP will take account of approved drawings, specification and other required documents being in place, related RFA submissions being approved and satisfactory completion of underlying layers. The ATP is a hold point which must be released by the Project Engineer or Lead Engineer before physical works commence.

### 3.3. Follow-up Inspections

Follow-up inspections, occur daily when work is in progress and are for the purpose of assuring that the controls established in the earlier phases of inspection continue to provide work which conforms to the contract requirements.

For compliance testing of the physical works, the Contractor shall submit a Request for testing (RFT) to check material and final product compliance to the Site Engineer with a copy to the Lead Engineer. The PM has the final decision on acceptance of the test results.

There are works that are 'cut and cover'. That is, work that cannot be inspected "after the fact". This includes concrete, where the size, number and location of reinforcing steel cannot be readily

determined after the concrete is placed. Most of the underground utilities cannot be inspected after covering. Work of this nature shall be closely controlled and monitored.

The Site Engineer and project management team will closely monitor the Quality Control program to assure that the control system is being correctly performed and that the contractor is effectively controlling all operations. If the Contractor Quality Control personnel are not capable and/or are not inspecting properly, the Lead Engineer shall be notified immediately and shall correct performance by using one or more of the enforcement tools provided for in the construction contract. Records and reports will document all facts.

## 4. Responsibilities

The Project Quality and Assurance Plan, in terms of the practical implementation approach of the Project Plan for the implementation of the works, has three responsible and independent oversight components.

**ECRP IOM Project Team:** The quality control and assurance of the contractors' activities will be implemented through close supervision and monitoring by the IOM Project Engineers and Community Site Supervisors under supervision of IOM Lead Engineer. The required quality control will be in accordance with the IOM instruction IN 168 Annex 20.1 Guide for Implementation of Construction Works to provide mandatory instructions for construction supervision for delivery of construction related projects.

**ECRP Project Management Unit (PMU):** It is the responsibility of the Project Management unit (PMU) to constantly monitor the implementation of the Quality and Assurance Plan to establish and put into practice necessary systems and procedures and ensure adherence to the Quality Management Strategy through regular auditing. UNOPS will be directly accountable to the World Bank in all aspects related project delivery (Project Management - Social and Environmental Safeguards, Fiduciary Oversight and Procurement Planning, Infrastructure Quality and Standards; Project Implementation – of community infrastructure as per agreed scope.

**Contractor Quality Control Plan:** The Contractor's Quality Control Plan indicates the contractor's resources and procedures for use to control the quality of products/materials and works in order to ensure that works are in compliance with the quality standards specified in the project technical specifications. The Project also shared with the contractor the HSSE Plans and various forms to be used during the implementation of the Project. The Construction Supervision and Quality Management forms will be shared in MS document format.

IOM, World Bank and Government of South Sudan will independently provide assurance of the quality of works and materials used as well as the final output products delivered through regular site visits, review of various quality testing results and progress reports. They will also conduct their assurance of the quality of products through the Project management Unit.

The Lead Engineer will assign a Project Engineer to each of the project sites. The Project Engineer, with support of the Site Engineer, will be responsible for the day-to-day implementation of the

Project Quality and Assurance Plan following the overall guidance and requirements of this document.

# 5. Project Staff

The ECRP IOM Project Staff for infrastructure implementation are as follow:

- IOM ECRP Programme Coordinator (PC-IOM)
- Lead Engineer
- Project Engineers
- Site Engineers
- Community Site Supervisor

The ECRP Project Management Unit staff include:

- PMU Senior Project Manager (PMU SPM)
- PMU Lead Quality Engineer (LQE)
- PMU Engineer
- PMU Health, Safety, Social and Environmental (HSSE)

## 5.1. Lead Engineer & PMU Lead Quality Engineer

As part of operational duties, the Lead Engineer reporting to IOM ECRP Programme Coordinator, will be responsible for designing and maintaining the project Quality Management Plan and a Quality Register throughout the lifecycle of the project, and for ensuring the quality management processes and procedures are implemented in accordance with approved project product descriptions. The project's quality management plan in combination with the project implementation plan will help ensure the project is delivered on time, within budget, and to the required and agreed quality standards.

Project quality assurance will be the overall responsibility of the Lead Engineer, who will be held accountable by the PMU. The Lead Engineer has the responsibility of administering the quality system used on the project and must also be able to answer any technical queries which the Contractor may raise. The Lead Engineer and PMU Lead Quality Engineer has the authority to approve and reject conforming and non-conforming work. The Lead Engineer can instruct the Contractor to complete works whether or not such works will increase the overall contract value.

The Lead Engineer has the authority to approve works and disapprove works proposed or completed by the Contractor. Also, the Lead Engineer can issue Site Instructions to the Contractor as required.

Consolidated, the Lead Engineer is responsible for the Day-to-day contract management, administration, evaluation and award and the following specific responsibilities.

- Reviewing and authorizing the project Quality Management Plan (QMP) and other project plans
- Assigning quality responsibilities to all project personnel

- Ensuring all project personnel are suitably trained, and possess the necessary skills, to undertake their designated quality responsibilities
- Ensuring the provision of appropriate training in quality for all project personnel
- Continually monitoring of quality performance to ensure compatibility and continued effectiveness with the Group's policy, objectives and other requirements
- Allocating resources to ensure the project quality objectives are achieved
- Participating in the review of the quality system and other relevant quality meetings and programs
- Auditing and assessment of the Contractor
- Liaising with the Client on Quality issues

### 5.2. ECRP IOM Programme Coordinator & PMU Senior Project Manager

The PMU Senior Project Manager has the overall responsibility of delivering the project to the Donor. The PMU SPM is the Donor's delegate and will remain the point of contact for the Donor on all program related matters. The ECRP IOM Programme Coordinator is the focal point for the IOM implementation team to the PMU.

The PMU SPM will have a duty to ensure all records are kept in a format which will be understandable to auditors, stakeholders and other parties involved in the program. The PMU SPM has a duty to guarantee that accountability for the budget and quality is maintained. The scheduling and engineering control are all the responsibility of the Lead Engineer.

### 5.3. Project Engineers & PMU Lead Quality Engineer

The Project Engineers have the responsibility of supervising the works being carried out on the project by the Contractor. The main task of the Project Engineer is to monitor and report on the performance of works being implemented by the Contractor. Quality Assurance is guaranteed by the site supervision of an inspector as per the following schedule:

**Construction Sites**

- **PMU Lead Quality Engineer** – ad hoc visits, for QA audit of ECRP IOM QM Plan
- **Lead Engineer** - one visit bi-monthly, per county, during "critical time period"
- **Project Engineer** - rotational of respective discipline, one site visits per week, per site during "critical time period"
- **Site Engineer** – two to three times per week during "critical time period", per assigned sites
- **Community Site Supervisor** - daily, per site

Critical time period is all RC foundation concrete slab, roof repair works, electrical installations and septic tank work where applicable, hence:

- Mechanical engineering supervision is required for water pumps, water harvesting works, etc.
- Electrical engineering supervision is required to monitor the electrical works
- Civil/structural engineer supervision to monitor RC foundation slab, wall, roof, finishes including fittings works, at all the building construction works where applicable, etc.

They must also be able to forward any technical queries as per design which the Contractor may raise with regards to the performance of works onsite. The Project Engineers are also directly responsible to the Lead Engineer & PC-IOM. However, all the site teams have the authority, as empowered by the Lead Engineer, to work as a team carrying out tasks pertaining to the implementation of the project in close cooperation with the IOM team.

The Project Engineers will keep the Lead Engineer & IOM team informed on any technical queries, progress, quality or any other pertinent details which deems necessary via frequent meetings in person and by phone. A thorough knowledge of the technical specifications is required by the Project Engineers.

