PROJECT QUALITY PLAN

PROJECT: WATER TRANSMISSION LINES FROM HAMRIYAH & ZUBAIR PUMPING STATIONS

CLIENT

هيئة كهرباء ومياه وغاز الشارقة
Sharjah Electricity, Water and Gas Authority

M/S. SHARJAH ELECTRICITY, WATER & GAS AUTHORITY (SEWA)

CONSULTANT

Stantec

M/s. STANTEC

CONTRACTOR

DARWISH ENGINEERING EMIRATES
GENERAL CONTRACTORS

M/s. DARWISH ENGINEERING EMIRATES

QUALITY PLAN APPROVAL

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01. SCOPE OF PROJECT QUALITY PLAN

CONTROL OF PROJECT QUALITY PLAN

- The QA/QC Auditor with consultation of the Project Manager shall prepare The project quality plan.
- The original copy from the plan shall be the colored copy.
- The distributed copies of the plan shall be stamped by controlled copy stamp.
- If it is contractually required the copy of the owner, owner representative and Client shall be controlled copy.
- In case of any modification or changes the same procedure of preparation and approval will prevail, the revision number shall be increased by one and the changes made shall be recorded in the quality plan revision records. The pages, which are updated, shall be suitably identified as cancelled copies to prevent unintended use.
- The parts, which are updated or changed, shall be highlighted.

Reference:

Control Document Procedure

PROJECT DESCRIPTION

Client	:	M/s. Sharjah Electricity, Water & Gas Authority
Consultant	:	M/s. Stantec
Contractor	:	M/s. Darwish Engineering Emirates
Original Construction Period	:	540 Days
Contract Start Date	:	19-July-2025
Contract Completion Date	:	18-Jan-2027
Original Contract Value	:	AED 645,000,000.00 (without VAT)
Clients' Representative	:	Mr. Faisal Al Sarkal
Consultant's Representative	:	Mr. Mohammed Yasser Adi
Contractor's Representative	:	Mr. Ahmed Juaidi (Project Manager)
Telephone Numbers	:	Site Office 06-5793734
In case of Emergency	:	Police Telephone No. 999 Civil Defense Telephone 997
Email Address	:	ahmedjuaidi@darwishengineering.com dc2.site@darwisheng.ae

General Scope of Works:

OVERVIEW OF SCOPE OF WORK

The scope of work is based on the fact that the project shall be completed in all respects with its specified material and workmanship. The limits of scope of work for this contract as given below are for the tender submission only and shall not be limited to these but shall include all services and every component required for the completeness of the project and safe and reliable operation of the proposed network. The limits are shown on related tender drawings in Volume 4.

The Sharjah Electricity, Water and Gas Authority (SEWA) Tender Number 2000000392, "WATER TRANSMISSION LINES FROM HAMRIYAH & ZUBAIR PUMPING STATIONS" (Project Number: WC.100199.04.01), covers Line 1 from Hamriyah IWP RO Plant until Al Zubair Tanks & Pumping Station and Line 2 Part 1 from Al Zubair Tanks & Pumping Station until connection to Line 2 Part 2 near Houma, Sharjah. The scope of this transmission pipelines projects broadly include the following:

- Design verification, supply, installation, testing and commissioning of approximately1.3 kms. of twin DN 1600 DI PN25 transmission pipeline near Hamriyah IWP RO plant boundary (from connection point of the Hamriyah's IWP RO Plant's final water transmission pumping station until battery limit of the Hamriyah Free Zone (HFZ)boundary). The scope also includes relevant chambers and associated civil and MEICA works as described in the tender documents. This pipeline will continue outside the battery limit of the Hamriyah Free Zone Area as described further below.

- Design verification, supply, installation, testing and commissioning of approximately 24 kms of twin DN 1600 DI PN25/PN16 transmission pipeline from Hamriyah Free Zone boundary till the battery limit of Al Zubair Tanks & Pumping Station's connection point (SEWA Project No: WC.100199.01). The transmission pipeline is divided into 2 segments based on the pressure ratings, approximately 16.25 kms of the pipeline is of 25 bar pressure rating (PN25) & approximately 7.75 kms of the transmission pipeline is of 16 bar pressure rating (PN16). The scope also includes relevant chambers and associated civil and MEICA works as described in the tender documents.

- Design verification, supply, installation, testing and commissioning of approximately 22 kms. of DN 1600 GRE PN16 transmission pipeline from battery limit of Al Zubair Tanks & Pumping Station's connection point (SEWA Project No: WC.100199.01) till connection to Line 2 Part 2 (SEWA Project No: WC.100199.04.02) near Houma, Sharjah. The scope also includes relevant chambers and associated civil and MEICA works as described in the tender documents.

The contractor is responsible to obtain all relevant construction NOC approvals from the associated stakeholders/Authorities. The tenderers are advised to visit the site and get themselves acquainted with the extent of work involved and to assess the existing terrain/nature of ground levels of the site and interconnecting pipeline routes. In addition, through this scope of work and other documents by SEWA/Engineer, which is made integral

part of this tender, Contractor will be able to visualize and calculate the quantum of works involved and all required material, etc. Contractor shall refer to tender drawings, layouts, topographic survey included in Volume 4 and 5 respectively All types of services such as, water and electricity, equipment, site offices, dewatering arrangements, storage areas, temporary access roads, temporary works and other obligations of the contractor required for the execution of this work, as mentioned in the contract conditions, drawings, and specifications, shall be considered, and included. All the works which may be incidental, contingent, or necessary for the proper completion and operation of the works in line with good engineering practices, but which are not specifically described herein shall also be considered as included.

Dimensions and the design are provided in the tender drawings. Construction and commissioning of pipelines, chambers, MEICA equipment, site facilities, supply and fixing/erection/laying of all pipes, fittings, valves, testing and commissioning of the same, as specified, is part of this contract. Contractor shall comply to all relevant SEWA guidelines and specifications for laying proposed pipelines at a suitable depth, with respect to the existing road level / proposed future road level, existing ground level, etc. in order to suit the site conditions, including providing sufficient cover to the pipeline. The successful contractor shall verify the proposed route using the topographic survey conducted by the engineer and attached to these tender documents and provide detailed shop drawings for the profile in A3 size of 500 m lengths, each drawing sheet separately in colour. Contractor shall prepare and submit complete coordinated shop drawings (across all disciplines) for review and approval by SEWA/Engineer. Contractor shall also be responsible for liaising with associated stakeholders and other related contractors for interconnection of the pipelines thru SEWA/Engineer.

The Contractor’s scope in general, comprises of alignment/Setout survey (for pipeline), geotechnical investigations (for chamber locations and NDRCs), preparing shop drawings, getting construction NOCs, liaising with the stakeholders/ other contractors for pipeline interconnection, getting final grade level/height reference from municipalities, bulk earthworks including excavation in any type of soil/rock for grading, transport and disposal of surplus excavation to landfill sites designated by relevant authorities, supplying, laying of pipeline in trench including dewatering, bedding and surround to pipes, testing, washing, disinfection and commissioning of all twin DI transmission pipelines of DN1600 approx. 25.3 kms long from Hamriyah IWP RO plant till Al Zubair Tanks & Pumping station and GRE transmission pipelines of DN1600 approx. 22 kms from Al Zubair Tanks & Pumping station till connection point of Line 2 Part 2 near Houma, Sharjah. The works also include valve chambers on the pipelines as per project requirement and as required to meet the intended purpose and operational requirements of the project. RCC chambers shall be provided for Manual Butterfly Valves, Motorized Butterfly Valves, Flow Control Valves, Pressure Reducing Valves, Air Valves, Washout Valves, Flow Meters, etc.

The work includes the installation of DI and GRE pipe and fittings including restrained joints pipelines wherever required as per design and BOQ, with construction of RCC valve chambers, installing along with associated civil works, protection / diversion of existing services, if any, complete earthworks for trench including, cuttings, compacting subgrade, imported sand / gravel for bedding and surrounding as appropriate for pipeline, back filling.

The trench up to the proposed grading level, filling approved granular imported material, service tracks and crossings by open-cut or micro-tunnelling/NDRC methods, clearing of obstructions as required, road crossing by suitable approved methods, with all the required valves, meters, FOC in uPVC duct, electrical and ICA works etc. complete in all respects as per standards, specifications, drawings and BOQ, special methods of installation of pipelines in waterlogged / weak strata by filtration encasement and pipeline RCC support in trough for sloped embankment in exposed conditions.

The scope also includes submission of design reports, calculations, material approvals, shop drawings, and as-built drawings to be approved by SEWA, respective Municipalities, respective Ministries and SEWA GIS Department.

All the above works shall be in compliance with maintenance and guarantee requirements during the defect's liability period in accordance with the conditions of contract complete in all respects

02. QUALITY ASSURANCE POLICY & OBJECTIVES

QUALITY POLICY

Darwish Engineering Emirates being a General Contracting Company, having long experience in various fields of Construction and having executed several major Projects in U.A.E. including (Multi Storey Buildings, Roads, Bridges, Sports Complexes, Airports, Dams, Water and Sewerage Networks, etc.) have the following Quality Policy: -

To ensure compliance with Customer's/Client's requirements to achieve possible success in meeting their Contractual & Legal requirements and to enhance their satisfaction.

Continual improvement of our quality and operation management systems including achievement of our Organization's Quality Objectives.

Developing quality consciousness amongst all company's staff and working force.

Managing Director

Mr Awni Sawan

Issue Date: April 16, 2018

2.1 Quality Objectives and Scorecard: -

PROJECT OBJECTIVE	TARGET	MEASURE	OWNER	HOW TO ACHIEVE
Reduce the rejection rate of technical submittals (Prequalification of Subcontractors, Material Submittals, Method Statements, Shop Drawings)	Max 10% rejection	QA/QC Monthly Report %age Passed	PM, QA/QC, PE, DC	Get the work right first time! Check submittals prior to submission to the Client
		QA/QC Monthly Report %age Passed	PM, QA/QC, PE, DC	Liaise closely with the Client in cases of doubt to agree a draft submittal prior to submission
Percentage of Material inward and Work inspections rejected	Max 5% rejection	QA/QC Monthly Report %age Passed	PM, QA/QC, PE, DC	Get the work right first time! Use of QA/QC checklists
Timely closure of NCRs/Observations	Min 80% score to be achieved as per project score card	QA/QC Monthly Report %age Open NCR's	PM, QA/QC, PE, DC	Adequate follow-up and monitoring through NCR register
Project Scorecard to encourage ownership and leadership	Overall Project score to reflect min 80% as per project score card	QA/QC Monthly Report %age	PM	Strict compliance with Procedure, Strict Compliance with Inspection Checklist Strict Compliance with Method Statements Strict Compliance with Inspection and Test Plan
Submission of client survey / satisfaction report	Minimum 3 survey reports to be submitted	Customer Satisfaction Form	PM / QA/QC Eng.	Submit the Satisfaction form Beginning of the Project Middle of the Project Closeout of the project
To improvement client feedback	Min 80%	Questioner	QA/QC	NCR to be raised where score is below 75% to find the root cause
Improved awareness of key construction quality issues through trade training and quality tool box	Min one tool box for each activity at start	Training Matrix	PM /PE/ QA/QC	Identify the improvement required via failure reports and deliver the approved trade trainings and tool box

2.2 Project Scorecard: -

SN	Item	Highest Rate	Apply	Evaluation Cases					Obtained Rate
				A	B	C	D	E	
1	Shop Drawings Submittals (Measures percentage) Note: Zero marks for the use of non approved drawings without formal notification to the client i.e. letter sent	8	Criteria	8 Marks (for 95-100 % approvals or approvals with comments)	6 Marks (for 90-94% approvals or approvals with comments)	4 Marks (for 85-89% approvals or approvals with comments)	2 Marks (for 80-84% approvals or approvals with comments)	1 Marks (for less than 80 % approvals or approvals with comments)	
2	Material Submittals (Measures percentage)	7	Criteria	7 Marks (for 95-100 % approvals or approvals with comments)	5 Marks (for 90-94% approvals or approvals with comments)	3 Marks (for 85-89% approvals or approvals with comments)	2 Marks (for 80-84% approvals or approvals with comments)	1 Marks (for less than 80% approvals or approvals with comments)	
3	Inspection Request percentage of approvals (get the first time work)	10	Criteria	10 Marks (for 95 to 100 % approval)	7 Marks (90 to 94% approval)	5 Marks (for 80 to 89 % approval)	3 Marks (for 70 to 79% of approval)	2 Marks (less than 60% of approval)	
4	Internal Inspection/Use of Checklist	10	Criteria	10 Marks (for 95 to 100 % approval)	7 Marks (90 to 94% approval)	5 Marks (for 75 to 89 % approval)	3 Marks (for 60 to 74% of approval)	1 Marks (less than 60% of approval)	
5	Materials testing results measures percentage. (NDT/FDT/Physical /Soil test,BW,Steel/Chemical test/etc.)	5	Criteria	5 Marks (for 97 to 100% passed results)	4 Marks (for 90 to 96% passed results)	3 Marks (for 85 to 89% passed results)	2 Marks (for 80 to 84% passed results)	1 Marks (less than 80% passed results	
6	Materials received at site (Measures the degree to which materials received at site)	5	Criteria	5 Marks (If 100 % of received materials match approved materials)	4 Marks (If 1-5 % of received materials don't match approved materials)	3 Marks (If 6-10 % of received materials don't match approved materials)	2 Marks (If 11-15 % of received materials don't match approved materials)	0 Marks (If more than 15 % of received materials don't match approved materials)	
7	Closure of Non-Conformities/Observation /Failure Report	25	Criteria	25 Marks (If 0-2 are open) Minus 10% of marks if estimated cost of NCR's total 500 – 2500 Dhs	15 Marks (If 3-6 are open) Minus 15% of marks if estimated cost of NCR's total over 2501 – 5000dhs	10 Marks (If 7-10 are open) Minus 30% of marks if estimated cost of NCR's total over 5001-20000 dhs	5 Marks (If 10-14 are open) Minus 60% of marks if estimated cost of NCR's total over 20001- 49999 dhs	0 Marks (If 15 or more are open) Minus 100% of marks if estimated cost of NCR's total over 50,000dhs	
8	Task Sheets in Place	5	Criteria	5 Marks (for 95 to 100 % approval)	4 Marks (90 to 94% approval)	3 Marks (for 75 to 89 % approval)	2 Marks (for 60 to 74% of approval)	1 Marks (less than 60% of approval)	
9	ITPs in Place	10	Criteria	10 Marks (for 100 % approval)	7 Marks (90 to 99% approval)	5 Marks (for 75 to 89 % approval)	3 Marks (for 60 to 74% of approval)	1 Marks (less than 60% of approval)	
10	Client and internal satisfaction surveys completed	5	Criteria	5 Marks (for 80% and above)	4 Marks (72 to 79%)	3 Marks (71 to 69%)	2 Marks (68 to 51%)	1 Marks (50% and less)	
11	Details for Internal Trainings	10	Criteria	10 Marks (for 95 to 100 % completed)	7 Marks (90 to 94% completed)	5 Marks (for 80 to 89 % completed)	3 Marks (for 70 to 79% of completed)	2 Marks (less than 60% of completed)	
	Total	100						Obtained Rate	

2.3 Quality Assurance Activities

2.3.1 Site Quality Walks

Regular Site Quality Walks shall be conducted to ensure that all construction activities are in compliance with approved drawings, specifications, and quality standards. These walks will involve representatives from the QA/QC team, site engineers, HSE personnel, and other relevant stakeholders.

