



PROCESS MAP OF QA & QC

(This document describes to control all the activities performed by and for the process implementation, in accordance with ISO 9001:2015, ISO 14001:2015 & ISO 45001:2018 requirements)

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Amendment History

Rev. No.	Date	DCR#	Page Affected	Reason for Change	Prepared	Reviewed	Approved
00	01.07.2019	--	All	Initial release of IMS documentation	Manager - QA&QC	HOD - QA & QC	Director-Projects
01	15-04-2025	--	All	Regular revision	Manager - QA&QC	HOD - QA & QC	Director-Projects

DISTRIBUTION MATRIX

Date:

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Prepared By	Reviewed By	Approved By	Issued by

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1. Purpose

To establish, measure, analyse, improve and control the process of inspection and testing of materials, products, construction activities performed as per the legal, contract and technical requirements with respect to inspection and test plan.

2. Scope

This process is applicable to all the products and services of MHCPL.

3. Responsibility

Primary: HOD - QA&QC

Secondary: Site Incharge - QA&QC

4. SIPOC (Source, Input, Process, Output & Customer)

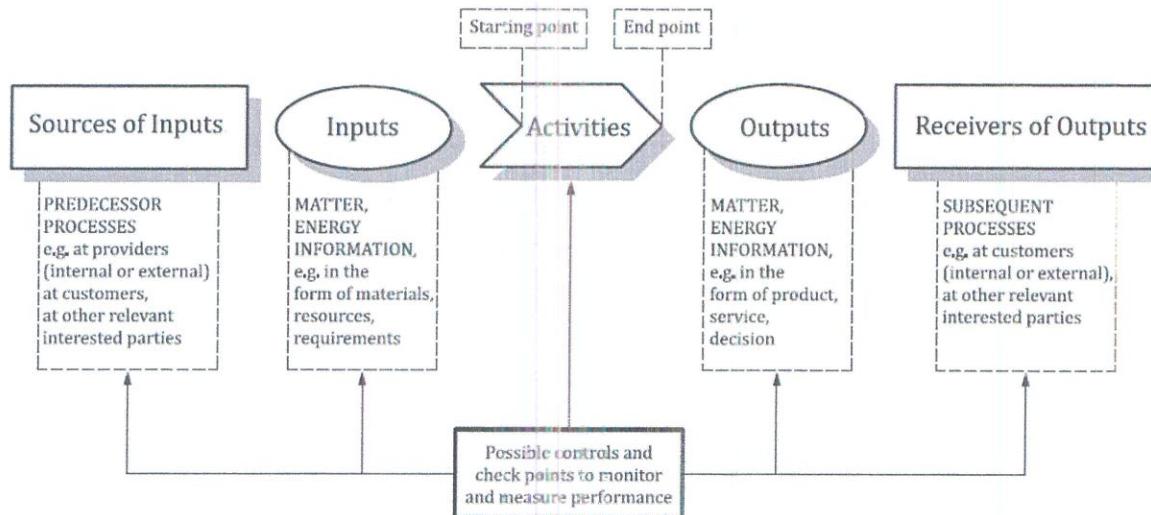


Figure 1 — Schematic representation of the elements of a single process

**4.1 SIPOC:**

Source of Inputs	Inputs	Process (Activity)	Outputs	Receiver of output (Customer)	Key Performance Indicator (KPI's)	Documented Information	Responsibility
Stores	Material Inspection Request (MIR)	Inspection & testing of incoming material	Accept/ Reject	Stores	Timely inspection within same day	Material inspection request, Inspection register, Material testing frequency plan & Testing procedures	QC Inspector
Stores	Delivery challan						
Stores	Manufacturer Test Certificate						
Stores/ Contractor	Third Party Test Certificate (Optional)						
Purchase	Approved Sample						
QA & QC	Equipment						
	Material testing frequency plan & Testing procedures						
Site Engineer	Work Inspection Request (WIR) & Inspection and testing plan	Inspection and testing of works	Conformance/ Approved with comments/ Non-conformances	Site Engineer	Timely inspection within same day	Work inspection request, Inspection register, Inspection and testing plan & Testing procedures	QC Inspector