The Project Engineers have authority, as empowered by the Lead Engineer, to approve works and disapprove works proposed or completed by the Contractor. Also, the Project Engineers can issue Site Instructions to the Contractor as required, provided it is not anticipated that the Site Instruction will increase the contract value.

The Project Engineer will review all concrete mix designs and submittals. Consultation with the PM shall be sought. Recommendations will be submitted to the Lead Engineer for consideration, and upon final approval, the Project Engineer will be directed to implement the project. The Lead Engineer will, as appropriate, seek guidance and commentary from the Project Engineers before rejecting or approving any construction components, including mix designs, from the Contractor.

It is the responsibility of the Project Engineer to monitor the construction execution for the project. Only in this way can compliance with the various protocols be confirmed. This effort will be headed by the Project Engineer.

Consolidated, the Project Engineers are responsible for the Day-to-day support, management, coordination, training and supervision of subordinate staff and the following specific responsibilities:

- Ensuring procedures in the Quality Management Plan are followed;
- Ensuring the project QMP is correctly implemented to meet the requirements of the project;
- Reviewing and approving Inspection and Test Plans, Project Forms/Checklists ;
- Reviewing inspection reports and ensuring any actions required are initiated;
- Ensuring and verifying that corrective action is taken when required for non-conforming work;
- Ensuring and verifying that agreed rectification works and corrective action is taken when required for nonconforming Work;
- Ensuring construction targets and programs are met.
- Attending meetings called to discuss quality issues
- Identifying and reporting any quality management system issues;

### 5.4. Site Engineers

The Site Engineer is responsible for day-to-day management, coordination and supervision of works and progress. They are also required to carry out day-to-day monitoring and reporting on quality and progress, and the following specific responsibilities.

- Performing verifications and quality inspections as requested;
- Monitoring and supervision of construction activities;
- Identifying and reporting material and/or workmanship nonconformity and notifying the Project Engineer of the suspected nonconformity;
- Rejecting defective workmanship and materials;
- Performing verifications and quality inspections as requested by the Lead Engineer and Project Engineer;
- Completing a diary on a project daily report
- Technical and logistic support to the Lead Engineer;
- Assisting with the preparation of Work Method Statements and Inspection & Test Plans (ITP's);

### 5.5. Community Site Supervisors

The Community Site Supervisor is responsible for daily monitoring of works and progress. They may carry out construction supervision work under specific instructions from the Site Engineer for the two to three days progress between the Site Engineer's visits. The Community Site Supervisor also has the following specific responsibilities.

- Performing verifications as requested;
- Monitoring of construction activities;
- Completing a daily log of site activities
- Reporting progress to the Boma Development Committee (BDC)

## 6. Quality Management Process

The Lead Engineer prepares the QM Plan while the PMU Lead Quality Engineer reviews and approves the plan. The Project Engineers and Site Engineers, and the awarded contractor to execute the project will be trained to use this plan which will help implement consistent supervisory methods for each type of ECRP community infrastructure. The manual will also help the Lead Engineer to monitor, verify, review, check, and rectify any quality aspect/issues systematically through the agreed check list and QC formats. Upon completion of the project, quality management data and records of the construction of the ECRP community infrastructures will be reviewed and handed over to the client.

The QA Process starts with approval from the Lead Engineer for a construction activity to proceed. This will require the Contractor to prove to the Lead Engineer and Project Engineers that they are ready to start the works, that documents and procedures are in place and in most instances, that the underlying layer has been approved. Once approval is obtained, the work can proceed. During the work phase and upon completion, the Contractor must allow testing of materials, inspection of construction activity and survey compliance checks to be performed.

Assuming satisfactory results, the Contractor must then gain approval from the Engineer before proceeding with the next work. As mentioned in Non-conforming Works above, any defective works or procedure non-compliance must be rectified before the process can proceed.

The whole Quality management plan process is indicated in Figure 2 and Figure 3:

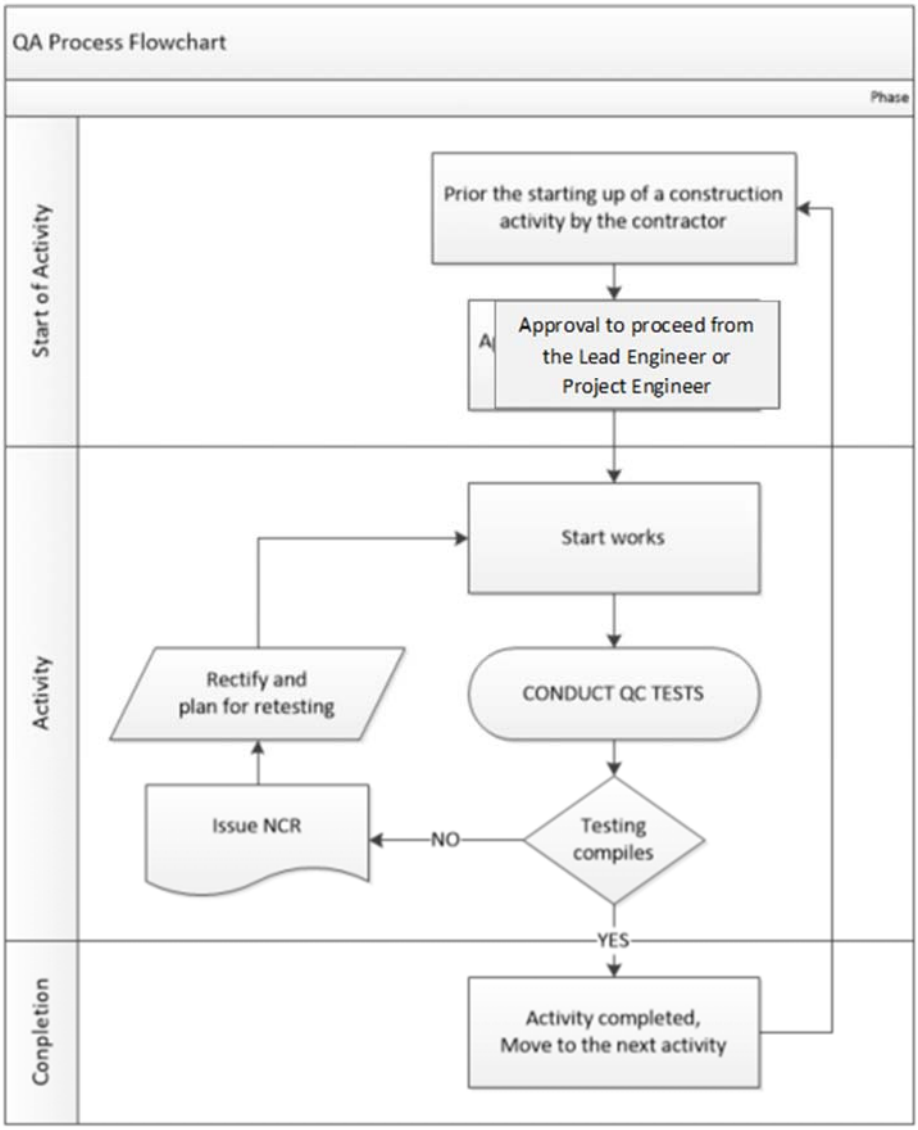


**Figure 2 QA Process Flowchart**

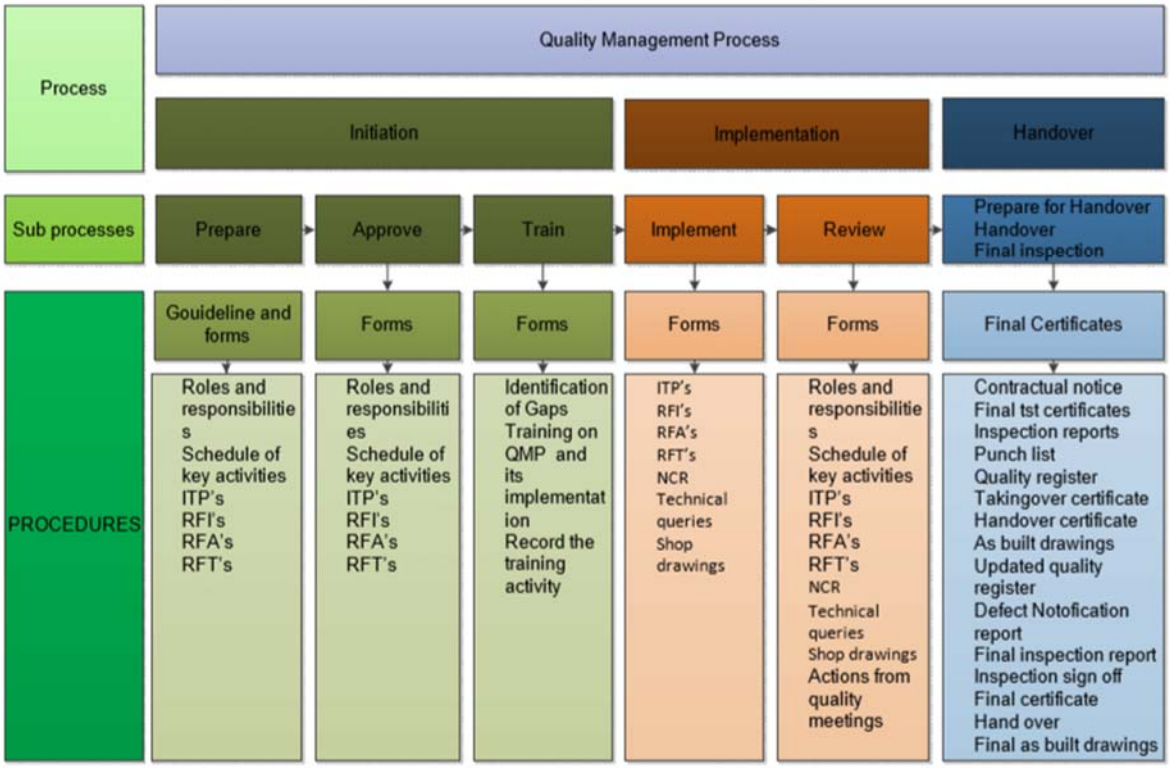


**Figure 3 Quality Management Process**

For the purpose of this project, especially all community infrastructure buildings, different checkpoints are established as indicated below. The Site Engineers shall always check the procedures or process used by the Contractors; quality of materials used; and quality of the end product at different checkpoints as indicated below.

**Check Point #1 Mobilization and site establishment**

- Check proposed logistic plan for mobilization of major items of construction equipment and materials including shipping / handling logistics;
- Check the construction of temporary site fencing, warehouses, compounds and other storage facilities, site offices, workers accommodation and connection to temporary services including electricity and water supply (potable).

**Check Point #2 Construction of Foundations**

- Check excavation level, dimension, soil type of the foundations, fabrication, proposed earthworks,
- Plant & machinery, and other equipment necessary to perform the works.

**Check Point #3 Construction of Ground Floor**

- Check formwork,
- Reinforcement steel, **spacers(!)** and
- Equipment for concrete mixing and placement.

**Check Point #4 Construction of Concrete Columns**

- Check formwork bracing / propping,
- Reinforcement steel, **spacers(!)** and
- Equipment for concrete mixing / placement.

**Check Point #5 Ground Floor Slabs**

- Check all necessary equipment and personnel for placement, finishing and curing of concrete.

**Check Point #6 Walls**

- Check all necessary equipment and personnel for construction

**Check Point #7 Construction of Ring Beams**

- Check formwork, propping, reinforcing steel, spacer, concrete mixing and placement.

**Check Point #8 Fabrication and Installation of Roof Trusses and Roofing**

- Check materials quality, equipment type, and scaffolding arrangement, cladding and fastenings.

**Check Point #9 MEP and allied fixing and fixtures**

- Check all necessary equipment and personnel for construction

**Check Point #10 Painting / Finishing Works**

- Check materials quality, equipment type, and scaffolding arrangement.

**Check point #11 Site Clearance**

# 7. Quality and Assurance Documents

## 7.1. Contractor Submittals

The contractor shall submit to Site Engineer and in copy to the Project Engineer and Lead Engineer the following QC forms and report for review and approval:

**Request for Approval (RFA):** prior to the commencement of any activities and or material intended to be used at the site, the contractor shall use this form and explain the nature activity, material and timeframe for completion. The contractor needs to get Project Engineer's approval prior to proceeding with planned activities.

**Request for Test (RFT):** prior to conducting any QC test, the contractor will use this form, informing the Site Engineer that the QC test is ready to be conducted. The Site Engineer shall plan their visit of the testing procedure accordingly.

**Daily Progress Report:** the contractor shall submit to the Site Engineers and in copy to the Project Engineer and Lead Engineer the project daily progress report at the end of the calendar week as well as at the end of the month. The daily weekly / monthly report will include the completed, ongoing and planned activities for the following week per construction site, respectively month per all project sites. In addition, the daily report shall address all the HSSE aspects of the project for the respective period.

## 8. Monitoring, Filing and Document Control

The ECRP Project will use all the relevant Quality Management and Construction Supervision templates/forms. Using ECRP forms is an important component in ensuring that quality materials are utilized, correct mixtures are applied and the right procedures are used in the process of construction. Monitoring tests are mostly divided between Laboratory tests and Field Tests.

**Due to lack of laboratory testing facilities in South Sudan outside of Juba, alternate QC measures in lieu of laboratory results can be agreed upon for remote sites with the Project Engineer in the Inspection and Testing Plan. The availability of testing services will be reviewed and if deemed feasible, lab testing can be added to the ITP based on the testing requirements in this plan.**

The Concrete casting activities will be subjected to quality control through laboratory testing which will be conducted by pre-selected independent laboratory companies on behalf of contractors whilst field tests are done by both Site Engineers and the contractor QC. All lab tests conducted should be availed to Site Engineers as evidence before work/next stage commencement. It is the contractors' responsibility to ensure that all required tests have been conducted. All test results are expected to meet ECRP technical specifications of the contract document otherwise it will be mandatory to redo tests.

The Project Engineer will periodically inspect material being used. If determined that the characteristics of the material being used differ from the material initially tested/approved, the engineers will direct the contractor to repeat the qualification testing and or to replace the installed items. If the new material qualification test results meet the criteria of the technical specification as guided by the ECRP Acceptance Criteria; a record is to be made and the new materials may be used for the work; otherwise, previously approved materials shall be used or other acceptable materials shall be sampled and tested as noted above prior to incorporating into the work.

In the life of the contract the monitoring of construction work will be done by ECRP to ensure that minimum standards are being adhered too. On a regular basis each project site will be visited by Project engineers and/or the Lead Engineer. Every visit will be used to assess completion of agreed corrections for subsequent visits to be reported on the Site Engineers Daily report. Other reports which will be produced include Daily reports and non-conformance reports which are discussed in the table that follows.