- **Frequency**: Bi-Weekly
- **Participants**: QA/QC Engineer, Site Engineer, Safety Officer, Consultant Representative
- **Purpose**:

- Identify and rectify quality concerns proactively
- Ensure implementation of corrective and preventive actions
- Promote continuous improvement through collaborative review

2.3.2 Routine Quality Meetings

Routine Quality Meetings shall be scheduled to review ongoing quality performance, discuss non-conformances, and ensure alignment with project quality objectives.

- **Frequency**: Bi-weekly
- **Participants**: QA/QC Manager, Project Manager, Project Engineer, Consultant's Quality Representative, Subcontractor QC (if applicable)
- **Agenda**:

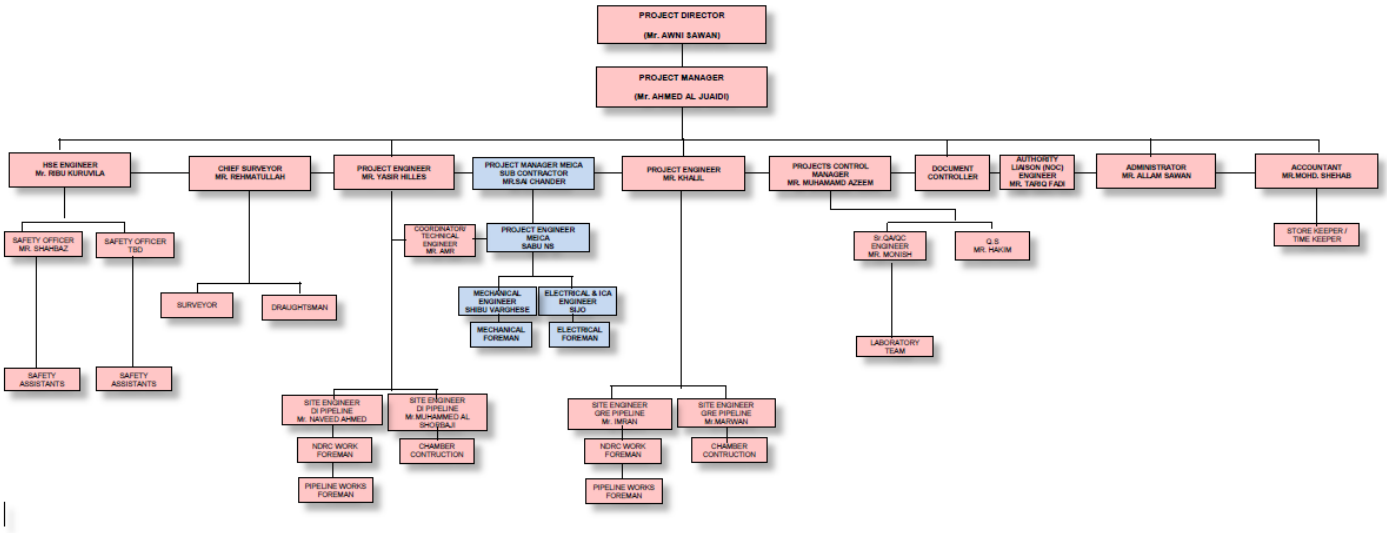
- Review of NCRs and quality observations
- Progress on QA/QC inspections and testing
- Discussion on upcoming critical quality-related activities
- Feedback and lessons learned

03. PROJECT ORGANIZATION

3.0 PROJECT ORGANIZATION CHART:

PROJECT : WATER TRANSMISSION LINE FROM HAMRIYAH & ZUBAIR PUMPING STATIONS - SHARJAH, UAE

ORGANIZATION CHART



Note: -The above organizational chart is for reference only. For detail review of above chart, refer Appendix I.

3.1 MANAGEMENT REPRESENTATIVE

The management has appointed individuals, who irrespective of other responsibilities, has defined responsibility and authority for the Quality Assurance System, which includes:

- Ensuring that processes of the quality assurance system are established and maintained in accordance with the requirements of Jazeerah Polices & Objectives, IMS, and Project Assurance System.
- Reporting to management on the performance of the quality assurance system, including needs for improvement.
- Promoting awareness of customer satisfaction throughout the organization.
- Liaison with external parties on matters related to the quality assurance system.
- Project Manager will be representative from contractor's side.

3.1.1 RESPONSIBILITIES FOR ALL KEY PERSONS

3.1.1.1 PROJECT MANAGER: -

PRIMARY RESPONSIBILITIES

- Be completely versed in the firm & client contract for the project, and of the client's objectives. Satisfy client's goals.
- Analyse the project scope, the client's RFP and firm's proposal with the Project Architect.
- Organize the work on the project and set forth the procedures to be employed in accomplishing the project.
- Be the one point-of contact for all incoming and outgoing project information.
- Ensure proper distribution of project information to all project team members and sub-Clients.
- Contract for the services of outside Clients when required.
- Administer the design budget.
- Develop and monitor the project design schedule to meet Client and firm time objectives.
- Notify the Client of changes in project scope, and prepare estimates for additional design fees.
- Keep the Client, Director of Operations and the firm Accounting Department informed on the status of the project.
- Develop and monitor the Client's construction budget and schedule. Identify long lead items and proposed form of construction contract as easily as possible.
- Attend project meetings, as necessary.
- Establish documentation and administrative organization for the project.

3.1.1.2 PROJECT ENGINEER: -

PRIMARY RESPONSIBILITIES

- Oversee and direct construction projects from conception to completion.
- Review the project in-depth to schedule deliverables and estimate costs.
- Oversee all onsite and offsite constructions to monitor compliance with Building and safety regulations
- Coordinate and direct construction workers and subcontractors
- Select tools, materials and equipment and track inventory.
- Meet contractual conditions of performance.
- Review the work progress on daily basis.
- Prepare internal and external reports pertaining to job status.
- Plan ahead to prevent problems and resolve any emerging ones.
- Negotiate terms of agreements, draft contracts and obtain permits and licenses.

- Analyse, manage and mitigate risks.
- Ensure quality construction standards and the use of proper construction techniques.

3.1.1.3 PROJECT CONTROLL & QUALITY MANAGER: -

PRIMARY RESPONSIBILITIES

- Contribute to the creation and implementation of best practice quality vision, strategy, policies, processes and procedures to aid and improve work performance.
- Implement all relevant procedures described in the Project Quality Plan (PQP) and ensure compliance.
- Issuing, distributing, removing, backup, controlling and changing of quality system manual, quality system procedure, project quality plans and technical procedures (Work instruction or method statement).
- Preparing the topics of management review meetings & maintain the review output.
- Following up the effectiveness of implementation of the corrective and/ or preventive actions.
- Analyzing for the nonconformity to prevent recurrence of such nonconformity.
- Managing & arranging the team of internal quality audit.
- Suggest to the top management for any possible improvement in the quality assurance system or the departmental activities.
- Ensuring availability of Inspection Test Plan (ITP) and Method Statements for all project works (both sources and site inspection)
- Ensure competencies of all skilled workforce and inspection personnel to ensure quality of work being performed.
- Publish Monthly Quality Report, trend in weekly KPIs and take actions to improve the trends.
- Manage Laboratory inspections with a dedicated team and ensure compliance to testing requirements.
- Develops project objectives by reviewing project proposals and plans; conferring with management.
- Determines project responsibilities by identifying project phases and elements; assigning personnel to phases and elements.
- Determines project specifications by studying product design, customer requirements, and performance standards; completing technical studies; preparing cost estimates.
- Confirms product performance by designing and conducting tests.
- Establishes project schedule by studying project plan and specifications; calculating time requirements; sequencing project elements.
- Incorporate agreed progress weightage in the schedule.
- Performs schedule risk analysis and publishes critical paths and action required to avoid slippages.

- Publish daily and weekly work plan to the project team.
- Controls project plan by reviewing design, specifications, and plan and schedule and cost variances and then recommending actions.
- Prepares project status reports by collecting, analysing, and summarizing information and trends; recommending actions.
- Maintains project data base by writing computer programs; entering and backing up data.
- Contributes to team effort by accomplishing related results as needed.

3.1.1.4 QA/QC ENGINEER: -

PRIMARY RESPONSIBILITIES

- The preparation of the project QA/QC documents with help of QC Manager.
- Control and the distribution of project quality documentation
- Monitor all quality related activities on the project
- Verify subcontractor quality requirements are matching with the project quality plan.
- Attend client quality management meetings
- Control of project quality assurance management documentation.
- Review quality inspection personnel qualifications and training requirements
- Monitor the disposition of all issued non-conformance reports.
- Monitor the progress and effectiveness of the project quality assurance system. Recommend and implement improvements when required.
- Coordinate all QA/QC activities with QC manager
- Coordinate all quality related correspondence with the client's representatives.
- Monitor statistical method reporting.
- QA/QC with his/her team will do the inspections of work done on the site prior to the submission to Client.
- Action and close all client's complaints
- Controls all achieve documentation upon the completion of the project.

3.1.1.5 SITE ENGINEER: -

PRIMARY RESPONSIBILITIES

- Acting as the main technical adviser on a construction site for subcontractors, crafts people and operatives.
- Setting out, levelling and surveying the site.
- Checking plans, drawings and quantities for accuracy of calculations.
- Ensuring that all materials used and work performed are as per specifications.
- Overseeing the selection and requisition of materials and plant.

- Agreeing a price for materials and making cost-effective solutions and proposals for the intended project.
- Managing, monitoring and interpreting the contract design documents supplied by the client or architect.
- Liaising with any Clients, subcontractors, supervisors, planners, quantity surveyors and the general workforce involved in the project.
- Liaising with the local authority (where appropriate to the project) to ensure compliance with local construction regulations and by-laws.
- Communicating with clients and their representatives (architects, engineers and surveyors), including attending regular meetings to keep them informed of progress.
- Day-to-day management of the site, including supervising and monitoring the site labour force and the work of any subcontractors.
- Planning the work and efficiently organizing the plant and site facilities in order to meet agreed deadlines.
- Overseeing quality control and health and safety matters on site.
- Preparing reports as required.
- Resolving any unexpected technical difficulties and other problems that may arise.

3.1.1.6 SAFETY OFFICER: -

PRIMARY RESPONSIBILITIES

- Develop and execute health and safety plans in the workplace according to legal guidelines.
- Prepare and enforce policies to establish a culture of health and safety.
- Evaluate practices, procedures and facilities to assess risk and adherence to the law.
- Conduct training and presentations for health and safety matters and accident prevention
- Monitor compliance to policies and laws by inspecting employees and operations
- Inspect equipment and machinery to observe possible unsafe conditions
- Investigate accidents or incidents to discover causes and handle worker's compensation claims
- Recommend solutions to issues, improvement opportunities or new prevention measures
- Report on health and safety awareness, issues and statistics

3.1.1.7 QUANTITY SURVEYOR: -

PRIMARY RESPONSIBILITIES

- Undertake cost analysis for repair and maintenance project work.
- Assist in establishing a client's requirements and undertake feasibility studies.
- Perform risk, value management and cost control.

- Advise on a procurement strategy.
- Identify, analyse and develop responses to commercial risks.
- Allocate work to subcontractors.
- Provide advice on contractual claims.
- Analyse outcomes and write detailed progress reports.
- Value completed work and arrange payments.
- Understand the implications of health and safety regulations.

3.1.1.8 SURVEYOR: -

PRIMARY RESPONSIBILITIES

- Making use of geographical information systems (GIS) to analyse and interpret site features.
- Producing detailed information (subsequently analysed by planners).
- Using a range of equipment to produce surveys, including GPS and conventional methods.
- Analysing information thoroughly before it is handed over to other professionals.
- Measuring the ground, including aspects such as small and large-scale distances, angles and elevations.
- Gathering data on the earth's physical and man-made features through surveys.
- Processing data.
- Undertaking digital mapping.
- Thinking creatively to resolve practical planning and development problems.
- Interpreting data using maps, charts and plans.
- Utilizing data from a range of sources, such as aerial photography & surveys
- Using computer-aided design (CAD) and other IT software to interpret data and present information.
- Keeping up to date with new and emerging technology.
- Providing advice to a variety of clients.

3.1.1.9 LABORATORY TEAM: -

PRIMARY RESPONSIBILITIES

- The job of a Laboratory Team is made up of a wide range of activities including aspects of testing, design and quality control of construction materials all as per approved ITPs.
- Advising clients and civil engineers on construction materials and their application, both in meetings and on construction sites.
- The Laboratory Team is responsible for testing (Asphalt, Concrete and Soil) and ensuring the quality of raw materials.

- Laboratory team along with QA/QC Engineer will do the inspections for incoming material.
- QA/QC Engineer shall be in charge of Laboratory Team. However, Quality Manager has the ultimate authority to manage laboratory team as required.

3.1.1.10 SUBCONTRACTOR QA/QC: -

PRIMARY RESPONSIBILITIES

- Subcontractor QA/QC personnel will be having clear concept of Project Quality Plan (PQP).
- Perform and coordinate inspections and determine quality assurance testing models of raw materials and finished products in accordance with project QA/QC Team.
- perform site inspection in accordance with ITP and raise inspection request as and when required
- Witnesses' material sampling by third parties
- Witnesses' material testing at third party laboratory.
- Sub-contractor QA/QC will be responsible for their material testing that will be used in the project. He / She will raise MIR as well as MAR for their material to get approved.
- Prepare, document, and execute detailed test plans, test cases, and defect reports.
- Review and approve quality requirements for manufacturing planning, supplier purchase orders, and engineering specifications to ensure contract compliance.
- Develop, document, and audit practices, program quality, and metrics reporting system
- DEE Quality Control Engineer will be in charge of Subcontractor QA/QC. However, Quality Manager has the ultimate authority to manage laboratory team as required.
- Subcontractor QA/QC's technical reporting will be to DEE Quality Manager.
- Subcontractor administrative reporting will be to their Project Manager only.

3.1.1.11 FOREMAN: -

PRIMARY RESPONSIBILITIES

- Coordinate tasks according to priorities and plans.
- Produce schedules and monitor attendance of crew.
- Allocate general and daily responsibilities.
- Supervise and train workers and trades people.
- Ensure manpower and resources are adequate.
- Guarantee all safety precautions and quality standards are met.
- Supervise the use of machinery and equipment.
- Monitor expenditure and ensure it remains within budget.
- Resolve problems when they arise.

- Report on progress to managers, engineers etc.

3.1.1.12 ADMIN / SECRETARY: -

PRIMARY RESPONSIBILITIES

- Using a variety of software packages, such as Microsoft Word, Outlook, PowerPoint, Excel, Access, etc., to produce correspondence and documents and to maintain presentations, records, spreadsheets and databases.
- Devising and maintaining office systems.
- Booking rooms and conference facilities.
- Using content management systems to maintain and update websites and internal databases.
- Managing and maintaining budgets, as well as invoicing.
- Liaising with staff and with external contacts.
- Ordering and maintaining stationery and equipment.
- Sorting and distributing incoming post and organizing and sending outgoing post.
- Arranging travel and accommodation for staff or customers and other external contacts.
- Liaising with colleagues and external contacts to book travel and accommodation.
- Organizing and storing paperwork, documents and computer-based information.
- Photocopying and printing various documents on behalf of other colleagues.
- Recruiting, training and supervising junior staff and delegating work as required.
- Manipulating statistical data.