**Table 1 Quality Management and Construction Supervision Templates and Forms**

| No | Document | Register / Log Maintained by | Distribute to | Record Type |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| QM01 | Contract kickoff meeting.docx | Site Engineer/Project Engineer | Stakeholder, IOM, ECRP PMU, Contractor | PDF |
| QM01 A | Site Establishment Checklist Record.docx | Site Engineer | Contractor, IOM | PDF |
| QM02 | Monthly site progress meeting.docx | Project Engineer | Stakeholder, IOM, Contractor | PDF |
| QM03 | Site instruction.docx | Project Engineer /Site Engineer | Contractor, IOM | PDF |
| QM04 | Issue of clarification / information (IOI).docx | Contractor / Project Engineer | Contractor, IOM | PDF |
| QM05 | Confirmation of verbal instruction.docx | Project Engineer | Contractor, IOM | PDF |
| QM06 | Request and Approval for work (RFW) / materials (RFM).docx | Contractor | IOM | Field Site |
| QM07 A | Request for Inspection and Testing Results report.docx | Contractor | IOM | Field Site |
| QM07 B | Inspection of Materials on Site | Site Engineer | Contractor, IOM | Field Site |
| QM08 | Request permit to work / Permission to proceed.docx | Contractor | IOM | Field Site |
| QM09 | Inspection and testing plan.docx | Project Engineer | Contractor, IOM | DOC |
| QM10 | Daily log book.docx | Contractor | IOM | Field Site |
| QM11 | Weekly / Monthly progress report summary.docx | Contractor | IOM | PDF |
| QM12 | Variation order request.docx<br>IOM FPU SF 19.30 Template.xls | Contractor / Project Engineer / Lead Engineer | Contractor, IOM | PDF |
| QM13 | Resource record summary for day work.docx | Contractor | IOM | Field Site |
| QM14 | Drawing report submission register.docx | Project Engineer | IOM | docx |
| QM15 | Measurement and testing equipment status report / register.docx | Project Engineer | Contractor, IOM | PDF |

| | | | | |
|---|---|---|---|---|
| QM16 | Submittal review and approval.docx | Contractor | IOM | PDF |
| QM17 | Interim payment certificate.docx | Lead Engineer and PMU | Contractor | PDF |
| QM18 | Non-conformance report.docx | Project Engineer/ Lead Engineer | Contractor | PDF |
| QM19 | Non-conformance register.docx | Project Engineer/ Lead Engineer | Contractor | DOC |
| QM20 | Construction punch list.docx | Project Engineer/ Site Engineer | Contractor, IOM | PDF |

At the discretion of the Lead Engineer, submissions and responses can be submitted via Project Engineers. However, responsibility for submissions lies with the Contractor and the PM for responses.

# 9. Document Flow

## 9.1. General Process

- **Request for Approval (RFA):**
  - Submitted by the Contractor
  - The Project Engineer will review and approve.
- **Approved to Proceed (ATP):**
  - The Project Engineer will review and approve.
  - The Project Engineer may require the Lead Engineer to check and comment on details before deciding on the approval.
- **Request for Test (RFT):**
  - The Site Engineer will review and approve.
  - The document will be registered by the Project Engineer before the test is conducted.
  - The decision for the Contractor or Project Engineer to take the registered request to the Testing Agency shall be made.
  - The Testing Agency will conduct the test and report on findings with recommendations as appropriate.
  - The results will then be resubmitted to the Project Engineer for approval.

## 9.2. Timeframe for Document Flow

To be fair to all parties and ensure effectiveness of the QM Plan, all parties must respect the timeliness of document submission and responses.

**Request for Test (RFT):** The contractor shall submit the RFT to the Project Engineer timely and await confirmation prior conducting any kind of QC test at the site. The Project Engineer shall review and respond to the contractor no later than a working day. This shall be documented by the Project Engineer.

**Request for Approval (RFA):** The Contractor must furnish results for mix designs as per the timeframes specified in the contract. 14 working days is afforded to ECRP for responding to these submissions.

**Approval to Proceed (ATP):** The Contractor shall make submission in a timely manner to IOM but no later than 1 full working day before the agreed inspection date on the construction sites.

Project or Site Engineer must respond to the Contractor by no later than 1 full day after the inspection has taken place.

### 9.3. Consequences of Delay

#### 9.3.1. By IOM

If IOM should hold the process up by more than the agreed timeframes, the item shall be deemed to be acceptable by IOM and the Contractor may continue with the works.

#### 9.3.2. By Contractor

If the Contractor should hold the process up by more than the agreed timeframes, the Project Engineer has the option to instruct removal of the works or not accept payment.

### 9.4. Document Archiving in the Region

The Contractor shall submit the original request forms and original attachments in soft copy by email to the Project Engineer with the Lead Engineer in copy. It is the responsibility of the Contractor to maintain their own records. The Project Engineers will register the request into the database and pass the original documents on to the Lead Engineer for review and initial acceptance. The Lead Engineer with pass the documents onto the IOM ECRP PC for PMU documentation.

If a request is rejected at this point, the Lead Engineer will on the original request form:

- state the reason
- sign
- raise NCR (if warranted)

Respective documents will then be sent electronically to the relevant person(s) for inspection, testing or follow up where applicable.

The original documents with further details and signatures will then be submitted back to the Lead Engineer along with any additional attachments in original form. The Lead Engineer will counter review and if rejected, follow the same steps mentioned above. If accepted, the Lead Engineer will sign and forward to the Contractor.

Project Engineers will have the Contractor sign for receipt of the original request form, make a copy for the Contractor including any relevant attachments and file the original documents. Final scanned copies should not replace any originals (both to be kept on file).

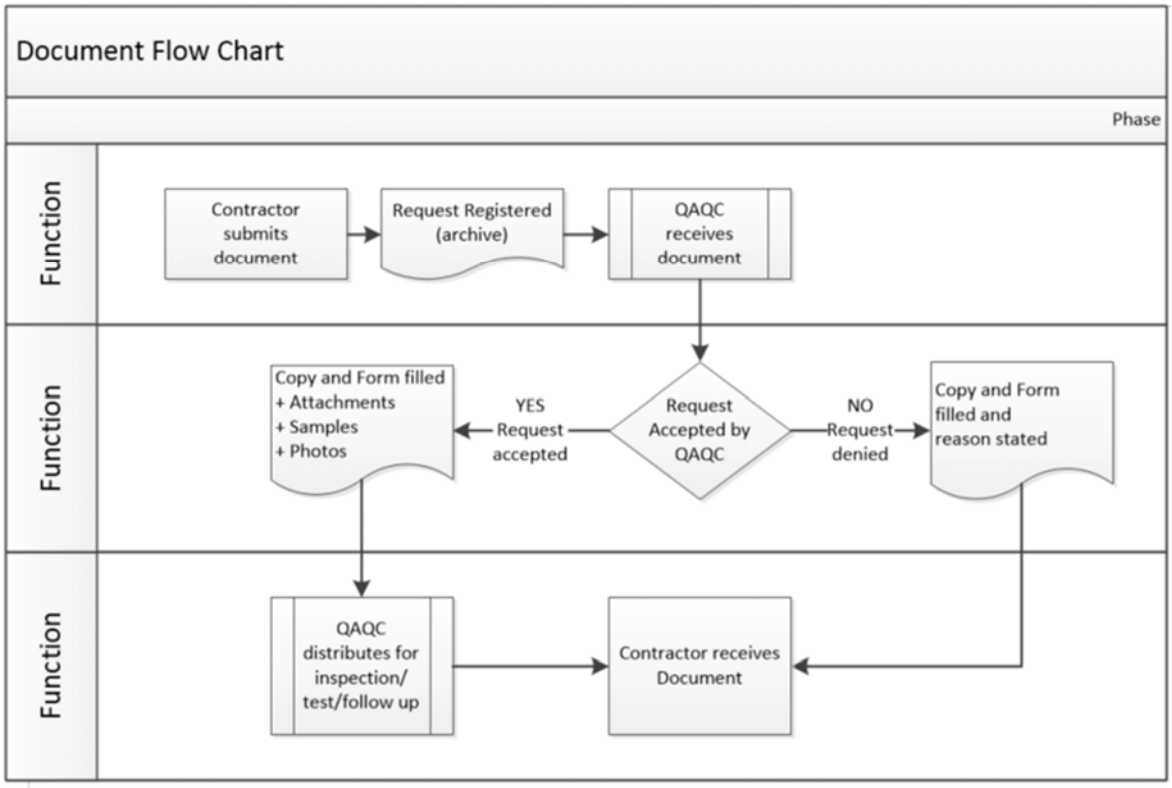


**Figure 4 Document Flow**

## 10. Reporting

The following quality management reports will be conducted:

### 10.1. Daily Reports

Completed on a daily basis by the contractor. Should contain the following details. Form QM10 is a standard template provided for this project.