3.1.1.13 STORE KEEPER: -

PRIMARY RESPONSIBILITIES

- Check inventory records for accuracy.
- Order Required Materials for the Site Usage with coordination of respective engineers and follow-up till delivery.
- Ensure storage of materials in accordance with manufacturer recommendation.
- Coordinate incoming material inspection
- Maintain the store neat and tidy, limiting access to unauthorized personnel.
- Maintain hazardous materials separately as per manufacturers' recommendation.
- Compile reports on various aspects of changes in production or inventory.
- Keep records of items received or transferred to another location.
- Find, sort, or move goods between different parts of the business

3.1.1.14 DRAUGHTSMAN: -

PRIMARY RESPONSIBILITIES

- Help design products with engineering and manufacturing techniques
- Add details to architectural plans from their knowledge of building techniques
- Work from rough sketches and specifications created by engineers and architects
- Specify dimensions, materials, and procedures for new products
- Prepare multiple versions of designs for review by engineers and architects
- Design plans using computer-aided design and drafting (CAD) software
- Work under the supervision of engineers or architects
- Draft and prepare layout drawings of the given structures, components and devices.
- Produce draft designs and diagrams according to the given specifications
- Assist and coordinate with designers and engineers.
- Collaborate with designers, constructors and engineers on projects.
- Calculate dimensions and allowances with accurate precision.
- Revise drawings and layouts to accommodate changes and enhancements.

3.1.1.15 Electrical Engineer

- Design review and implementation of electrical systems (cabling, power distribution, lighting, earthing).
- Review and approve shop drawings and material submittals.
- Coordinate with SEWA for interface points and electrical connections.
- Ensure compliance with local codes and international standards.
- Supervise installation, testing, and commissioning of electrical systems.
- Prepare red-marked drawings and As-Built documentation.
- Coordinate with other disciplines (Mechanical, Civil, I&C).

3.1.1.16 Mechanical Engineer

- Manage installation of mechanical systems such as pumps, valves, piping (GRP), and associated equipment.
- Ensure all materials and equipment comply with project specifications.
- Oversee hydrotesting and mechanical completion activities.
- Resolve technical issues in coordination with the design and QA/QC teams.
- Conduct inspections and liaise with SEWA representatives.
- Prepare method statements and risk assessments for mechanical works.

3.1.1.17 Instrumentation & Control (I&C) Engineer

- Responsible for installation and commissioning of instrumentation, SCADA, RTUs, and control systems.
- Ensure integration with SEWA's existing automation systems.

- Supervise installation of sensors, transmitters, and control panels.
- Validate loop checks and signal calibrations.
- Coordinate with vendors and automation team for programming and FAT/SAT.
- Develop I&C documentation such as IO list, control philosophy, and interface diagrams.

3.1.1.18 Foreman (Electrical / Mechanical / I&C)

- Execute site works in accordance with drawings, specifications, and safety requirements.
- Supervise and manage technicians and labourers on site.
- Ensure proper usage of materials and tools.
- Coordinate with engineers for daily work plans and progress.
- Report daily work progress, constraints, and resource needs.
- Ensure safety compliance and housekeeping at work areas.

NOC Procedures

Purpose: To secure all necessary No Objection Certificates (NOCs) from relevant authorities before initiating work at specific locations such as road crossings, utilities, and infrastructure zones.

NOC Workflow:

1. **Identification of NOC Requirement**
   - Based on project scope and location
2. **Preparation of NOC Package**
   - Layout drawings, method statement, traffic management plan (if required), utility coordination maps.
3. **Submission to Concerned Authority**
   - Via official correspondence or online portal depending on authority.
4. **Follow-up and Response**
   - Track application progress, attend joint inspections if required.
5. **Approval and Record Keeping**
   - Once NOC is granted, documentation is saved and distributed to all concerned site personnel.

Key Person Responsible:

- **NOC Coordinator / Public Relations Officer (PRO)**

- Responsible for preparation, submission, and follow-up of all NOC applications.
- Coordinates with Engineers for technical inputs.
- Liaises directly with government departments and utility authorities.

➢ **Project Manager / Project Engineer**

- Oversees the overall NOC progress and ensures it aligns with project schedule.
- Signs off and approves submissions where required.

3.2 INTERNAL COMMUNICATION: -

Within the Project Team:

Regular meetings (daily stand-ups, weekly reviews) to discuss progress, issues, and quality metrics. Shared workspaces (online platforms, document repositories) for easy access to quality documents, standards, and procedures. Clear communication channels (instant messaging, email) for quick updates and issue resolution. Training sessions to ensure everyone understands the quality plan and their roles.

To Project Management/Steering Committee:

Periodic reports on quality performance, key metrics, and any deviations from the plan.

Escalation procedures for critical quality issues that need management attention.

The list of software's with latest versions that will be used in this project are following:

- Microsoft Windows
- Microsoft Office
- AutoCAD
- Primavera

3.3 EXTERNAL COMMUNICATION: -

With Clients/Customers:

Regular updates on project progress and quality milestones achieved.

Transparent reporting on quality metrics and any issues encountered.

Mechanisms for feedback and addressing concerns related to quality.

With Suppliers/Vendors:

Clear communication of quality requirements and standards expected.

Collaborative approach to quality assurance, including joint reviews and audits.

Performance monitoring and feedback to ensure quality standards are met.

With Regulatory Bodies (if applicable):

Formal reporting and documentation as required by regulations.

Open communication and cooperation during inspections or audits.

3.4 MANAGEMENT REVIEW: -

3.4.1 General: -

Darwish Engineering Emirates has established management meeting as a platform for management reviews. These reviews ensure the continuing suitability, adequacy and effectiveness of the whole Quality Assurance System. The review includes evaluation of the need for changes to quality assurance system, including quality policy and quality objectives.

3.4.2 Review Input: -

The management reviews include periodic review of current performance and improvement opportunities related to:

- Results of Internal and External Audit reports;
- Service performance and External providers;
- Status of non-conformity, preventive and corrective actions;
- Customer satisfaction and perception;
- Changes that could affect the quality Assurance system.
- Risk and Opportunities

3.4.3 Review Output: -

The outputs from management review include actions related to:

- Improvement of quality assurance system and its processes;
- Improvement of product/services related to customer requirements;
- Resource needs.
- Results of management reviews are recorded in the form of meeting minutes.

3.4.4 Management Review Meeting: -

Management Review Meeting			
Meeting No.	**Date**	**Time**	**Location**
1	31-Jul-25	1PM	Head Office
2	14-Aug-25	1PM	Head Office
3	28-Aug-25	1PM	Head Office
4	11-Sep-25	1PM	Head Office
5	25-Sep-25	1PM	Head Office
6	09-Oct-25	1PM	Head Office
7	23-Oct-25	1PM	Head Office
8	06-Nov-25	1PM	Head Office
9	20-Nov-25	1PM	Head Office
10	04-Dec-25	1PM	Head Office
11	18-Dec-25	1PM	Head Office
12	01-Jan-26	1PM	Head Office
13	15-Jan-26	1PM	Head Office
14	29-Jan-26	1PM	Head Office
15	12-Feb-26	1PM	Head Office
16	26-Feb-26	1PM	Head Office
17	12-Mar-26	1PM	Head Office
18	26-Mar-26	1PM	Head Office
19	09-Apr-26	1PM	Head Office
20	23-Apr-26	1PM	Head Office

Management Review Meeting			
Meeting No.	**Date**	**Time**	**Location**
21	07-May-26	1PM	Head Office
22	21-May-26	1PM	Head Office
23	04-Jun-26	1PM	Head Office
24	18-Jun-26	1PM	Head Office
25	02-Jul-26	1PM	Head Office
26	16-Jul-26	1PM	Head Office
27	30-Jul-26	1PM	Head Office
28	13-Aug-26	1PM	Head Office
29	27-Aug-26	1PM	Head Office
30	10-Sep-26	1PM	Head Office
31	24-Sep-26	1PM	Head Office
32	08-Oct-26	1PM	Head Office
33	22-Oct-26	1PM	Head Office
34	05-Nov-26	1PM	Head Office
35	19-Nov-26	1PM	Head Office
36	03-Dec-26	1PM	Head Office
37	17-Dec-26	1PM	Head Office
38	31-Dec-26	1PM	Head Office
39	14-Jan-27	1PM	Head Office

04. PROJECT DOCUMENT LIST / LIST OF ACTIVITIES

4.1 Document Control

Document List

During the project execution phase, the following documents shall be controlled in accordance with the established procedure and contractual requirements. All submissions will follow the review/approval cycle with the Engineer/Client before implementation.

General Submissions:

- Monthly Progress Reports
- Drawing / Document Submittals
- Material Submittals & Approvals (MAR)
- Material Inspection Requests (MIR)
- Request for Information (RFI)
- Programme and Progress Reports
- Estimates & Payment Applications
- Variations / Change Requests
- Service Department NOCs
- Earthworks, Asphalt Works, Concrete Works Records
- Local Purchase Orders (LPO)
- Correspondence with Client, Subcontractors, Suppliers

Technical & QA/QC Submissions:

- Method Statements (Civil, Mechanical, Electrical, Instrumentation & Automation)
- Inspection & Test Plans (ITPs)
- Operation & Control Philosophy (for MEICA works)
- Operation & Maintenance (O&M) Manuals
- Training Manuals / Training Program Schedules
- As-Built Drawings (Civil, MEICA & Commissioning records)
- Warranty Certificates
- Spare Parts List & Recommended Spares Schedule

Control Process:

- All documents shall be identified, numbered, indexed, and filed for traceability.
- Obsolete revisions will be removed promptly from circulation and stamped “Superseded.”
- Finalized submissions (O&M, Training, As-Builts, Warranties, Spare Parts) shall form part of the project handover documentation.

4.2 Distribution of Documents

All pertinent documents on this project will be made available at all locations where essential operations are being performed and all obsolete documents will be removed promptly from all points of issue and use.

Upon receiving any document/information the document controller/secretary sending the original information to the project manager with distribution stamp, then PM will tick the persons who required receiving that information. The document controller/secretary will distribute the document with transmittal & person will return the transmittal after acknowledgement. The document controller/secretary to log the information in the transmittal registers. The person receives the document shall be responsible to remove the old revision/superseded document from his folder & keep the latest information, in case the still required previous revision for his information then he should put a clear stamp of “superseded Document”.

4.3 Document Numbering and Filing System (Project Records)

All project documentation at the project site will be identified, indexed, and stored for trace ability and retrieval as per the Project filing Index.

The following Document Identification Numbering shall be used:

Type of Document:

PQP	– Project Quality plan
NCR	– Non-Conformance Report.
MSRA	– Method Statement & Risk Assessment.
PQ	– Pre-Qualification
MAR	– Material Approval Request
MIR	– Material Inspection Request.
OTH	– Other General Documents
ITP	– Inspection & Test Plan.
TN	– Document Transmittal
SD	– Shop Drawing
POW	– Programme of Works
AS	– As Built Drawings
WIR	–Work Inspection Request
WSN	– Work Start Notification
RFI	– Request for Information
CVI	– Confirmation of Verbal Instruction

Material Approval Request Example: DJ682-MAR-CIV-XXX-00

DJ 682 – Project & the Contract Number
MAR – Document Type
CIV – (Civil-Discipline)
XXX – Document Sequence Number.
00 – Doc Rev

Request for Information Example: DJ682-RFI-CIV-XXX-00

DJ 682 – Project & the Contract Number
RFI – Document Type
CIV – (Civil-Discipline)
XXX – Document Sequence Number.
00 – Doc Rev

Work Start Notification: DJ682-WSN-CIV-XXX-00

DJ 682 – Project & the Contract Number
WSN – Document Type
CIV – (Civil-Discipline)
XXX – Document Sequence Number.
00 – Doc Rev

4.4 Control of Design and Design Related Change

All the project construction activities shall be carried out in accordance with latest revision of Project Drawings bearing the status, 'Issued for Construction'. All deviations to the above drawings shall be detailed in 'red ink' on a continual basis using a separate controlled set of drawings these shall be recorded as "As-Built" by the Project Engineer. Evidence to support such deviations will be collated by the Project Engineer, normally through the use of approved forms.

DEE site design coordinator will be the contact point between DEE & the appointed design Client. On receiving the design from the nominated design Client, the DEE design site coordinator will liaise with the DEE Design Department for technical review, any queries will be relayed back to the Client for revision. On finalization of the design the design coordinator with issue it to the project manager for the final review before submitting to client for the approval.

S.NO.	PROJECT CONTROL FORMS	REFERENCE
1	Daily Progress Report	DJ 682-DPR-0001
2	Document Transmittal	DJ 682-TN-0001
3	Work Inspection Request	DJ 682-WIR-CIV-0001
4	Material Submittal / Approval	DJ 682-MAR-CIV-0001
5	Request for Information	DJ 682-RFI-CIV-0001
6	Material Inspection Request	DJ 682-MIR-CIV-0001

4.5 File Management System

S. No.	Titles
1.	General
2.	Monthly Progress Report
3.	Drawing / Document Submittal
4.	Material Submittal
5.	Request for Information
6.	Programme and progress
7.	Estimates
8.	Payment Application
9.	Variation
10.	Service Departments (NOC)
11.	Earth Works
12.	Asphalt Works
13.	Concrete Works
14.	Local Purchase Orders (LPO)
15.	Letters Client (From / To)
16.	Letters to Subcontractors/Suppliers (From / To)
17.	Subcontractors Payment Certificate
18.	Daily Report
19.	Internal Memo (Circulars)
20.	Time Keeper (Monthly Time Records)
21.	Head Office (DEE) (From / To)
22.	Hired Plant / Machinery Record
23.	Daily Progress Report
24.	Site Safety Report
25.	Plant / Machinery Daily Report
26.	Site Meetings Records
27.	Material Requisitions (Main Stores)
28.	Staff & Labour Records

05. APPLICABLE SYSTEM PROCEDURES & PROCESSES

THE QUALITY ASSURANCE SYSTEM PROCEDURES AND PROCESSES ARE APPLICABLE FOR THIS PROJECT

5.1 Quality Assurance System Procedures / Operating Procedure: -

The quality assurance system procedures / operating procedures are the second level quality
assurance system documents, which contain a detailed description of how quality assurance system requirements have been addressed and implemented in various functions.
The Quality Assurance System procedures serve as an operational guide for all the concerned
departmental staff to ensure that operations are carried out in a controlled and systematic manner as per quality assurance system requirements. Controlled copies of Quality Assurance System Procedures are
distributed to all the concerned persons listed in the controlled circulation record.

Quality Assurance System procedure in which all site works related documents and forms (Enclosed in project documents list) have been distributed to the internal concern staff and instruct to follow-up with the procedure to enable to comply with the project requirement (such as
daily report, inspection request, checklist etc. to concern engineer's, foreman and surveyor's).

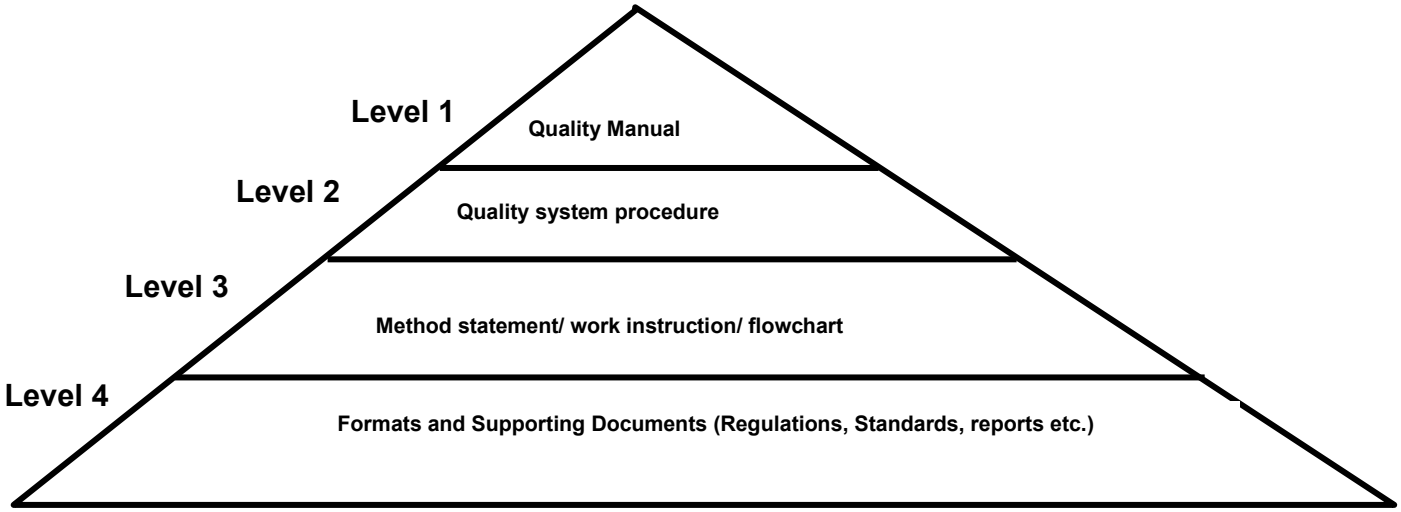
5.1.1 Method Statements/Work instructions: -

The method statements and work instructions are third level quality assurance system documents, which contain instructions for individuals & department to perform routine tasks or specific functions. The method statements and work instructions are then distributed to the related service place to ensure that the activities are performed as per instructions. Managements maintain the distribution status of method statement and work instruction on circulation record.
Prior to commencing any major work activities, the corresponding method statements must be prepared and approved

5.1.2 Quality Records: -

These are fourth level quality assurance system documents, which include records required in the Quality Assurance System of the organization. These are properly referenced in all the relevant procedures/method statements, and include data / records such as inspection reports, forms, log sheets and other reports generated while performing routine activity.

The Quality system document structure is given below:



5.1.3 Control of Documents: -

The organization has established a procedure for controlling documents used in its quality assurance system. This control ensures that the:

- Documents are approved for adequacy prior to release;
- Documents are reviewed, updated as necessary and re-approved;
- Documents are identified with current revision status;
- The relevant versions of documents are available at all locations where activities essential to the effective functioning of the quality operating system and process are performed;
- Documents remain legible, readily identifiable and retrievable;
- Applicable documents (regulations, notifications, etc.) of external origin are identified.
- Obsolete documents are removed from all points of issue or use, or are otherwise controlled to prevent unintended use. Any obsolete documents retained for legal or knowledge preservation purposes are suitably identified
- Quality records are maintained and controlled to demonstrate conformance to requirements and effective operation of the quality assurance system.
- The organization has established and maintains quality assurance system procedures for record identification, storage, retrieval, protection, retention time and disposition of engineering drawings and quality records.

5.2 Quality Control Management: -

5.2.1 Quality Control Management on Site: -

DEE Project Manager, will be the primary contact person at the site with whom Client/clients appointed representatives will interact with on a daily basis under this contract.

DEE Project Manager will ensure that:

- Quality to be checked before an activity or deliverable completed.
- All tasks are conducted in accordance with the project specifications.
- Quality should be considered whenever there is a change to the project constraints.
- Quality standards and process are adequate enough to meet the project requirement.
- Project Manager along with QA Manager review the quality plan to modify or improve.

DEE field personnel will be supported by Office staff throughout the course of the project. DEE Operations Manager and Quality Manager together with the Project Manager will become and remain personally involved until each problem is resolved and appropriate corrective measures are implemented. They will typically communicate at weekly on the progress of the project.

5.2.2 Inspection and Test: -

All construction activities that are required to be subjected to inspection and tests are identified and controlled by means of an 'Inspection & Test Plan".

NOTE: -

For detail review of "inspection and test plan", review Appendix II

5.2.3 Inspection and Test Status: -

Status of inspection and testing will be clearly mentioned on the Inspection request register. Inspection Request Register will be having the following details;

- Serial Number of Inspection
- Description of Inspections
- Number of inspections completed
- Status of Completed Inspections

Quality Engineer will ensure that all inspections & testing mentioned in the ITP is completed and each ITP shall be closeout.

5.2.4 Quality Observation and Corrective Action: -

QOR is meant for submitting minor noncompliance / as an initial attempt to document and resolve non-conformances. QOR can be raised by any project team personnel. Logged and tracked by Quality team, Action taken by respective Action party. Where no satisfactory Action taken QOR will be elevated to an NCR

The result of above audited Quality Observation Report (QOR) will be discussed and auctioned in accordance with "Quality Observation Report Process" as part of internal weekly process meeting. The Project Manager will be responsible for the initiation, implementation, verification and conclusion of the associated corrective actions. The site QA/QC Engineer will maintain these records.
To aid in reducing QOR's the proactive measure of QA/QC site tours is required. The QA/QC Engineer shall on a weekly basis record a general tour of the site identifying areas for improvement.

5.2.5 Non-conformities, Correction and Corrective Action: -

All non-conformities (NCR's) on this project are defined as those activities that have resulted from non-compliance to a set of planned arrangements stated in The Project Quality Plan. The site QA/QC engineer will be responsible for recording of all findings / observations of potential non-conformances during the day-to-day operations at site on the 'Investigation report NCR/ CAR. In addition to the above the QA Manager will conduct a periodic audit to assess the compliance of site activities to the requirements of the PQP.
The records of 'Non-conformance Report, Non-conformance Register generated as a result of the above audits will be discussed and auctioned in accordance with 'Non-conformance & CA procedure' as a part of the Internal weekly progress meeting's agenda. The Project Manager will be responsible for the initiation, implementation, verification and conclusion of the associated corrective actions. The site QA/QC Engineer will maintain these records.

All NCR's/failures recorded shall have a cost of Non-Conformance identified using the cost calculator. This shall be measured at site and corporate level; all costs shall be reported to the meeting chaired by the CEO.
All QORs and NCRs shall be copied to the Client and Client will be notified while closing QORs/ NCRs.
To aid in reducing NCR's the proactive measure of QAQC site tours is required as part of the DEE management system. The QAQC Engineer shall on a weekly basis recorded a general tour of the site identifying areas for improvement, those that are not NCR's but may lead to one if continued. These shall be reported on an inspection form.
NCR Format attached in Appendix 2

5.2.6 Monitoring and Measuring Devices: -

The Stores function together with the assistance of QA/QC Engineer on site will maintain a list of all the project instruments. The person(s) so authorized will ensure that these are properly maintained and where appropriate calibrated at regular intervals.

In accordance with the method statements and inspection and test plans, the Site Engineers shall be responsible for ensuring the relevant standard test methods are used to measure the performance of the materials and works, as appropriate and where specified.
When measuring and test equipment is calibrated by external calibration agency, results of calibration, indicating calibration status, will be recorded and maintained.
Quality department from main contractor will make sure that sub-contractor's instruments are well maintained, calibrated with proper record maintained.

5.3 Analysis of Data and Continual Improvement: -

The company collects and analyses data to demonstrate the suitability and effectiveness of the QSHE management system and to highlight potential areas for improvement.
The focus of the analysis is on customer satisfaction (client, company stakeholders, employee's, etc.), achievement of objectives, product conformance requirements, preventive action, beneficial supplier relationship and continual improvement. The feedback of such analysis is presented during management reviews for review and further setting the phase for continual improvement.

5.4 Quality & Control of Subcontractor:

By controlling project quality, it is possible to confirm that the product is complete and developed in line with expectations. Subcontractor quality control involves business and technical staff in a range of activities such as defining technical standards, setting business expectations, establishing product requirements and others.
Contractor will ensure the competencies of sub-contractor quality personnel. It will be documented and submitted as required by Client.

Quality control starts when a project is initiated and lasts throughout the entire project lifecycle until the product is developed and handed over to the customer

The Subcontractor Quality Manager will follow these following key tasks to control the quality.

- Create a quality review schedule that defines timing for controlling a given stage.
- Develop an agenda that determines key tasks of people involved in the control process.
- Assign reviewers who will perform stage quality control, including stage objectives, products, commitments, roles, responsibilities etc.
- Document and record all actions and decisions taken throughout the control process
- Ensure that appropriate follow-up actions are taken
- Notify stakeholders of project status after the control process is done

5.5 Quality Assurance of Subcontractor:

Following are the key activities that the subcontractor is going to perform in this project

A. ELECTROMECHANICAL WORKS
B. MICRO TUNNELLING WORKS
C. WELDING

All Sub-Contractor for above works will be submitted officially to Client with the Form to get their previous approval to commence works for our project.
Contractor will make sure that the Subcontractor's MS and ITPs have been approved before starting of the works at site followed by the work start notification process.
Once it is approved by Client will issue awarding letter to Sub-Contractor to proceed with the related works with respective to Client and Contractor specification and methods of works.
Before commissioning of respective works for Sub-Contractor it is must to submit the relative methods statement and drawings for the works to get approval from Client and Contractor.

All Sub-Contractor works at site will be monitored by Contractor representative engineer and it should be reported respectively to management. Failure / delay of sub-contractor works will not be permitted and will be find out earlier to avoid such situation at site progress.
Sub-Contractor works will be jointly inspected with the Client to their satisfaction and relative works approval will be taken from Client accordingly at site.

5.6 DESIGN REVIEW PLAN:

5.6.1DESIGN REVIEW PLAN

A design review is a milestone within a product development process whereby a design is evaluated against its requirements in order to verify the outcomes of previous activities and identify issues before committing to - and if need to be re-prioritize - further work.

DOCUMENTS AND RECORDS REQUIREMENTS

5.6.2 CONTROL OF DOCUMENT

Document control procedure ensures that all correspondence, documents, drawings and technical data received or generated is recorded, distributed, filed and stored in an efficient manner.
DEE's Project Server is set up to ensure that correspondence (with client), documents, drawings and technical data generated or received from the client are recorded, distributed, filed and stored in an efficient and controlled manner.

Correspondences to clients for documents, drawings, data sheets are uploaded on Client's E-Room or thru E-mail.

This document control includes:

- Document Identification
- Review and approval of changes to documents and drawings
- Control of documents, including approved changes, to preclude inadvertent use of obsolete or superseded documents
- Filing and storage control

All documents' revisions including procedures, drawings and technical documents will be handled in a controlled manner as described within the document control procedure.

5.6.3 ENGINEERING AND DESIGN

❖ **DESIGN DEVELOPMENT PLANNING**

Engineering & Process Expert is responsible for providing design integrity and technology management issues. Prior to commencement of engineering and design the Engineering Expert establishes a Project Engineering and Design Execution Plan. The plan in which all aspects of ISO 9001 "Design and Development" are addressed for ensuring adherence to the design policy and all statutory and technical requirements of the work, as well as measures for keeping consistency between basic and detailed engineering. Each engineering discipline will be headed by a discipline representative who will be responsible for the development of detailed discipline design plans and procedures in line with the Engineering Execution Plan. The Engineering Expert will ensure that the basic technologies are not compromised during the Project execution work and will plan and conduct reviews to ensure that all design issues are properly addressed.

❖ **DESIGN AND DEVELOPMENT INPUT**

The design input and other documents including statutory and regulatory requirements are controlled by the Engineering Expert. Inputs are distributed to the relevant organizational disciplines for review. Any questions thereof such as incomplete, ambiguous or conflicting requirements are clarified by the Engineering Expert with End-Client. The design criteria is established for each Engineering discipline in accordance with the contractual requirements, design information from End-Client and regulatory requirements prior to commencement of design work.
The Design and development input, output, review, verification and validation are described in the Engineering Design Procedure

❖ **DESIGN AND DEVELOPMENT OUTPUT**

The design output is expressed by drawings, specifications, calculations, requisitions, data sheets or other data or documents. The technical contents of design output including those submitted by vendors are reviewed by the Discipline Engineer of each engineering discipline in order to ensure that the design output: Meets the design input requirements, Contains or references acceptance criteria, conforms to applicable regulatory requirements, Ensures safe and proper functioning of the product.
Each engineering discipline registers their output deliverables and the output deliverables made by vendors are registered in Vendor Document Register (VDR).
All output deliverables are approved by the Engineering Expert or the head of the departments before submission for approval to End-Client to ensure that the quality requirements are applied.

❖ **DESIGN AND DEVELOPMENT REVIEW**

Design reviews are carried out at appropriate stages of the design process before submitting output deliverables to End-Client for approval and prior to any construction work. The design reviews are defined in the engineering discipline design plans.
The Engineering Expert or the head of the department is responsible for the design review process, but will involve the team leaders of each design output concerned as well as other specialists, as required. The design and development reviews will cover as a minimum: Design Review Comprehensive review of Plot Plans, P & ID review.
All review results will be documented

❖ **DESIGN AND DEVELOPMENT VERIFICATION:**

The design verification as required by DEE's system is carried out at appropriate design stages by the responsible team leader to ensure that the design output meets the design input requirements. The design verifications are defined in the engineering discipline design plans, procedures. As an integral part of design verification also ergonomics, constructability, maintainability, operability and safety reviews are scheduled and conducted.
Design verification of critical work elements involves personnel other than those having direct responsibility for the design work. All results from design verification will be documented as required by DEE's system.

❖ **DESIGN AND DEVELOPMENT VALIDATION:**

The Engineering & Process Expert is responsible for the "design validation" and will define the scope, conditions and procedures to be followed. Design validation will be conducted preferably at the early stage of the design. The timing and scheduling of design validation is defined by the Engineering Expert through the internal Project planning

5.7 PROJECT PROCUREMENT PLAN

5.7.1 Purpose: -

The purpose of project procurement management is to establish and maintain relationships with vendors of goods and services during the project life cycle. This unique function is an essential part of project management, which is concerned with overseeing designated sets of temporary operations. Project management for procurement purposes is an essential part of supply chain management.

5.7.2 Procedure: -

In general, the following key procedure steps will be involved in whole project procurement management,

- Preparation of Procurement Statement of Work (SOW).
- Preparation of cost estimate to determine the budget
- Advertising the opportunity.
- Identifying a short list of qualified sellers
- Preparation and issuance of bid documents
- Preparation and submission of proposal by sellers

- Conducting a technical evaluation of the proposals including quality
- Cost evaluation of the proposals
- Preparing the final combined quality and cost evaluation to select the winning proposal
- Finalizing negotiations and signing contract.

Contractor will follow the following 3 key process in Procurement Management.

5.7.3 Plan Procurements: -

Project Procurement planning is the process of documenting project procurement decisions, specifying the approach and identifying potential sellers.
Planning is important process in procurement as it sets the baseline for the further process in procurement. Planning of the procurement will be done by the following methods.

5.7.3.1 Expert Judgement:

Expertise will be considered from Contractor and Client with specialized knowledge or training on the following topics:

- Procurement and Purchasing
- Contract types and Contract documents
- Regulations and compliance topic

5.7.3.2 Market Research: -

Project Manager will ensure that if no vendor is available for the required material or service in Approved Vendor List then market research will be done. Necessary project documents along with project schedule are forwarded to Procurement department to perform Market Research. These documents will be sent to Vendors as well.
Market research will include examination of industry and specific vendor capabilities. Procurement team will leverage information gained at conferences, online reviews, and variety of source to identify market capabilities. The team will also refine specific procurement objectives to leverage maturing technologies while balancing risk with the breadth of who will provide the desired material or services.

5.7.3.3 Make-Or-Buy Analysis: -

A make-or-buy analysis will be used to determine whether work or deliverables can best be accomplished by the project team or should be purchased from outside source. Company's current resource allocation and their skills and abilities, will be taken in to consideration while doing make-or-buy analysis. Risk associated with each make-or-buy decision will be evaluated too. Once it will be obvious that goods or services will be gained from outsource company then according to the requirements of the projects the following procedure will be followed by contractor

- First of all, Project Manager will initiate the process by reviewing the project document that which material or service is more critical as per schedule.
- Then He/she will review the Approved Vendor List that will already be there in project documents. Approved Vendor List is agreed document form client as well as Client and is part of Project Documents in Initiation Process.