- Site Data/Information — Temperature, weather, working hours
- Labour - type of staff on site
- Equipment and Machinery— report arrival and departure of each major item of equipment, report equipment in use and idle equipment.
- Materials – What materials and quantities have been transported to the site and in use
- Inspection, Testing or Measurements carried out
- Site Observations, Progress, Delays
- Instructions given and received - identify recipient and source.
- Activities – Description of what has been done in relation to time.
- HSSE related issue

### 10.2. Non Conformance Report (NCR)

The purpose of the Non-Conformance Report (NCR) is to effectively document works which for any reason whatsoever do not comply with the requirements of the Contract Documents. Secondly, NCR's also ensure that these works are isolated until effective rectification works are carried out, inspected and where necessary tested to ensure that they demonstrate compliance. The third major function of the NCR reports is to ensure that any deflective works are not paid for until rectification works are carried out and the works conform to the requirements of the contract documents.

The status of the NCR will be shown in a register and this register shall be kept up to date with monitoring to ensure that NCR's are resolved promptly and the rectification works carried out forthwith. Form QM18 is the NCR template with the records being registered in Form QM19.

### 10.3. Quality Register

Quality checks will be conducted in accordance with the QM Plan to confirm that processes are being carried out effectively. The Quality Register will be used to record all the quality aspects of ECRP infrastructure Project.

# 11. Document Information

**Document circulation**

| Organization | Department | Name | Title |
|---|---|---|---|
| UNOPS SSCO | ECRP | Amleset TEWODROS | Senior Project Manager |
| UNOPS SSCO | ECRP | Munyaradzi MARAMBIRE | HSSE Specialist |
| UNOPS SSCO | ECRP | Tsigereda Woldegiorgis | Lead Quality Engineer |
| IOM South Sudan | ECRP | Gaia BAUDINO | ECRP Programme Coordinator |
| IOM South Sudan | ECRP | Margaret SUEN | Lead Engineer |
| Contractor | HQ | TBC | |

# 12. Inspection and Testing Plan

Inspections and Test Plans for different materials and works are indicated in the tables below.

**Due to lack of laboratory testing facilities in South Sudan outside of Juba, alternate QC measures in lieu of laboratory results can be agreed upon for remote sites with the Project Engineer in the Inspection and Testing Plan. The availability of testing services will be reviewed and if deemed feasible, lab testing can be added to the ITP based on the testing requirements in this plan.**

## 12.1. Water for Concrete

| No. | Inspection and Testing Description | Testing method | Acceptance criteria | Frequency of Test | Test to be conducted by | Responsibilities | |
|---|---|---|---|---|---|---|---|
| | | | | | | Contractor | Engineer |
| 1 | Suspended matter | BS 872, BS 6068 | 2000mg/lit | One sample per site | Approved lab | E | W |
| 2 | Dissolved mater | | | One sample per site | Approved lab | E | W |
| | Sodium & Potassium Bicarbonate | | 1,000 mg/litre | | Approved lab | E | W |
| | Sodium Chloride | | 20,000 mg/litre | | Approved lab | E | W |
| | Sodium Sulphate | | 10,000 mg/litre | | Approved lab | E | W |
| | Ca +Mg Bicarbonate as | | HCO3 400 mg/litre | | Approved lab | E | W |
| | Calcium Chloride | | 20,000 mg/litre | | Approved lab | E | W |
| | Iron Salts | | 40,000 mg/litre | | Approved lab | E | W |
| | Sodium Iodate, Phosphate, Arsonate& Borate | | 500 mg/litre | | Approved lab | E | W |
| | HCL + H2SO4 - | | 10,000 mg/litre | | Approved lab | E | W |
| | NaOH | | 5,000 mg/litre | | Approved lab | | |
| 3 | pH value of water | BS 1647 | >6 | One sample per site | Approved lab | E | W |

E=execution, w= witness, H=hold, TC= test certificate, MTC = manufacture test certificate, R= review, n/a = not applicable

## 12.2. Cement (Ordinary Portland Cement)

| *No.* | *Inspection and Testing Description* | *Testing method* | *Acceptance criteria* | *Frequency of Test* | *Test to be conducted by* | *Responsibilities* | |
|---|---|---|---|---|---|---|---|
| | | | | | | *Contractor* | *Engineer* |
| 1 | cement | BS 196-1 | BS 12 | Every lot | Manufacturer / approved lab | R/E | R |

E=execution, w= witness, H=hold, TC= test certificate, MTC = manufacture test certificate, R= review, n/a = not applicable

## 12.3. Coarse Aggregates (cement concrete)

| No. | Inspection and Testing Description | Testing method | Acceptance criteria | Frequency of Test | Test to be conducted by | Responsibilities | |
|---|---|---|---|---|---|---|---|
| | | | | | | Contractor | Engineer |
| 1 | Grading | BS-812 | Sts. Table 4.1 | One sample per 1500 m3 | Approved lab | E | W |
| 2 | AIV | BS 812 | <45% | One sample per 3000m3 | Approved lab | E | W |
| 3 | FI | BS 812- | <35% | One sample per 1500m3 | Approved lab | E | W |
| 4 | TFV | BS 812 part | >50KN for other concretes | One sample per 3000m3 | Approved lab | E | W |
| 5 | % passing 0.075mm | BS 812 | <4% | One sample per 3000m3 | Approved lab | E | W |

E=execution, w= witness, H=hold, TC= test certificate, MTC = manufacture test certificate, R= review, n/a = not applicable

## 12.4. Fine Aggregates (cement concrete)

| *No.* | *Inspection and Testing Description* | *Testing method/Design guide lines* | *Acceptance criteria* | *Frequency of Test* | *Test to be conducted by* | *Responsibilities* | |
|---|---|---|---|---|---|---|---|
| | | | | | | *Contractor* | *Engineer* |
| 1 | Cement content | BS 1881 | Spec – different for different structures | As per the mix design | Approved lab/manufacturers certificate | E | W |
| 2 | W/C ratio | | | | | E | W |
| 3 | Slump test | | | | | E | W |
| 4 | Compressive strength | | 7 & 28 days strength/different for different structures | | | E | W |

E=execution, w= witness, H=hold, TC= test certificate, MTC = manufacture test certificate, R= review, n/a = not applicable

## 12.5. Cement concrete

| *No.* | *Inspection and Testing Description* | *Testing method/Design guide lines* | *Acceptance criteria* | *Frequency of Test* | *Test to be conducted by* | *Responsibilities* | |
|---|---|---|---|---|---|---|---|
| | | | | | | *Contractor* | *Engineer* |
| 1 | Cement content | BS 1881 | Spec – different for different structures | As per the mix design | Approved lab/manufacturers certificate | E | W |
| 2 | W/C ratio | | | | | E | W |
| 3 | Slump test | | | | | E | W |
| 4 | Compressive strength | | 7 & 28 days strength/different for different structures | | | E | W |

E=execution, w= witness, H=hold, TC= test certificate, MTC = manufacture test certificate, R= review, n/a = not applicable

## 12.6. Reinforcement

| *No.* | *Inspection and Testing Description* | *Testing method* | *Acceptance criteria* | *Frequency of Test* | *Test to be conducted by* | *Responsibilities* | |
|---|---|---|---|---|---|---|---|
| | | | | | | *Ccontractor* | *Engineer* |
| 1 | Chemical properties | BS | BS4449 | One sample/50T for 16mm or below and one sample/100T for above 16mm | Approved lab/MTC | R | R |
| 2 | Physical properties | | | | | | |

E=execution, w= witness, H=hold, TC= test certificate, MTC = manufacture test certificate, R= review, n/a = not applicable