- As per the Project specifications, Communication Matrix will be used in all the above process so that information will be transferred with right content at right time to the right audience. So, after doing this business areas will be outlined that will save the money. At this stage procurement department will set its budget for the project.

5.7.3.4 Source Selection Analysis: -

Evaluation method will be included in procurement documents so that bidders/vendors will come to know that how they will be evaluated. The methods that will be used are as below

- Quality-based/highest technical proposal score:
  The selected firm will be asked to submit a proposal with both, technical and cost details and will then be invited to negotiate the contract if the technical proposals will prove acceptable.
- Quality & Cost Based:
  This method will allow cost to be included as a factor in the seller selection process. By obtaining the risk and uncertainty factor in to account, this method will be adopted.
  Prequalification of vendors that is the result of this technique, along with the required material/service catalogue or organizational structure respectively, will be sent to Client to get the approval that selected vendor is meeting project specifications

5.7.3.5 Meetings: -

Research alone will not provide specific information to formulate a procurement strategy without additional information interchange meetings with potential bidders/vendors. Meetings will be used to determine the strategy for managing and monitoring the procurement.
By using all the above method Bid Documents, Procurement Statement of Work, Source Selection Criteria, Make-or-Buy Decisions, and independent cost estimate will be gained.

5.7.4 Conduct Procurements:

Conduct procurement is the process of obtaining seller responses, selecting a seller, and awarding a contract. It will result in establishing agreements including formal contracts.
Procurements will be conducted by using the following techniques,

5.7.4.1 Expert Judgement: -

Expertise will be considered from Client and Contractor with specialized knowledge or training in the following topic

- Proposal evaluation
- Technical or subject matter
- Relevant functional areas like finance, engineering, design, development, supply chain management etc.
- Industry regulatory environment
- Laws, regulations, and compliance requirement; and
- Negotiation

5.7.4.2 Bidder Conferences: -

Bidder conferences are meetings between the buyer and prospective sellers prior to proposal submittal. They will used to ensure that all prospective bidders have a clear and common understating of the procurement and no bidder receive preferential treatment. After this process request for quotation is submitted to seller/vendor along with the comparison criteria of commercial and technical aspects so that vendor will be having the clear idea that how he/she will be evaluated. Vendor will be asked to send the material submittal with technical data sheet along with proposal.

5.7.4.3 Proposal Evaluation: -

Proposal will be evaluated by contractor by doing comparison on aspects like technical as well as commercial. Proposal will be evaluated to ensure they are complete and respond in full to the bid documents, procurement statement of work, source selection criteria, and any other document that went out in the bid package.

5.7.4.4 Negotiation: -

Negotiation is a discussion aimed at reaching an agreement. Procurement negotiation will clarify the structure, rights, and obligations of the parties and other terms of the purchases so that mutual agreement will be reached prior to signing the contract.

5.7.4.5 Agreements: -

After negotiation vendor “confirmation for compliance statement” and “Material Approval Request” will be submitted to Client to get the approval. QC Engineer will make the “Material Approval Request”. On getting the approval “Purchased Order” will be submitted to vendor. It will make sure that purchased order is within the schedule constraints. In case of “rejection” or “approved with comments” vendor will resubmit the proposal with required actions by repeating the whole process. This process will include signed contract document that will be executed by both of the parties.
By applying the above techniques, list of Selected Sellers and Agreements will be gained.

5.7.5 Control Procurements: -

Control Procurements is the process of managing procurement relationships; monitoring contract performance, and making changes and corrections as appropriate and closing out the contract.
Both sellers and buyers will meet the project’s requirement according to the terms of the legal agreement as a result of control procurement.
Procurements will be controlled by the following techniques to assure that all the procurement procedures are complying with the project requirements.

5.7.5.1 Inspection: -

An inspection is a structured review of the work being performed by contractor. Inspections will be of two types.

- Factory Acceptance Test (FAT):
  On the basis of Purchase Order when manufacturing will be completed, vendor will send invitation to contractor/buyer to do the acceptance test. Contractor will then forward this

invitation to Client for the same. After this FAT report will be generated and on the decision of Client shipment will be done.

- Site Acceptance Test (SAT):
  Material will be delivered to the site with “Delivery Notes". QC Engineer will make “Overage Shortage & Damage Report” by assuring that delivery notes are matching with Purchase Order as well as Material Approval Request.
  QC Engineer will make the “Material Inspection Request” (MIR) and will submit to Client along with overage shortage and damage report and invitation of SAT. Client will then assure the product first with MAR and then will perform SAT. After completion of FAT and SAT QC Engineer will make sure that material is preserved as per specifications of project as well as the specifications of manufacturer.

- Client will receive the request for SAT for all the material that will be procured. The list of materials that will be procured is attached in appendix III.
- As per contract, Client/Client will decide the materials that will require FAT.
- Manufacturer’s inspection records, operation and maintenance manuals will be collected upon delivery against each item that will be procured as per procurement schedule.
- Material submittal and MIR approval shall be obtained prior to use at the site

5.7.5.2 Performance Evaluation: -

Performance of the procured material will be checked at different intervals or at the end of the project depending upon the nature of the product. Complete performance evaluation will be done during “commission and testing” phase of the Project. Performance Evaluation will be done on the basis of material approval request, Purchase order, Manufacturer’s manuals provided with material and other legal clauses that were agreed before.
At this stage Supplier will give guaranty/warranty for the materials and defect liability period in case of services.

5.7.5.3 Performance Reviews: -

Performance reviews for agreement will measure, compare, and analyse quality, resource, schedule, and cost performance against predetermined baselines. This will include identifying procurement related work packages that are ahead or behind schedule, over or under budget, or have resources of quality issues. Lessons learned will be captured in this stage to record all the data for next.

5.7.5.4 Earned Value Analysis: -

Earned value analysis will be performed to check either procurement activities are causing any schedule or cost variance or not. This will also give the effectiveness of procurements procedures applied in the project.

5.7.5.5 Trend Analysis: -

Trend Analysis will develop a forecast estimate at completion by taking procurement strategies into account for cost performance to see if performance is improving or deteriorating, so that necessary preventive and corrective action will be taken.

06. INSPECTION AND TESTING PLAN & QUALITY CONTROL PROCESSES

QUALITY CONTROL TESTING AND VERIFICATIONS

6.1 PURPOSE: -

To ensure that tests of the Contractor's and Subcontractor's work is adequately planned and that the necessary testing procedures are available to perform the tests in a satisfactory manner. This procedure establishes the methods to be used when performing the tests listed in the specifications. Test reports are submitted to Document Control and are filed and logged with project documentation.

6.2 WORK INSPECTION REQUEST AND PROCESS: -

Work Inspection Request means a written request made by the Construction Contractor, utilizing a Request for Inspection (WIR) form, for the Engineer to complete an inspection of construction work in progress as required under the Inspection Plan (Copy of WIR) is attached in Appendix-II).
For this inspection staffing plan will be followed. In general, according to Inspection staffing plan Quality Control Engineer will be the prime persons of all the inspection of material received or work done respectively. Quality Control Engineer will do the inspections with the help of laboratory team & Quality Control Engineer with his/her team will do the inspections of work done on the site prior to the submission to consultant.
Apart from this DEE Quality Control Engineer will do the specific inspection of Subcontractor Material received or Work done respectively with the Quality team of Subcontractor before inspection of client.
Below are the steps you need to take for your Request for Inspection to be properly controlled:

6.2.1 Site Engineer Prepares a Draft WIR

Once a part of the project is completed, the Site Engineer will inform DEE Quality Engineer to inspect the work prior to Client inspection. So, by this way control quality process will be followed. After that Site Engineer will prepare a draft of the Work Inspection Report or he/she may write a description of the inspection on a drawing or sketch of the work completed. After that He/she will then hand it over to the QA/QC Engineer.
He/she will highlight the specific location of the area to be inspected, indicating the gridlines on the drawing.

6.2.2 QA/QC Engineer will prepare the Work Inspection Request

QA/QC Engineer takes care of preparing the WIR. Once the WIR is received from the Site Engineer the description can be written in approved WIR template.
QA/QC Engineer is the one controlling the WIR, and then he/she can just use the reference number that comes next.
Then inspection date and time is written, which will occur after 24 hours.

6.2.3 Main contractor Document Controller to Submit WIR to Consultant

The document controller shall be responsible for submitting the Work inspection Request for to Consultant. Contractor will make sure that before submitting WIR to Consultant, "Two Weeks Inspection Look Ahead Schedule" is submitted. He/she will make a copy from the original WIR as a "received copy," which he/she will hand over to the Consultant's document controller. At this stage of the process, the main contractor's document controller will use any mode of communication by using communication matrix

6.2.4 The Main Contractor's Document Controller to Log the WIR

Once the WIR received copy is returned to the document controller of the main contractor, he/she will record all the details on the WIR in his/her log. He/she should make sure that the log is up-to-date with all the details indicated on it.
At this stage, the log is being updated with the date the WIR is submitted along with the revision, which is at zero status (revision 0).
When the original WIR is returned with comments (Client has definitely completed the inspection), then the DC will give a copy of the WIR's front sheet to each concerned staff member, especially the QAQC Engineer because he/she is the one who will follow up with the rectification if the WIR needs to be revised and the status resubmitted. He/she will eventually resubmit the WIR once the rectification is completed.
If the WIR is returned with "Approved with Comment status" a copy shall also be given to the concerned staff members to inform them of what the comments are. Although it is approved, there are still requirements that need to be taken care of.
The DC will update the log putting in all the necessary details, such as the "date returned" and the comments, which shall be recorded in the log. But this is optional because it will require a lot of work to record all the comments. A single DC can't always perform that task due to his/her work volume.

6.2.5 QA/QC Engineer to resubmit the WIR

Now, at this time a commented WIR will only be submitted if the comments are addressed.QA/QC Engineer will take a copy of the revision 0 of the same WIR and then save as Revision 1 (Rev. 1) and then update the date and time of your desired time of inspection.

6.2.6 Start Over at step 3

The main contractor's document controller shall start over again at Step 3. He/she will follow the process again, but this time it is for the Revision 1 Work Inspection Request until it reaches Step 6. If the WIR still gets a "revise and resubmit" status, then go back to Step 3 and so on and so forth.

NOTE: -

For detail review of "Request for Information", "Document Transmittal", "Work Inspection Request" and "Work Notification", refer Appendix II

6.3 NOTICE FOR COMMENCEMENT OF ACTIVITY PROCESS: -

To start work on site it will be ensured by Quality Manager or Construction Manager that relative stakeholder is aware of that work. In order to meet the expectation of relative stakeholder following process will be followed,

1. Ensuring that work plan status is up to the requirements of project specifications and within the project constraints.

2. Then Work Start Notification will be submitted to Client by the following way

- Six Weeks Look Ahead Schedule will be submitted along with notice for commencement
- Method statements with inspection tests plan, Job Hazard Analysis and relevant checklists will be submitted 4 weeks in advance.
- Notice for commencement of new Work Front will be submitted 48 hours in advance.

3. Then if work plan is approved from the Client/Consultant, then it will go to the next phase (execution).

4. If work plan is approved with the comments, then necessary corrective action will be taken to get the work plan approved.

5. If the work plan is rejected, then new work plan with required strategies will be submitted to get the approval and then it will go to the next phase.

6.4 TESTING (Onsite, Factory/Offsite): -

A list of tests required to verify that control measures are adequate are delineated in the specifications and/or determined upon the completion of the design. The list includes the test name, specification paragraph and feature of work to be tested, the test frequency and the organization's name that will perform the test.

6.4.1 FAILED TEST: -

Failing tests are cleared by one of the following methods:

1. Retest – Retest if there is any doubt that the first test was not adequate.
2. Rework – Re-inspect and re-test.
3. Failed Material – Remove, replace, re-inspect and re-test.

6.4.2 PROCEDURES: -

1. The Quality Manager reviews the testing requirements to ensure that the planned test is in accordance with the design documents: i.e. plans, specifications, shop drawings and/or other documents.
2. Instruments used for testing are calibrated in accordance with established calibration procedures. Specialists experienced in such work perform the calibration.
3. Technicians performing tests provide copies of calibration certificates and their field notes and

reports to the Quality Manager.

4. The Quality Manager witnesses all required tests detailed in the design documents (plans, specifications, shop drawings, etc).
5. Client witnessing of tests does not relieve the Contractor and Subcontractor of their obligation to comply with the requirements of the Contract Documents.
6. Client is notified 3 days in advance of all scheduled tests (5 working days for Factory/offsite tests).
7. Test reports, when completed, are attached to the Contractor's Quality Control Report and submitted to Client.

6.5 TESTS AND RECORDS: -

6.5.1 PURPOSE: -

This section establishes a system for the control of documentation and records which provide objective evidence of the quality of items and activities performed in accordance with the programmatic requirements. The Quality Manager is responsible for the control, review, verifications and maintenance of the documentation delineated in the specifications.

6.5.2 REPORTING AND DISTRIBUTION OF REPORTS: -

1. After reviewing reports (including Subcontractor reports) the Quality Manager submits documentation to Client Document Control.
2. All inspections and testing are summarized and recorded in a Contractor's Quality Control Report (CQCR). A copy of the CQCR is sent to Client Document Control and to the Project Manager. "Original" reports are retained by the Quality Manager. Field notes, inspection forms and test reports are filed and available for review by Client.
3. The Contractor's Quality Control Report includes the following:

- Contractor and Subcontractor areas of responsibility.
- Working, idle and downtime hours for equipment.
- Work accomplished each day, indicating the location, activity and by whom.
- Laboratory test reports, including the test results (passing or failing), location of tests and specification references.
- Deficiencies and corrective actions.
- Material received onsite.
- Safety violations and corrective action implemented.
- Conflicts encountered in the plans and/or specifications.
- Monthly Project Score Card and KPI register.
- Assessment of inspection coverage with a matrix showing work areas verses inspectors assigned.
- Measuring instruments Calibration Status.
- QOR/NCR register.
- Procurement (offsite) inspection expected / completion status
- Audit findings register.

4. Monthly quality reports with monthly updates will be submitted within 3 working days after each month end to maintain the quality as well as to meet the expectations of Client/Client.

6.5.3 RECORDS STORAGE AND RETENTION: -

1. Project records are stored in areas that protect them from damage, deterioration and/or loss at the site Field Office during the construction period. Records are accessible to Client personnel.

2. Project records are stored for a period of time as determined by the contractual documents. Records, designated for storage, are not to be destroyed or otherwise disposed of within that period of time. Control and final disposition of Subcontractor and Supplier records, both onsite and offsite, are to be in accordance with the contractual documents.

6.6 QUALITY CONTROL PROCESS SYSTEM: -

As per contract provision, PM shall list all tests to be done into "Test Requisition Form" and submit it to the Lab Manager along with relevant documents/sections of the contract documents.

Test Requisition Form must clearly specify:

- Project No.
- Client Name & Contact Person
- Site Location

6.6.1 Sampling Procedures: -

6.6.1.1 Number of samples: -

a) According to the current local and internationally recognized Standards or Contract / Client specifications.
b) While sampling, concerned Lab Tech. shall give great consideration to the minimum number of samples sufficient to perform the intended test and the way of collecting these samples. The relevant sampling procedures/ instructions shall be strictly followed.
c) Lab Technician shall collect new samples if he observes or suspects any deficiency in collected samples, or test result.
d) When applicable, Lab Technician shall collect two samples, one from the Plant and the other from site.

6.6.1.2 Samples Identification: -

a) Each sample shall be identified by:
   - Unique sample No. (if applicable)
   - Location
   - Project No./Title
b) Care shall be taken to maintain the samples identification during the various testing stages.

6.6.2 Equipment Maintenance & Calibration: -

a) Lab supervisor shall ensure that, Test equipment is properly maintained and calibrated according to their respective calibration procedure/standard.

b) Lab supervisor shall maintain Equipment Register and Calibration Record for each unit, which need to be calibrated.

c) Before using any equipment, Lab technicians must check equipment's calibration status, to assure test credibility and accuracy.

d) Lab Manager shall be responsible to ensure that, equipment which is currently out of order shall be displayed with "**OUT OF ORDER**" mark/tag.

e) If break down occurred to any machine or equipment, the technician shall

- Be responsible to inform Lab Manager who may at his discretion either.
- In coordination with Purchasing Manager, sends equipment to be repaired.
- Decide to scarp the item of equipment if in his opinion, the item is beyond reasonable repair or the cost of the required repairs is not commercially viable

f) The Lab Manager shall be responsible to maintain a list of the company approved Suppliers/Subcontractors, which include names of calibration agencies.

6.6.3 Test Records/ Reports: -

Regardless test being done, Test records/reports shall be designed and completed to provide sufficient details. Following are details necessary to be pointed into any Test Report:

- Project No.
- Test type
- Sample No.& sources (if applicable)
- Test Method/ Reference Standard
- Test Data
- Acceptance Criteria
- Test Result (acceptable/ not acceptable)
- Checking & Approval / Authority
- Corrective action in case of test failure

Lab will ensure that the signed test reports are provided within 24hrs of completion tests.
Lab will also maintain an up-to date log of testing (collection / completion / reported).
Lab will also be audited once in a month.
If Lab Manager doubts test result due to any reasons (Human or Machine error) he shall request Lab technician to repeat test and compare between obtained results.
This may require collecting new samples, or checking machine calibration and re-calibrating if necessary.

6.6.4 Test Technical Procedures and Reference Books: -

Lab Manager shall maintain list of all test done by company labs along with their respective:

- Test method standard No., Rev. & Year;
- Reference book title
- Test Report Title
- Equipment used
- Authorization, etc.
- He shall communicate with concerned parties (Client, municipality, and external labs) to cope with development/ changes of the current test methods.
- Lab Manager shall be responsible to properly maintain Reference Books contain tests technical procedures and methods.
- Access to cabinets, where Reference Books are kept, shall be available only for Lab in Manager, addition to the Lab Assistant.

Record:

Test Reports for tests mentioned earlier in this procedure should be maintain by the Lab Manager 3 years or as per contract period, whether they are performed by the company's Lab or by any external lab.

TYPE OF TESTS

6.6.4.1 CONCRETE: -

a) Scope:

- Approved Third Party laboratory.

b) Purpose:

Initial laboratory tests for assessment of suitably of proposed materials: -

For material used for Concrete Production: (Receiving Inspection)

a) For Aggregate as Stockpile:

1.	Aggregate Grading Test	BS 812 Part 103
2.	Soundness (Mg SO4)	ASTM C 88
3.	Specific Gravity & Water Absorption	BS 812 Part 2
4.	Clay, silt and dust content	BS 812 Part 103
5.	Clay lumps and friable particles	ASTM C 142
6.	Organic impurities	ASTM C 40, ASTM C 87
7.	Acid solution Sulphate and Chloride content	BS 812 Parts 118 & 119
8.	10% Fines value for coarse aggregates	BS 812 Part 111
9.	Elongation	BS 812 Part 105.2
10.	Flakiness	BS 812 Part 105.1
11.	Potential alkali relativity	BSI/WG 10/ASTM P 214 & ASTM C227

12. Los Angeles abrasion test	BS 812 Part 120
13. Moisture content	BS 812 Part 109

b) For Water

Water to comply with the requirements	BS 3148

In- Situ laboratory tests during production (In process) for Concrete Mix

1. Slump Test	BS 1881 Part 102
2. Temperature Control Test	

Laboratory tests to monitor the consistency of the approved materials (Final Inspection) at Site for Concrete Mix

1. Temperature Control Test	
2. Slump Test	BS 1881 Part 102
3. Compressive Strength	BS 1881 Part 116
4. Durability Tests	
5. ISAT	BS 1881 Part 5, Part 208
6. Water Permeability	DIN 1048
7. Chloride Permeability	ASTM C 1202
8. Water Absorption	BS 1881 Part 122

6.6.4.2 ASPHALT: -

a) Scope: -

- Approved Third Party laboratory.

b) Purpose: -

Initial laboratory tests for assessment of suitably of proposed materials: -

For material used for Asphalt Production: (Receiving Inspection)

a) For Aggregate as Stockpile:

1. Aggregate Grading Test	BS 812 Part 103
2. Soundness	ASTM C 88
3. A.C. V	BS 812 Part 110
4. Elongation	BS 812 Part 105.1
5. Flakiness	BS 812 Part 105.1
6. Specific Gravity & Water Absorption	BS 812 Part 2
7. Acid Solution Sulphate and Chloride content	BS 812 Parts 118 & 119

b) For Bitumen:

1. Bitumen 60/70	BS 3690

In- Situ laboratory tests during production (In process) or Hot Asphalt Mix (One Sample from Plant)

1. Temperature Control Test	
2. Bitumen Content & Sieve Analysis	ASTM D 2172, ASTM, C 136

Laboratory tests to monitor the consistency of the approved materials (Final Inspection) for Hot Asphalt Mix (One sample from Plant and other from Site)

1. Temperature Control test	
2. Bitumen Content & Sieve Analysis	ASTM D 2172, ASTM C 136
3. Marshall Stability & Flow	ASTM D 1559
4. Bulk Specific gravity	ASTM D 1188
5. GMM	ASTM D 2041
6. Degree of compaction of paving mixture	ASTM D 1188

6.6.4.3 SOIL: -

a) Scope:

DARWISH ENGINEERING LABORATORIES: -

- Site Laboratory
- Approved Third Party laboratory.

b) Purpose:

Initial laboratory tests for assessment of suitably of proposed materials: -

For material as Stockpiles at Site: (Receiving Inspection)

1. Grading test (Sieve Analysis)	BS 1377 Part 2
2. Maximum Dry Density / OMC	BS 1377 Part 4
3. California Bearing Ratio (C.B.R)	BS 1377 Part 4
4. Liquid Limits / Plastic Limit / P.I. & Linear Shrinkage	BS 1377 Part 2
5. Chloride Content & Sulphate Content	BS 812 Part 117 & 11
6. Sand Equivalent	ASTM D 2419
7. Flakiness Index	BS 812 Part 105.1
8. Elongation Index	BS 812 Part 105.2
9. Soundness	ASTM C 88

Laboratory tests during preparation and mixing of material at Site (In Process)

1. Sieve Analysis	BS 1377 Part 2
2. Moisture Content	BS 812 Part 109

In- Situ tests (Final Inspection) at Site

1. Compaction Test	BS 1377 Part 9

6.7. Routine Site / Field QA/QC Tests and Sample Collection

The following routine site and field tests shall be conducted to ensure compliance with project specifications, applicable standards, and approved Inspection & Test Plans (ITPs). All tests will be performed either at site or in an approved independent laboratory, as per frequency and standards defined in the project specifications.

1. Soil / Earthworks

- Field Density Test (FDT – Sand Cone / Nuclear Gauge)
- In-situ Compaction Test
- Moisture Content Test
- Sieve Analysis (Grading)
- Atterberg Limits (LL, PL, PI)
- Maximum Dry Density (MDD) & Optimum Moisture Content (OMC)
- California Bearing Ratio (CBR)
- Sand Equivalent Test

2. Concrete Works

- Slump Test
- Concrete Temperature Test
- Fresh Concrete Sampling & Casting of Cubes / Cylinders for Compressive Strength
- Durability Tests (Water Absorption, Permeability, ISAT, etc. – as specified)

3. Asphalt Works

- Temperature Control (at Plant & Site)
- Marshall Stability & Flow
- Bitumen Content & Gradation (Extraction Test)
- Bulk Specific Gravity & Theoretical Maximum Specific Gravity
- Degree of Compaction (Field Core Testing)

4. Aggregates

- Sieve Analysis (Grading)
- Flakiness & Elongation Index
- Specific Gravity & Water Absorption
- Aggregate Crushing Value (ACV)
- Soundness Test

5. Pipeline / Utilities (where applicable)

- Hydrostatic Pressure Test
- Leakage Test
- Washing, Disinfection & Commissioning Tests

6.8 Laboratory Documentation: -

S. No.	DOCUMENT TITLE	DOCUMENT NO.
1	**AGGREGATE**	
	★ Aggregate- Sieve Analysis	DEE/ L/ W1/A-01
	★ Aggregate- Specific Gravity & Absorption	DEE / L/ W1/A-02
	★ Aggregate- Soundness	DEE / L/ W1/A-03
	★ Aggregate- Flakiness Index	DEE / L/ W1/A-04
	★ Aggregate- Elongation Index	DEE / L/ W1/A-05
	★ Aggregate- Crushing Value	DEE / L/ W1/A-06
	★ Aggregate- Moisture Content	DEE / L/ W1/A-07
2	**ASPHALT**	
	★ Asphalt- Marshall Stability/ Flow	DEE / L/ W1/B-01
	★ Asphalt- Bitumen Content	DEE / L/ W1/B-02
	★ Asphalt- Bulk Specific Gravity	DEE / L/ W1/B-03
	★ Asphalt- Theoretical Max. Sp. Gravity	DEE / L/ W1/B-04
	★ Asphalt- Degree of Pavement Compaction	DEE / L/ W1/B-05
3	**CONCRETE**	
	★ Concrete - Compressive Strength Test	DEE / L/ W1/C-01
	★ Concrete- Slump Test	DEE / L/ W1/C-02
4	**SOIL**	
	★ Soil- Compaction Test	DEE / L/ W1/D-01
	★ Soil- Sieve Analysis	DEE / L/ W1/D-02
	★ Soil- C.B. R	DEE / L/ W1/D-03
	★ Soil- Liquid Limit	DEE / L/ W1/D-04
	★ Soil- Plastic limit & Plasticity Index	DEE / L/ W1/D-05
	★ Soil- MDD & OMC	DEE / L/ W1/D-06
	★ Soil- Sand Equivalent	DEE / L/ W1/D-07
	★ Soil- Linear Shrinkage	DEE / L/ W1/D-08

6.9 Internal Audits and Client Satisfaction

6.9.1 Audits: -

The audit plan shall include auditing of the project QA/QC systems and those of key suppliers. Each supplier shall be audited at least once and the project system shall be audited every 6 months, whether this is by the corporate department, the site QA/QC Engineer of through cross auditing from another DEE QA/QC Engineer from another project. To maintain the auditing procedure in line with project requirements following steps will be followed.

- Audit Schedule for internal process, subcontractor, suppliers and laboratory will be submitted separately.
- Audit checklist will be submitted to Client/Engineer before each audit.
- Audit report will be submitted to Client within 7 working days after audit.
- Client will be invited to participate in each audit as a “observer”.

6.9.2 Client Satisfaction (External & Internal): -

The Project Manager has responsibility for ensuring all Client feedback is obtained (External / Internal) distributed to Operations Managers / Department Heads and records of such maintained.
Operations Managers / Project Managers / Department Heads are responsible for immediately reporting to Senior Management any urgent feedback from Clients – Positive or negative.
The Quality Manager ensures that Client Satisfaction is reviewed, analysed and appropriate improvement actions generated through the procedure,

The General Manager must be represented at each system review and sign off on Client satisfaction level improvement actions.
Operations Managers / Project Managers / Department Heads must ensure that actions required to improve Client satisfaction levels are implemented where necessary on site or in Head Office.
HOD’s / Operations Managers must ensure processes are modified / improved where required based on Client feedback.

6.10 NCR & Corrective and Preventive Action Reports

Control of Non-conformances (NCR)

6.10.1 Purpose: -

To establish a procedure to eliminate the cause of nonconformities in order to prevent recurrences.

6.10.2 Scope: -

This procedure is applicable to all activities carried out by the organisation.

Definitions

Non-conformity – non-fulfilment of a requirement
Correction – Action to eliminate a detected nonconformity
Corrective action – Action to eliminate the cause of a detected nonconformity
Risk Management – Action to eliminate the cause of a potential nonconformity

6.10.3 Roles and Responsibilities: -

Management Representative:

- Co-ordinate with Department heads to initiate corrective action for a detected nonconformity.
- Analyse the effectiveness of the corrective actions taken.

Department Heads:

- Responsible for identifying the root cause of the problem and to suggest and initiate corrective action.

6.10.4 Process Description – Corrective Action: -

6.10.4.1 Analysis and review of non-conformances'

Corrective action is carried out to eliminate causes of non-conformity to avoid its recurrence.

The cause of non-conformity is analysed by the respective department personnel and necessary corrective action is determined by the department heads. Root cause analysis can be done by using any of the following tools:

- Cause and effect diagram
- Brain storming

MR shall follow-up with the respective departmental personnel for the implementation of the corrective action. Details of corrective action carried out shall be recorded in the Corrective action request.

6.10.4.2 Evaluation of the need for corrective action:

Non-conformances identified in the Darwish Engineering Emirates, shall be evaluated against factors like operating costs, costs of non-conformity, service performance, satisfaction of customers and other interested parties.

Non-conformances are identified from various sources like-

- Clients' complaints
- Legal issue
- Outputs of data analysis
- Audit reports

- Outputs from management review
- Relevant quality management system records etc.
- Non-conformances are evaluated for corrective action to eliminate or minimise recurrence.

6.10.4.3 Implementation and review of Corrective action:

Concerned department head along with the assigned personnel mentioned in the NCR is responsible for the corrective action decided. MR shall monitor the implementation of the corrective action.

The results of the corrective action shall be recorded by MR. The departmental head is responsible to evaluate the effectiveness of the corrective action over a period of time. The verification may occur during subsequent internal audits.

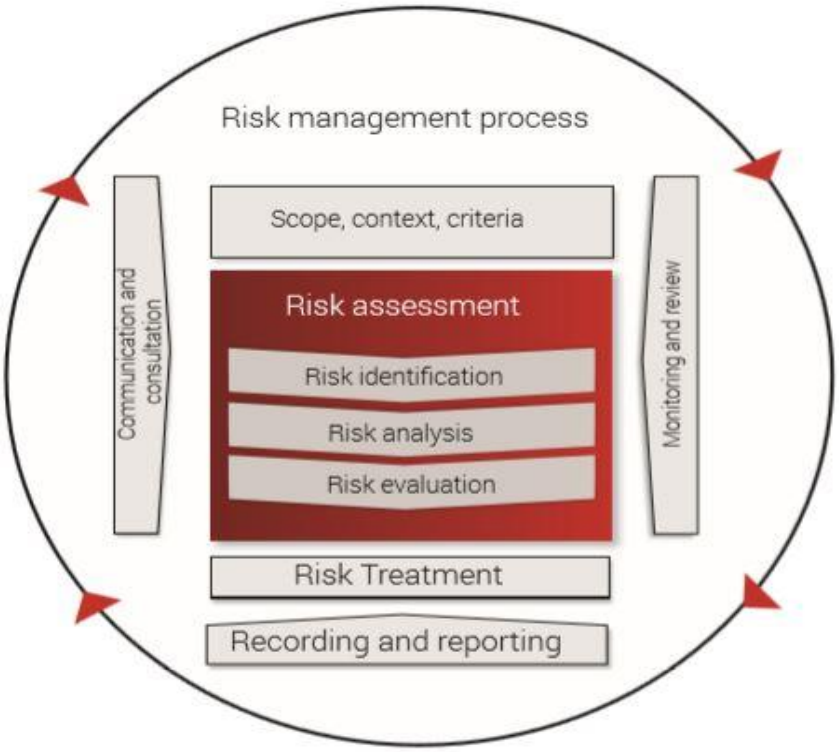
Results of corrective action and its effectiveness monitored over a period of time shall be reviewed in the management review meeting.