## 12.7. Brick

| No. | Inspection and Testing Description | Testing method | Acceptance criteria | Frequency of Test | Test to be conducted by | Responsibilities | |
|---|---|---|---|---|---|---|---|
| | | | | | | Contractor | Engineer |
| 1 | Average compressive strength | B.S. 6073 | Grade 1:- 4.8 N/mm2 (700 p.s.i.) Grade 2:- 2.8 N/mm2 (410 p.s.i.) | One sample per lot | Approved lab | E | W |
| 2 | Dimension | Measurement | 220 mm x 105 mm x 65 mm (8.7" x 4.1" x 2.6"). | One sample per lot | Field staff | E | W |
| 3 | Maximum water absorption | B.S. 6073 | 28 % | One sample per lot | Approved lab | E | W |
| 4 | Efflorescence | B.S. 6073 | Moderate | One sample per lot | Approved lab | E | W |

E=execution, w= witness, H=hold, TC= test certificate, MTC = manufacture test certificate, R= review, n/a = not applicable

## 12.8. Blocks

| No. | Inspection and Testing Description | Testing method | Acceptance criteria | Frequency of Test | Test to be conducted by | Responsibilities | |
|---|---|---|---|---|---|---|---|
| | | | | | | contractor | Engineer |
| 1 | Average compressive strength | BS 6073 | Average of 10 blocks shall be not less than 2.8 N/mm2 | One sample per lot | Approved lab | E | W |
| 2 | Dimension | Measurement | The maximum size of bricks shall be 337.5 mm x 225 mm x 112.5 mm. The size of bricks shall generally conform to the work sizes in B.S. 6073 Part 2 | One sample per lot | Field staff | E | W |

E=execution, w= witness, H=hold, TC= test certificate, MTC = manufacture test certificate, R= review, n/a = not applicable

## 12.9. Site preparation, Excavation and backfilling

9. Inspection and Test Plan: Site preparation, Excavation and back filling

| Item | Task | Requirement | Reference/ Source Document | Quality Control Acceptance Criteria | Hold Point | Responsibility | Frequency of Test/ Inspection | Type of Control/ Record Procedure |
|---|---|---|---|---|---|---|---|---|
| 1 | Site handover | Hand over/Possession of sites to the contractor | Condition of contract Su-clause 2.1 | Technical spec | yes | QA/Field engineer | During site handover | Minutes of meeting and handover letter |
| 2 | Setting out | Setting out orientation and plan of the buildings | Approved drawings | Check against approved drawings | yes | QA/Field Engineer | During each setting out of each unit | RFA |
| 3 | Site clearing | site plan or bill of quantities shall be cleared of all obstructions, roots and growth, vegetation of every description, trees and saplings | Tech. spec – clause 2.1 | Unless otherwise specified, 150 mm top soil shall be removed from that part of the site to be occupied by the proposed buildings and for a distance of 3 meters around it and the area leveled. The top soil shall be preserved in stock piles if so directed by the officer -in charge. | yes | QA/field engineer | During each clearing and grubbing | RFA |
| 4 | Check levels | Before any excavation is commenced, the levels of the surface after removal of top soil shall be agreed by the field engineer and the Contractor | Tech spec – clause 2.2.1.2 | All levels are shall be recorded on a drawing showing levels at redetermined intervals, and shall be signed by the contractor and the field engineer | yes | Field engineer | During checking levels | Recorded on the drawing and signed by both parties |
| 5 | Excavation | Excavation shall be taken to the natural firm ground and to the depths as indicated in the drawings. | Tech spec clause 2.2.9. | Excavations are to be inspected by the field engineer and the work approved before any further work or concrete or backfill is laid on them. | yes | Field Engineer | During each excavation | RFI |
| 6 | Disposal of surplus and unsuitable materials | All surplus material shall be carried away from the site and dumped at dumping sites selected by the field engineer | Tech. spec. 2.2.10 | All softer material shall be laid along the centre of heaps, the harder and more weather resisting materials forming the casing on the sides and top at a designated location | yes | Field engineer | During each Disposal | RFI |
| 7 | Backfilling and Compaction | Back filling shall be done after foundations, have been inspected and approved by the field engineer. | Tech spec. 2.3 | Material for backfilling shall generally be obtained from the spoil of excavations. As soon as the work in foundations has been accepted and measured, the spaces around the foundation structures in pits and trenches shall be cleared. It shall then be filled with earth in layers not exceeding 200 mm in thickness, each layer being watered, rammed and properly consolidated before the succeeding one is laid. The final surface shall be trimmed and leveled to proper profile. | yes | Field engineer | During each back filling | |

## 12.10. Concrete works

| Item | Task | Requirement | Reference | Quality Control Acceptance Criteria | Hold Point | Responsibility | Frequency of Test/ Inspection | Type |
|---|---|---|---|---|---|---|---|---|
| 1 | Concrete ingredients | All ingredients must be approved before concreting | Tech Spec 4.1 | Concrete shall satisfy specified proportion of the Constituents and specified maximum size of aggregates | yes | QAE/Filed engineer | Prestart concrete work | RFA |
| 2 | Mix proportions | Mix design or prescribed mix | Tech spec 4.3.1 | Approved mix design or prescribed design for different classes of concrete | yes | QAE/field engineer | Prestart concrete work | RFI |
| 3 | Mixing concrete | The mixing shall be done by a mechanical mixer | Tech spec 4.3.2 | The required quantity of materials shall be loaded in the drum and shall not exceed the rated capacity of the mixer. | yes | Field engineer | Each pour | RFI |
| 4 | Checking consistency | The concrete shall be of such consistency as will suit the method of placement and compaction | Tech spec 4.3.3 | Slump for different classes of concrete shall be as per table 4.5 of the tech spec. | No | Field engineer | Each mix | RFT |
| 5 | Compressive strength test | Not more than 5% of the specimens tested shall have a compressive strength less than specified. | Tech spec 5.4.9 | Meets requirements of technical spec. and drawings | No | QAE/Field engineer | one sample per 20 cubic meters, 20 batches or 1/4 of the total quantity of concrete under consideration for testing whichever is the lesser volume, but not at a rate less than 1 sample per Day per grade. | RFT |
| 6 | Laying | The entire concrete used in the work shall be laid gently (not thrown) in layers not exceeding 150 mm. | Tech spec 4.3.4 | Sufficient notice of not less than 24 hours shall be given to the field engineer prior to commencing concreting so as to enable inspection of forms, reinforcement etc. The position of all construction joints and programme of concreting shall be decided in advance. Necessary stop-boards shall be provided. | No | Field engineer | Each pour | RFI |
| 7 | Curing and Protection | Work shall be protected from rain by suitable covering. After the concrete has begun to harden i.e. about 1 to 2 hours after its laying, it shall be protected against quick drying. After 24 hours of laying of concrete, the surface shall be cured by flooding with water and by covering with wet absorbent materials. | Tech spec 4.3.5 | The curing Shall be done for a minimum period of 7 days. | No | Field engineer | Each item | RFI |