6.10.5 Process Description – Risk Management:

The Risk Management process involves the systematic application of policies, procedures and practices to the activities of communicating and consulting, establishing the context and assessing, treating, monitoring, reviewing, recording and reporting the risk.

We will submit the 'Risk Management Plan' separately and establish the 'Risk Register.' These will be discussed and updated periodically through 'Risk Management Workshops,'

It comprises the activities described in the diagram shown below.



Properly designed and implemented, risk management framework will ensure that the risk management process is a part of all the activities throughout the organisation, including decision-making, and that changes in internal and external contexts will be adequately captured. A risk management is a set of components that provides the foundations and organisational arrangements for designing, implementing, monitoring, reviewing and continually improving risk management throughout the organisation.
A summary of the key activities for the risk management process is shown in table below.

Process activity	Description
Communication & Consultation	Assist relevent stakeholders to understand the risk, the basis on which the decisions are made and reasons why particular actions are required. Communication seeks to promote awareness and understanding of risk, where as consultation involves obtaining feedback and information to support informed decision-making
Scope, context, criteria	Understand the department's objectives and defining the external and internal enviornment within which the department operates. It include defining the scope and context and risk criteria.
Risk Identification	Find, recognise and describe the uncertain events or risks that might help or prevent the department from achieving the objective. It involves identifying the risk resources, events, their causes and their potential consequences. Relevent, appropriate and up-to-date information is necessary in identifying the risks.
Risk Analysis	Comprehend the nature of the risk and determine the level of the risk exposure. It involves considerations of uncertainities, risk sources, consequences, liklehood, events, scenarios, controls and their effectiveness.
Risk Evaluation	Comparing the results of the risk analysis with the risk criteria to determine if additional action is required. This can lead to a decision to: (1) do nothing further; (2) consider risk treatment options; (3) undertake further analysis to better understand the risk; (3) maintain existing controls; (4) reconsider
Risk Treatment	Selecting and implementing options for addressing the uncertain event - accept, monitor, share, avoid, reduce likelihood/impact of threat or optimise opportunities. Balance the potential benefits derived in relation to the achievement of the objectives against costs, effort or disadvantages of implementation. The tolerance for the risk should determine the type and extent of the response.
Monitoring and Review	Monitoring and identifying change from the performance level required or expected. Review the suitability, adequacy and effectiveness of the risk management process, risk, controls and treatments to achieve established objectives. Determining whether the operating environment has changed and whether new risks have emerged.
Recording & Reporting	Documenting and reporting continuously on the risk management process and its outcomes through appropriate governance mechanisms to enhance the quality of discussion with stakeholders and support top management and oversight bodies in meeting their responsibilities.

6.10.5.1 Communication and consultation

Effective communication and consultation are essential to ensure that those responsible for identifying and managing risks and those with a vested interest understand the basis on which risk-informed decisions are made and reasons why particular actions and treatments are selected.
The purpose of communication and consultation is to assist relevant stakeholders in understanding risk, the basis on which decisions are made and the reasons why particular actions are required. It is a continual and iterative process to provide, share or obtain information, and to engage in dialogue with stakeholders regarding the management of risk.

A stakeholder is a person or organisation that can affect, be affected by, or perceive themselves to be affected by a decision or activity.

Communication seeks to promote awareness and understanding of risk, whereas consultation involves obtaining feedback and information to support decision-making.

Consultation is a two-way process of informed communication between an individual or organisation and its stakeholders on an issue before making a decision or determining a direction on that issue.

Communication and consultation with appropriate external and internal stakeholders will take place within and throughout all activities of the risk management process.

Risk management is enhanced through effective communication and consultation when all parties and stakeholders understand each other's perspectives and, where appropriate, are actively involved in the decision-making process.

A collaborative and consultative approach is more likely to:

- Help establish the context appropriately and ensure that the interests of all stakeholders are understood and considered.
- Ensure that uncertainties, risks, issues and opportunities are adequately identified and managed.
- Bring together different areas of expertise when assessing or analysing risks to ensure different, and sometimes opposing, views are appropriately considered when defining the risk criteria and when assessing risks.
- Help secure endorsement, support and commitment for a treatment plan.
- Enhance any change management processes associated with making risk-informed decisions.

Methods of communication and consultation may include meetings, reports and on-line communication systems.

6.10.5.2 Scope, Context and Criteria

The purpose of establishing the scope, the context and criteria is to customise the risk management process and enabling effective risk assessment and appropriate risk treatment.

Defining the scope

The relevant objectives to be considered and their alignment with objectives while defining the scope.
When planning the approach, considerations include:

- Objectives and decisions that need to be made.
- Outcomes expected from the activities.
- Time, location, specific inclusions and exclusions.
- Appropriate risk assessment tools and techniques.
- Resources required, responsibilities and records to be kept.
- Relationships with other projects, processes and activities.

External and internal context

External and internal context is the environment in which objectives are defined and achieved. The context of risk management activities establishes from the understanding of the external and internal environment in which it operates. It reflects the specific environment to which the risk management activities are to be applied.

Establishing the context sets the structure and foundation within which the risk assessment should be undertaken. It ensures that reasons for carrying out the risk assessment are clear. It also provides the backdrop of circumstances against which risks can be identified and assessed.

Defining risk criteria

It is to be specified the amount and type of risk that may or may not take in to consideration, relative to the objectives.

Risk criteria are the terms of reference against which the significance of a risk is determined. It is a set the criteria for:

- Deciding whether a risk or an opportunity can be accepted in pursuit of the objectives.
  - *Sometimes referred to as risk appetite, it specifies a technique to determine the magnitude of risk, or a parameter related to risk, together with a limit beyond which risk becomes unacceptable.*
  - *The acceptability of risk can also be defined by specifying the acceptable variation in specific performance measures linked to objectives.*
- Evaluating the significance of a risk
  - *An evaluation of the significance of a risk compared to other risks is often based on an estimate of the magnitude of risk compared with criteria which are directly related to thresholds set around the objectives.*
  - *Comparison with these criteria can inform which risks should be focused on for treatment, based on their potential to drive outcomes outside of thresholds set around objectives.*
- Deciding between options
  - *Criteria relevant to the decision will be identified. That is how the criteria are to be weighted or trade-offs made should be decided and accounted for.*
  - *In setting criteria, the possibility that costs and benefits may differ for different stakeholders will also be considered.*
  - *The way in which different forms of uncertainty are to be taken into account will be decided.*

  This is the point where attitude, appetite and tolerance for risk come in.
- **Risk attitude** is the approach to assess and eventually pursue, retain, take or turn away from risk

- **Risk appetite** is the amount and type of risk that is willing to pursue or retain to achieve our objectives and outcomes.

- **Risk tolerance** is readiness to bear the risk after risk treatments are implemented to achieve the objectives and outcomes.

  While criteria will be established at the beginning of the risk assessment process, they are dynamic and will be continually reviewed and amended, if necessary.

  To set the criteria to evaluate the significance of a risk and to support decision-making processes, the following will be considered:

- The nature and type of uncertainties, risks and opportunities that can affect outcomes and objectives (both tangible and intangible).

- How consequences- both positive and negative- and likelihood will be defined and measured.

- Time-related factors.

- Consistency in the use of measurements.

- How the level of risk is to be determined.

- How combinations and sequences of multiple risks will be taken into account.

- The capacity to manage risks.

6.10.5.3 Risk Identification

The purpose of risk identification is to find, recognise and describe risks that might help or prevent from achieving the objectives.

Identifying risk enables uncertainty to be explicitly taken into account. All sources of uncertainty and both beneficial and detrimental effects might be relevant, depending on the context and scope of the assessment.

Risk identification involves the identification of risk sources, events, their causes and their potential consequences. A risk source is an element which alone or in combination has the intrinsic potential to give rise to risk. An event {or incident or accident) is an occurrence or change of a particular set of circumstances. It can be one or more occurrences and can have several causes.

Identify what might happen (known uncertainties) or what situations exist that might affect the achievement of objectives and outcomes.

This includes identifying risks that are associated with not pursuing an opportunity. This is the risk of doing nothing and potentially missing out on an opportunity to improve performance,
Relevant, appropriate and up-to-date information is important in identifying risks.
The following factors and the relationship between these factors, will be considered during the risk identification activity:

- tangible and intangible sources of risk;

- causes (risk drivers) and events:
- threats and opportunities;
- vulnerabilities and capabilities;
- changes in the external and internal context;
- indicators of emerging uncertainties and risks:
- the nature and value of assets and resources;
- consequences and their impact on objectives;
- limitations of knowledge and reliability of information;
- time-related factors: and
- Biases, assumptions and beliefs of those involved.

Consideration should be given that there may be more than one type or outcome, which may result in a variety of tangible or intangible consequences.
Once a risk is identified, it is to be identified if there are any existing controls, such as design features, people, processes and systems.

6.10.5.4 Risk Analysis

The purpose of risk analysis is to comprehend the nature of the identified risk and its character-istics including, where appropriate, the level of risk.

Level of risk, or risk rating, is the magnitude of a risk or combination of risks, expressed in terms of the combination of consequences and their likelihood.

The risk analysis activity involves a detailed consideration of uncertainties, sources, causes (drivers of risk), consequences, likelihood, events, scenarios, controls and their effectiveness. An event can have multiple causes and consequences and can affect multiple objectives.
Risk analysis can be undertaken with varying degrees of detail and complexity, depending on the purpose of the analysis, the availability and reliability of the information, and the resources available.

Analysis techniques can be qualitative, quantitative or a combination of these, depending on the circumstances and intended use.

Risk analysis considers following factors such as:

- the likelihood of events and consequences;
- the nature and magnitude of consequences;
- complexity and connectivity;
- time-related factors and volatility;

- the effectiveness of existing controls;
- And sensitivity and confidence levels.

Risk can be associated with several different types of consequences, impacting different objectives. Consequences might also change over time. For example, the adverse impacts of a fault might become more severe the longer the fault exists. Sometimes consequences result from exposures to multiple sources of risk.

Likelihood can refer to the likelihood of an event or the likelihood of a specified consequence. The parameter to which a likelihood value applies will be explicitly stated. The event or consequence whose likelihood is being stated will be clearly and precisely defined.

There are usually many interactions and dependencies between uncertainties, risks and opportunities. For example, multiple consequences can arise from a single cause or a particular consequence might have multiple causes.

Existing controls and their effectiveness will be taken into account during this risk analysis activity as the level of risk will depend on their adequacy and effectiveness.

Control is something that is currently in place that is reducing the risk. It is often brought in as a result of a previous situation or incident.

There are three categories of controls:

- **Preventative**- To reduce the likelihood of a situation occurring including policies and procedures, approvals, authorisations, police checks and training. These controls generally target the causes or drivers of a risk event.
- **Detective** -To identify failures in the current control environment including performance reviews, reconciliations, audits and investigations.
- **Corrective** - To reduce the consequence and rectify a failure after it has been discovered including the crisis management and business continuity plans, insurance and disaster recovery plans. These controls generally target the potential consequences of a risk event.
  Risk is affected by the overall effectiveness of any controls that are in place. The following aspects of controls will be considered:
- the mechanism by which the controls are intended to modify risk;
- whether the controls are in place, are capable of operating as intended, and are achieving the expected results;
- whether there are shortcomings in the design of controls or the way they are applied;
- whether there are gaps in controls;
- whether controls function independently, or if they need to function collectively to be effective;
- whether there are factors, conditions, vulnerabilities or circumstances that can reduce or eliminate control effectiveness including common cause failures; and

- Whether controls themselves introduce additional risks.

Any assumptions made during risk analysis about the actual effect and reliability of controls will be validated where possible, with an emphasis on individual or combinations of controls that are assumed to have a substantial modifying effect. This should consider information gained through routine monitoring and review of controls.

6.10.5.5 Risk Evaluation

The purpose of risk evaluation is to support decisions.
Risk evaluation involves comparing the results of the risk analysis with the established risk criteria to determine where additional action is required. This activity uses the understanding of risk obtained during risk analysis to make risk· informed decisions about potential future actions.

This can lead to a decision to:

- do nothing further;
- consider risk treatment options:
- undertake further analysis to better understand the risk;
- maintain existing controls; or
- Reconsider objectives.

The information from risk identification and analysis can be used to conclude whether the risk will be accepted and the comparative significance of the risk relative to the objectives and performance thresholds.

This provides input into decisions about whether a risk is acceptable or requires treatment and any priorities for treatment. Decisions will take account of the wider context and the actual and perceived consequences to external and internal stakeholders.

A risk may be acceptable or tolerable in the following circumstances:

- no treatment is available;
- treatment costs are prohibitive or uneconomical;
- the level of risk is low and does not warrant using resources to treat the risk;
- opportunities involved significantly outweigh the threats; or
- A conscious decision has been made not to treat it.

The outcome of risk evaluation will be recorded, communicated and then validated at appropriate levels of the organisation.

Once risks have been evaluated and treatments decided, the risk assessment activity can be repeated to check that proposed treatments have not created additional adverse risks and that the risk remaining after treatment within risk appetite.

6.10.5.6 Risk Treatment

The purpose of risk treatment is to select and implement options for addressing risk. Having completed a risk assessment, treating a risk involves selecting and implementing one or more treatment options that will change the likelihood of occurrence, the consequences of the risk, or both. Risk treatment involves an iterative process of;

- formulating and selecting risk treatment options;
- planning and implementing risk treatment;
- assessing the effectiveness of that treatment;
- deciding whether the remaining risk is acceptable;
- And if not acceptable, taking further treatment.

Selecting the most appropriate risk treatment option involves balancing the potential benefits derived in relation to the achievement of the objectives against costs, effort or disadvantages of implementation.
Risk treatment options are not necessarily mutually exclusive or appropriate in all circumstances. Options for treating risk may involve one or more of the following:

- avoiding the risk by deciding not to start or continue with the activity that gives rise to the risk; taking or increasing the risk to pursue an opportunity;
- removing the risk source:
- changing the likelihood;
- changing the consequences;
- sharing the risk {ex. through contracts, buying insurance); or
- Retaining the risk by informed decision.

If the goal is to reduce the likelihood of the risk, then it may need to adjust the approach. Successfully altering the approach will depend on identifying the causes of the risk and causal links between the risk and its consequences, both of which should have been identified in the risk assessment activity.

If the goal is to reduce the consequence of the risk, then a contingency plan will be made to respond to the risk. This planning may be undertaken in combination with other controls. That is, even if steps have been taken to minimize the likelihood of the risk, it may still be worthwhile to have a plan in place to reduce the consequence or the risk.

If the goal is to share the risk, then involving another party such as an insurer or contractor will come in to picture. Risk can be shared contractually, by mutual agreement, and in a variety of ways that meet all parties' needs and requirements. Such arrangements will be formally recorded - whether through a contract, agreement or a formal letter. Sharing the risk does not remove the obligation and accountability for managing the risk. A risk cannot be transferred to another party.

If the risk is so significant that the goal is to eliminate or avoid it altogether, then the treatment option is to change the project scope or design.

Risk treatments, even if carefully designed and implemented might not produce the expected outcomes and could produce unintended consequences. Monitoring and review need to be an integral part of the risk treatment implementation to give assurance that the different forms of treatment become and remain effective.

Risk treatment can also introduce new risks that need to be managed.

If there are no treatment options available or if treatment options do not sufficiently modify the risk, the risk will be recorded and kept under on-going review.

Decision-makers and other stakeholders will be made aware of the nature and extent of the remaining risk after risk treatment. The remaining risk will be documented and subjected to monitoring, review and. where appropriate, further treatment.