## 12.11. Brick/Block works

| Item | Task | Requirement | Reference/ Source Document | Quality Control Acceptance Criteria | Hold Point | Responsibility | Frequency of Test/ Inspection | Type of Control/ Record Procedure |
|---|---|---|---|---|---|---|---|---|
| 1 | Materials | All brick/block materials shall be approved | Tech spec 6.1 | Inspection and test plan for bricks/blocks | yes | Field engineer | One sample per lot | RFA |
| 2 | Mortar | Mortar shall satisfy quality criteria | Tech spec 6.2 | Table 6.3 of the tech spec | yes | Field engineer | Each application | RFI |
| 3 | Handling of Bricks/blocks and Preparation | Bricks/blocks shall not be handled in baskets, thrown from a height or in other manner that would destroy the sharpness of the edges | Tech spec 6.2.2 | In no case shall bricks of different dimensions be used in the same-work except when specially permitted by the field engineer | Yes | Field engineer | Each layer | RFI |
| 4 | Laying and Jointing | Bricks/blocks shall be laid in English bond unless otherwise specified. Half or cut bricks/blocks shall not be used except where necessary to complete the bond; Closers in such cases shall be cut to the required size and used near the ends of walls. In all load bearing walls the bricks shall be laid with frogs upwards and the frogs shall be filled with mortar. | Tech spec 6.2.3 | A layer of mortar shall be spread on full width over a suitable length of the lower course. Each brick shall be properly bedded and set home (in position) by gentle tapping with the handle of a trowel or wooden mallet inside faces of the set bricks shall be buttered with mortar and the next brick to be laid shall be pressed against it. All bricks in every course shall be grouted full with mortar using the trowel for chasing in for this purpose. The thickness of mortar joint shall not exceed 10 mm. | Yes | Field engineer | Each layer | FRI |
| 5 | Raising of Walls | The walls shall be carried up uniformly in all cases where the nature of the work admits it. No part shall be left more than one meter below the rest of the work. The work shall not be built higher than 1.5 m in one day. The courses shall be kept perfectly horizontal and every fourth course shall be checked for level and plumb | Tech spec 6.2.4 | All Perpends, Quoins etc. shall be kept strictly true and square and the whole properly bonded together and brought to final levels at each floor. | Yes | Field engineer | Each layer | RFI and check list |
| 6 | Curing and Protection | Brick/block work shall be protected from rain by suitable covering when the mortar is green. | Tech spec 6.2.5 | The wall shall be kept constantly moist on all faces for minimum period of seven days. | No | Field engineer | Each layer | RFI and check list |

## 12.12. Roofing

| Item | Task | Requirement | Reference/ Source Document | Quality Control Acceptance Criteria | Hold Point | Responsibility | Frequency of Test/ Inspection | Type of Control/ Record Procedure |
|---|---|---|---|---|---|---|---|---|
| 1 | Preparatory works | Right levels & dimensions/ clean/ safe | Drawings | Shall pass inspection and measurement as per the drawings | Yes | Field engineer | Before start installation | RFI and check list |
| 2 | Materials inspection | Contractor should submit all specifications of roof materials | Tech spec. 15 | Meets technical specification | Yes | Field engineer | Each delivery | RFA |
| 3 | Slope Roof, Laps, Purlin Spacing | shall be jointly inspected and approval granted | Tech spec 15.3.2 and drawings | Roofs shall be **as per the drawing** or shall not be pitched at a slope flatter than 100 | Yes | Field engineer | During installation | FRI and check list |
| 4 | Laying | Shall be jointly inspected and approval granted | Tech spec 15.3.2.3 and drawings | Shall be as per the drawings or roof framing shall be true to lines and levels | yes | Field engineer | During installation | RFI and check list |
| 5 | Cutting and drilling | All cuttings and drillings shall be true to the requirement | Tech spec 15.3.2.3 | The holes for the fixing bolts shall be through the crown of the corrugation. They shall be 1.5 mm larger in diameter than the bolts or fixing screws used. Holes for fixing the sheets shall be in the exact positions required to suit the purlins. | Yes | Field engineer | During installation | RFI and check list |
| 6 | Fixing | Trial section required for the approval | Tech spec 15.3.2.4 | The sheets shall be fixed commencing from the leeward end so that the side laps will have the better protection from rain driven by the prevailing wind. The eaves course shall be laid first with the top edges extending at least 39 mm beyond the back of steel angle purlins or 75 mm beyond the centre line of timber purlins. | Yes | Field engineer | During fixing | RFI and check list |
| 7 | Fixing of Ridges and Hips | Ridges and hips shall be as per the drawing and spec | Tech spec 15.3.2.5 | The ridges and hips of plain galvanized steel sheets shall lap at least 200 mm on each side over the corrugated galvanized steel sheets. The end laps of the ridges and hips, as well as between ridges and hips shall also be not less than 200 mm. | Yes | Field engineer | During installation | RFI |
| 8 | Finish | All works shall be true to lines and slopes | Tech spec 15.3.2.6 | the fastenings shall be checked and adjusted as necessary to ensure that they are watertight and the sheeting is secure but not buckled or distorted. The roof, when completed shall be true to lines and slopes and shall be leak proof. | Yes | Field engineer | final inspection | RFI and check list |

## 12.13. Plastering

| Item | Task | Requirement | Reference/ Source Document | Quality Control Acceptance Criteria | Hold Point | Responsibility | Frequency of Test/ Inspection | Type of Control/ Record Procedure |
|---|---|---|---|---|---|---|---|---|
| 1 | Materials | Contractor shall submit all details of plastering materials | Tech spec 16 | Meets technical specification | yes | QAE/field engineer | Each delivery | RFA and check list |
| 2 | Surface Preparation | The walls shall be brushed clean of all dust thoroughly wetted and surface dried before plaster is applied. | Tech spec 16.1 | Meets technical specification | yes | Field engineer | Pre-plastering | RFI |
| 3 | Application | Shall commence after completion of ceiling plastering if any. The plastering shall be started from the top and worked down towards the floor. All put log holes (i.e. holes left for scaffolding) shall be properly filled in advance of the plastering. | Tech spec 16.1 | Meets technical specification | yes | Field engineer | Each work area | RFI |
| 4 | Finishing and curing | shall be a true and plumb surface and to the degree of smoothness required | Tech spec 16.1 | Surface shall be tested frequently as the work proceeds with a true straight edge not less than 2.5 m long and with plumb bobs. The gap between the straight edge and any point on the plastered surface shall not exceed 3 mm. All horizontal lines and surface shall be tested with a level and all jambs and corners with a plumb bob as the work proceeds. | yes | Field engineer | Each work area | RFI |

## 12.14. Painting

| Item | Task | Requirement | Reference/ Source Document | Quality Control Acceptance Criteria | Hold Point | Responsibility | Frequency of Test/ Inspection | Type of Control/ Record Procedure |
|---|---|---|---|---|---|---|---|---|
| 1 | Materials | Contractor shall submit all details of painting materials | Tech spec 18 | Meets technical specification | yes | QAE/field engineer | Each delivery | RFA and check list |
| 2 | Preparation of surfaces | New surfaces shall be thoroughly cleaned of mortar or other splashes. Any damage to the plaster shall be made good to match the adjacent surfaces and the surface brushed clean of dust and dirt. | Tech spec 18 | Meets technical specification | yes | Field engineer | Pre application | RFI |
| 3 | Application | Each coat shall be laid on with a brush and allowed to dry before the next coat is applied. One coat comprises a stroke of the brush given from the top downwards, another from the bottom upwards over the first stroke and similarly one stroke from the right and another from the left over the first brush before it dries. The number of coats to be applied shall be as specified. At the end of the work, the whole surface shall present a uniform appearance and color shall be of even tint without exhibiting any patches, streaks or hair cracks. | Tech spec 18 | Meets technical specification | yes | Field engineer | Each application | RFI |