6.10.5.7 Preparing and implementing risk treatment plans

Once treatment options have been identified and appropriate treatments have been selected for implementation by treatment owners, treatment plans will be prepared to monitor implementation progress.
The purpose of risk treatment plans is to specify how the chosen treatment options will be implemented. This is where arrangements are understood by those involved and progress against the plan can be monitored.

The treatment plan will identify the order in which risk treatment will be implemented. The plans will be integrated into the management plans and processes, in consultation with appropriate stakeholders.

Once treatments are implemented, the residual risk rating should generally be lower than the original risk rating. The level of residual risk refers to the likelihood and consequence of the risk occurring after the risk has been treated.

Residual risks will be documented, monitored and reviewed. Where appropriate, further treatments might be prudent.

6.10.5.8 Monitoring and review

The purpose of monitoring and review is to assure and improve the quality and effectiveness of process design, implementation and outcomes. The two key actions:

- Monitoring and identifying change from the performance level required or expected.
- Reviewing the suitability, adequacy and effectiveness of the risk management process, risk, controls and treatments to achieve established objectives. This includes determining whether the operating environment has changed and whether new risks have emerged.

On-going monitoring and periodic review of the risk management process and its outcomes will be a planned part of the risk management activities, with responsibilities clearly defined.

As part of the risk management process, risks, controls and treatments will be monitored and reviewed regularly to verify that:

- Assumptions about the uncertainties, risks and opportunities remain valid.
- Expected results and performance are being achieved.
- Results of risk assessments are in line with experience or expectations.
- Risk assessment techniques are properly applied and working effectively.
- Risk treatments are effective.

Monitoring and review will take place through risk management activities. It includes planning, gathering and analysing information, recording results and providing feedback.

The results of monitoring and review will be incorporated in performance management, measurement and reporting activities.

6.10.5.9 Recording and reporting

The risk management activities and its outcomes will be documented and reported through appropriate mechanisms.

Recording and reporting aims to:

- communicate risk management activities and outcomes across the organisation;
- provide information for decision-making;
- improve risk management activities; and
- Assist interaction with stakeholders, including those with responsibility and accountability for risk management activities.

Reporting is an integral part of an organisation's governance. It will enhance the quality of dialogue with stakeholders and support top management and oversight bodies in meeting their responsibilities.

Factors to consider for reporting include, but are not limited to:

- differing stakeholders and their specific information need and requirements;
- cost, frequency and timeliness of reporting;
- method of reporting; and
- Relevance of the information to objectives and decision-making.

The purpose of records is to:

- Communicate information about risk to decision-makers and other stakeholders including regulators.
- Provide a record and justification of the rationale for decisions made.
- Preserve the results of assessment for future use and reference.
- Track performance and trends.
- Provide confidence that uncertainties, risks and opportunities are understood and are being managed appropriately.
- Enable verification of the assessment.

6.10.6 Control Procedure: - (Conclusion):

All Non-conformities (NCR's) on this project are defined as those activities that have resulted from non-compliance to a set of planned arrangements stated in The Project Quality Plan. The site QA/QC engineer will be responsible for recording of all findings / observations of potential non-conformances during the day-to-day operations at site on the 'Investigation report NCR/ CAR. In addition to the above the QA Manager will conduct a periodic audit to assess the compliance of site activities to the requirements of the PQP.

The records of 'Non-conformance Report, Non-conformance Register generated as a result of the above audits will be discussed and auctioned in accordance with 'Non-conformance procedure' as a part of the Internal weekly progress meeting's agenda. The Project Manager will be responsible for the initiation, implementation, verification and conclusion of the associated corrective actions recorded on 'Non-conformance Report and Non-conformance Register. The site QA/QC Engineer will maintain these records.

All NCR's/failures recorded shall have a cost of Non-Conformance identified using the cost calculator. This shall be measured at site and corporate level; all costs shall be reported to the meeting chaired by the CEO. To aid in reducing NCR's the proactive measure of QAQC site tours is required as part of the DEE management system. The QAQC Engineer shall on a weekly basis recorded a general tour of the site identifying areas for improvement, those that are not NCR's but may lead to one if continued. These shall be reported on an inspection form.

The flow process of internal NCR's/QOR's will follow the following guidelines;

- All internal NCRs/QORs will be submitted to Stantec within 24 hours
- Contractor will get the Stantec approval for internal NCR closeout.
- Contractor will submit "root cause analysis" for each NCR.
- Contractor will issue proposal for correction and corrective actions within 72 hours of issuance, for the issued NCRs from Stantec.
- Contractor will submit a weekly report with reasons for NCRs open for more two weeks of issuance.

6.10.7 Trainings: -

Training is teaching, or developing in oneself or others, any skills and knowledge or fitness that relate to specific useful competencies.
Training is necessary in order to reduce the quality observation reports, Non-conformance reports as well as HSE observation report
Trainings in construction differ from project to project. Anyhow the trainings that will be conducted in this project will be of two types

- 1. Internal Trainings
- 2. External trainings

Internal Trainings that will be conducted in this project are following

1. Technical or Technology Training.
2. Quality Training.
3. Skills Training.
4. Team Training.
5. Managerial Training.
6. Safety Training.

External training is not only but the training of client representative during commissioning phase.

6.10.8 Training Schedule

**Audience: ** Site Supervisors & Laborers

**Location: ** Project Site

**Mode: ** Mixed (Presentation + Practical Demo)

**Topic: ** GRP Pipe Installation – All Related Works

Time	Session Title	Format	Trainer / Lead
08:00 – 08:30	Registration & Safety Induction	In-person	HSE Officer
08:30 – 09:00	Overview of Project Scope & Work Plan	Presentation	Site Engineer / PM
09:00 – 10:00	GRP Pipe Material Handling & Storage	Presentation	QA/QC Engineer
10:00 – 10:15	Tea Break	—	—
10:15 – 11:30	Pipe Laying Procedure & Jointing Methods	Practical Demo	Installation Supervisor
11:30 – 12:30	Bedding, Backfilling & Trench Work	Practical Demo	Civil Supervisor
12:30 – 13:30	Lunch Break	—	—
13:30 – 14:15	Safety Practices During Pipe Installation	Presentation	HSE Officer
14:15 – 15:00	Inspection & Testing Procedures	Mixed	QC Engineer
15:00 – 15:30	Common Site Issues & How to Solve Them	Open Forum	Senior Supervisor
15:30 – 16:00	Q&A and Feedback Session	Open Forum	Training Lead
16:00 – 16:15	Closing Remarks & Certificate Distribution	In-person	Project Manager

6.11 Inspection Works and Site Measurement Record

6.11.1 Inspection Works for Pipeline Construction

Pre-Construction Phase

- **Material Inspection:**
  - Verify pipes (DN 1600 DI PN25/PN16, DN 1600 GRE PN16), fittings, valves, and other materials for quality and compliance with tender specifications.
  - Inspect for damages, defects, or non-conformities.
- **Site Preparation Inspection:**
  - Check site clearing, trench excavation, and leveling according to design requirements for approximately 1.3 km of twin DN 1600 DI PN25, 24 km of twin DN 1600 DI (16.25 km PN25, 7.75 km PN16), and 22 km of DN 1600 GRE PN16 transmission pipelines.
  - Verify access roads and workspace preparation, including temporary access roads and dewatering arrangements.
- **Geotechnical Investigations:**
  - Conduct and inspect geotechnical investigations for chamber locations and NDRCs (Non-Disruptive Road Crossings).

Construction Phase

- **Pipeline Installation:**
  - Inspect laying of DN 1600 DI and GRE pipelines, including restrained joints where required, at suitable depths with sufficient cover.
  - Oversee installation in varying terrains, including waterlogged/weak strata (requiring filtration encasement) and sloped embankments (requiring pipeline RCC support in troughs).
- **Trench and Backfill Inspection:**
  - Inspect trenching, dewatering, bedding (imported sand/gravel), pipe surrounding, and backfilling up to proposed grading levels.
  - Ensure compaction of subgrade and use of approved granular imported material for filling.
- **Testing:**
  - Supervise and inspect testing, washing, disinfection, and commissioning of all twin DI and GRE transmission pipelines.

- **Valve and Fitting Installation:**
  - Inspect installation of all valves, meters, and associated fittings within RCC valve chambers. This includes Manual Butterfly Valves, Motorized Butterfly Valves, Flow Control Valves, Pressure Reducing Valves, Air Valves, Washout Valves, and Flow Meters.
- **As-Built Documentation:**
  - Review and verify as-built drawings for accuracy against constructed works.
- **Final Inspection:**
  - Conduct a comprehensive final inspection of the entire pipeline network, chambers, and associated civil/MEICA works for completeness and operational readiness.

6.11.2 Site Measurement Record for Pipeline Works

- **Daily Work Reports:** Document daily progress, activities, and resources utilized.
- **Material Usage Records:** Keep detailed records of all materials supplied and installed, including pipe lengths, diameters, and pressure ratings (DN 1600 DI PN25/PN16, DN 1600 GRE PN16), fittings, valves, etc.
- **Quantity Measurement Sheets:** Record measured quantities of excavation, backfilling, pipe laying, concrete works for chambers, etc.
- **Inspection and Testing Records:** Maintain records of all inspections, pressure tests, washing, disinfection, and commissioning results.
- **Pipeline Length:** Accurately record the installed lengths of approximately 1.3 km of twin DN 1600 DI PN25, 24 km of twin DN 1600 DI (PN25/PN16), and 22 km of DN 1600 GRE PN16 transmission pipelines.
- **Trench Dimensions:** Record actual trench depths, widths, and profiles.
- **Pipe Diameter and Wall Thickness:** Verify and record pipe specifications as per design.
- **Inspection Checklists:** Utilize comprehensive checklists for all inspection stages.
- **Photographic Records:** Maintain detailed photographic records of all critical construction phases, site conditions, and installations.
- **Signatures and Approvals:** Ensure all records are signed and approved by relevant authorities (SEWA/Engineer, Municipalities, Ministries, etc.).
- **Billing and Reporting:** Prepare regular progress reports and support billing based on verified site measurements.

6.11.3 Design and Engineering

- **Compliance:** Ensure all design verification, supply, installation, testing, and commissioning works comply with the Scope of Work under the Contract, SEWA guidelines and specifications, and all other requirements for a complete, safe, and reliable water transmission network.

- **Pipeline Design Verification:**
  - Verify the design for approximately 1.3 km of twin DN 1600 DI PN25 pipeline near Hamriyah IWP RO plant.
  - Verify the design for approximately 24 km of twin DN 1600 DI transmission pipeline from Hamriyah Free Zone boundary to Al Zubair Tanks & Pumping Station (approx. 16.25 km PN25 & 7.75 km PN16).
  - Verify the design for approximately 22 km of DN 1600 GRE PN16 transmission pipeline from Al Zubair Tanks & Pumping Station to connection with Line 2 Part 2 near Houma.
- **Chamber Design:** Design and verify RCC chambers for Manual Butterfly Valves, Motorized Butterfly Valves, Flow Control Valves, Pressure Reducing Valves, Air Valves, Washout Valves, Flow Meters, and other necessary appurtenances to meet project operational requirements.
- **Shop Drawings:** Prepare and submit complete coordinated shop drawings (across all disciplines) for profiles (A3 size, 500m lengths, colour) and all installations, for review and approval by SEWA/Engineer.
- **Design Reports and Calculations:** Submit comprehensive design reports and calculations for approval by SEWA, respective Municipalities, Ministries, and SEWA GIS Department

6.11.4 Stakeholder Approvals and Coordination

- **Obtain Approvals:** Secure all necessary construction NOC approvals from associated stakeholders/Authorities for design modifications and construction stages.
- **Coordination:** Coordinate with stakeholders and other related contractors for pipeline interconnection, diversions, data collection, and obtaining final grade level/height references from municipalities.
- **Liaison:** Liaise with stakeholders (through SEWA/Engineer) for interconnection of pipelines.

6.11.5 Temporary and Access Arrangements

- **Diversions and Access:** Make necessary arrangements for diversions, access roads, and utility services during construction stages.
- **Mobilization:** Mobilize survey equipment, and arrange for temporary dewatering and access to existing networks.
- **Site Facilities:** Provide water and electricity, equipment, site offices, dewatering arrangements, storage areas, and temporary works.

6.11.6 Permits and NOCs

- **Cost Inclusion:** Include the cost of all required permits and NOCs from authorities such as SCD, Sharjah Police, Municipality, and other relevant bodies.

6.11.7 Trial Pits and Service Relocation

- **Trial Pits:** Conduct trial pits to identify existing services (e.g., FOC in uPVC duct, electrical and ICA works).
- **Protection/Relocation:** Protect or relocate identified services as per stakeholder requirements and approvals, including managing existing services during construction.

6.11.8 Value Engineering and Innovation

- **Adoption:** Adopt value engineering and innovative technologies in the design and construction works to ensure efficiency and optimal performance.

6.11.9 Miscellaneous

- **Temporary Arrangements:** Implement any necessary temporary arrangements for access and utility services protection during construction.
- **Network Integrity:** Ensure the integrity of the networks and the proper functioning of the systems throughout the project lifecycle and during the defect's liability period.
- **Incidental Works:** Include all works that may be incidental, contingent, or necessary for the proper completion and operation of the works in line with good engineering practices, even if not specifically described.
- **Disposal:** Arrange transport and disposal of surplus excavation to landfill sites designated by relevant authorities.

6.11.10 Sub Contractors Works

- **MEICA Works:** This encompasses Mechanical, Electrical, Instrumentation, Control, and Automation (MEICA) works, including ICA and chamber list as per project requirements
    - **a) Submission of I&C Material Submittal:**

1. Process Flow Diagram (PFD)
2. Instrument tagging philosophy
3. Piping & Instrumentation Diagram (P&ID)
4. Instrument list

- **b) Prior to proceeding with FO cable laying along with pipeline:**

  1. FO cable route layout approval
  2. Method of Statement

- **c) Prior to proceeding with RTU schematic drawings:**

  1. Input / output list
  2. Control system architecture for each location
  3. Functional Design Specification (FDS)
  4. Panel schematic drawing

- **d) Prior to proceeding with Logic development / Factory Acceptance Test:**

  1. Alarm, event list
  2. Cause and effect Schedule
  3. Operation and Control Philosophy (OCP)

- **e) Prior to proceeding with Instrument installation:**

  1. Hookup drawing
  2. Flowmeter/instruments installation drawing
  3. Method of statement – instrument installation

- **f) Prior to proceeding with cabinet installation at site:**

  1. General arrangement drawing for each location
  2. Cable route layout for each location
  3. Method of statement – installation of Panels

- **g) Prior to proceeding with Instrument cable termination:**

  1. Loop drawing for each location
  2. Cable termination schedule

- **Micro Tunnelling/NDRC Works:** Execution of road crossings by suitable approved methods, including micro-tunnelling or Non-Disruptive Road Crossings where required.

APPENDIX – I
ORGANIZATION CHART

APPENDIX – II
RFI, ITP, DTN, WSN, NCR & WIR

APPENDIX III
MAR & MIR

APPENDIX IV

LIST OF METHOD STATEMENT & RISK ASSESS-MENT

APPENDIX – V
LIST OF METHOD STATEMENT – CIVIL & MEICA

APPENDIX – VI
LOD

APPENDIX – VIII

INSTALLATION, TESTING & COMMISSIONING CHECK-LIST, CRS, NOC LOG, MAR LOG / PROCUREMENT REGISTER, SHOP DRAWINGS REGISTER

APPENDIX – IX
SHOP DRAWING SAMPLE WITH TITLE BLOCK

ISO QMS CERTIFICATES