## 12.15. Transformer and Panel

| Item | Task | Requirement | Reference/ Source Document | Quality Control Acceptance Criteria | Hold Point | Responsibility | Frequency of Test/ Inspection | Type of Control/ Record Procedure |
|---|---|---|---|---|---|---|---|---|
| 1 | Materials Inpection | As per the design requirement Contractor shall submit technical data and detail specification for Transformer, Switchger Panel, etc and approved document | Tech spec / Government Approval / Manufacturer instruction | Meets technical specification; drawings; relevant applicable industrial codes and standards, | yes | M&E Engineer/ Field Engineer | Pre Application | MAR and check list |
| 2 | Pre Installation Inspectionn | Contractor need to request for Factory Acceptance Test | MAR / Tech spec / Manufacturer Routine Test | Meets technical specification and Routine Test Result | yes | M&E Engineer/ Field Engineer | Pre application | RFI/Checklist |
| | | Visual Inspection; Contractor need to request for Site Acceptance Test for switchger panel and accessories as per manufacturer recommendation and need to submit calibration certificate for testing equipments | MAR/ Tech spec / Approved Drawng / Manufacturer Routine Test | Meets Manufacturer Recommendation and Local Rules and Regulations | yes | M&E Engineer/ Field Engineer | Pre application | RFI/Checklist |
| 3 | Installation Inspection | Visual Inspection; All related items are installed as per drawings and manufacturer recommendation. | MAR/ Tech spec/ Approved Drawing/MOS | Meets technical specification and Local Installation Standard | yes | Field Engineer | Each application | RFI/Checklist |
| 4. | Testing and Commissioning | All Testing results need to be acceptable for energizing; All equipments' calibration certificate should be provided. | MOS/As built Drawing/ MOM | Meets technical specification and Local Installation Standard | yes | Field Engineer | After Installation | RFI/Checklist |

## 12.16. Wire Way

| Item | Task | Requirement | Reference/ Source Document | Quality Control Acceptance Criteria | Hold Point | Responsibility | Frequency of Test/ Inspection | Type of Control/ Record Procedure |
|---|---|---|---|---|---|---|---|---|
| 1 | Materials Inpection | Contractor shall submit technical data and detail specification for trays,ladders, trunkings, metallic and non metallic conduits | Tech spec 20.2.1 to 20.2.4 | Meets technical specification; drawings; relevant applicable industrial codes and standards | yes | M&E Engineer/ Field Engineer | Every Delivery | MAR |
| 2 | Pre Installation Inspectionn | Contractor shall submit the detail installation drawing and routing for wire way installation. | MAR/ Tech spec/ RFA | Meets technical specification and Routine Test Result | yes | M&E Engineer/ Field Engineer | Pre application | RFI/Checklist |
| 3 | Installation Inspection | Contractor shall install the wire ways with proper supports as per approved MOS and Local Installation Standard. | RFA/ Tech Spec: 20.2.5 to 20.2.8 | Meets As built Drawings and MOS | yes | Field engineer | Each application | RFI/Checklist |

## 12.17. Cables & Wire

| Item | Task | Requirement | Reference/ Source Document | Quality Control Acceptance Criteria | Hold Point | Responsibility | Frequency of Test/ Inspection | Type of Control/ Record Procedure |
|---|---|---|---|---|---|---|---|---|
| 1 | Materials Inpection | Contractor shall submit technical data and detail specification for all wires and cables. | Tech spec 20.2.9 | Meets technical specification; drawings; relevant applicable industrial codes and standards | yes | M&E Engineer/ Field Engineer | Every Delivery | MAR |
| 2 | Installation Inspection | -Contractor shall submit the RFI with completed attachments( as built single line diagram/load schedule ) . | RFA/ Tech Spec: Chapter 26, Article 6 | Meets As built Drawings and MOS | yes | Field engineer | Each application | RFI/Checklist |
| 3. | Testing | Contractor shall request for continuity and insulation test(Megger Test) for wire and cables with approved drawings and calibrated equipments. | MOS/As built Drawing/Tech Spec: 20.3 | Meets technical specification and Local Installation Standard | yes | Field Engineer | After Installation | RFI/Checklist |

## 12.18. Distribution Boards and Accessories

| Item | Task | Requirement | Reference/ Source Document | Quality Control Acceptance Criteria | Hold Point | Responsibility | Frequency of Test/ Inspection | Type of Control/ Record Procedure |
|---|---|---|---|---|---|---|---|---|
| 1 | Materials Inpection | Contractor shall submit technical data and detail specification for distribution board and accessories. | Tech spec 20.2.13 ,20.2.14 & 20.2.15 Manufacturer instruction/ Local Rules and Regulations | Meets technical specification; drawings; relevant applicable industrial codes and standards, | yes | M&E Engineer/ Field Engineer | Pre Application | MAR |
| 2 | Pre Installation Inspectionn | Contractor need to request for Factory Acceptance Test | MAR/ Tech spec/ Manufacturer Routine Test | Meets technical specification and Routine Test Result | yes | M&E Engineer/ Field Engineer | Pre application | RFI/Check list |
| | | _Visual Inspection<br>Contractor need to request for Site Acceptance Test for distributon board and accessories as per manufacturer recommendation and need to submit calibration certificate for testing equipments | MAR/ Tech spec/ Approved Drawing/Manufacturer Routine Test | Meets Manufacturer Recommendation/Local Rules and Regulations | yes | M&E Engineer/ Field Engineer | Pre application | RFI/Checklist |
| 3 | Installation Inspection | -Visual Inspection<br>- Contractor shall submit manufacturer test certificate for breakers, realys, distribution boards and other accessories. | MAR/ Tech spec/ Approved Drawing/MOS/Panel builder drawings | Meets technical specification , approved panel builder drawings and Local Rules & Regulations | yes | Field Engineer | Before Energizing | RFI/Checklist |
| 4. | Testing and Commissioning | -All equipments' calibration certificate should be provided. | MOS/As built Drawing/Tech Spec 20.3 | Meets technical specification and Local Installation Standard | yes | Field Engineer | After Installation | RFI/Checklist |

## 12.19. Wall and Ceiling Fitting

| | Task | Requirement | Reference/ Source Document | Quality Control Acceptance Criteria | Hold Point | Responsibility | Frequency of Test/ Inspection | Type of Control/ Record Procedure |
|---|---|---|---|---|---|---|---|---|
| 1 | Materials Inpection | Contractor shall submit technical data and detail specification for all wall and ceiling mounted ceiling (e.g switches & socket outlets, lighting fixtures etc) | Tech spec 20.2.10/20.2.11/Local standard code | Meets technical specification; drawings; relevant applicable industrial codes and standards | yes | M&E Engineer/ Field Engineer | Every Delivery | MAR |
| 2 | Installation Inspection | Contractor shall install wall and ceiling fittings as per MEP and Archi Drawings. | RFA/ Tech Spec: 20.2.10 & 20.2.11 | Meets technical specification/Local Rules and Regulations/ As built Drawings and MOS | yes | Field engineer | Each application | RFI/Checklist |
| 3 | Testing & Commissioning | Contractor shall request for Lux Level inspection that should meets the designer's requirements and local rules and regulations. | MOS/As built Drawing/Tech Spec: 20.3 | Meets technical specification, manufactrurer's specification and Local Installation Standard | yes | Field Engineer | After Installation | RFI/Checklist |

## Annexes

| | |
|---|---|
| QM01 | Contract Kickoff Meeting.docx |
| QM01A | Site Establishment Record.docx |
| QM02 | Monthly Site Progress Meeting.docx |
| QM03 | Site Instruction.docx |
| QM04 | Issue of Clarification/Information (IOI).docx |
| QM05 | Confirmation of Verbal Instruction.docx |
| QM06 | Request and Approval for work (RFW) / materials (RFM).docx |
| QM07A | Request for Inspection and Testing Results report.docx |
| QM07B | Inspection of Materials on Site.docx |
| QM08 | Request permit to work / Permission to proceed.docx |
| QM09 | Inspection and testing plan.docx |
| QM10 | Daily log book.docx |
| QM11 | Weekly / Monthly progress report summary.docx |
| QM12 | Variation order request.docx<br>IOM FPU SF 19.30 Template.xls |
| QM13 | Resource record summary for day work.docx |
| QM14 | Drawing report submission register.docx |
| QM15 | Measurement and testing equipment status report / register.docx |
| QM16 | Submittal review and approval.docx |
| QM17 | Interim payment certificate.docx |
| QM18 | Non-conformance report.docx |
| QM19 | Non-conformance register.docx |
| QM20 | Construction punch list.docx |