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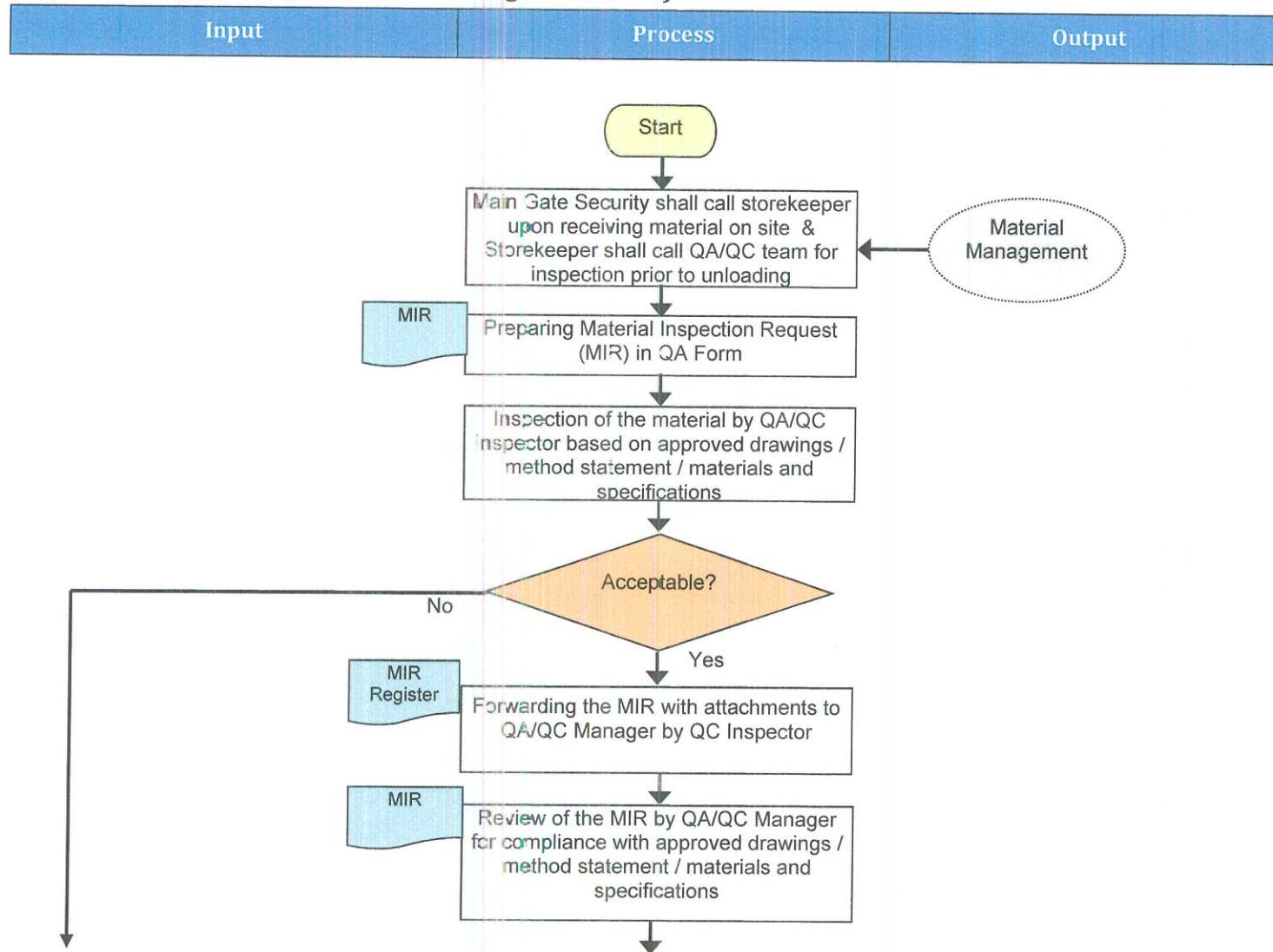
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Source of Inputs	Inputs	Process (Activity)	Outputs	Receiver of output (Customer)	Key Performance Indicator (KPI's)	Documented Information	Responsibility
QA&QC	Non-conformance while inspection and testing (works & material)	Control of non-conformance outputs/ Observations	Corrective actions & Lessons learnt	Projects/ Stores	Timely closing of NC's, = $\frac{\text{Projected} - \text{Actual}}{\text{Projected}} \times 100\%$ Zero reoccurrence of NC's	NC register	Manager QA&QC
Site - QA&QC, Site Engineers	Training Needs Identification, Training material, Job oriented trainings	Training	Competency improvement	Workforce & Supervisors	Training evaluation = Min 80%	Training records	Manager QA&QC

5.1 Process flow diagram (Inspection and Testing of Materials)





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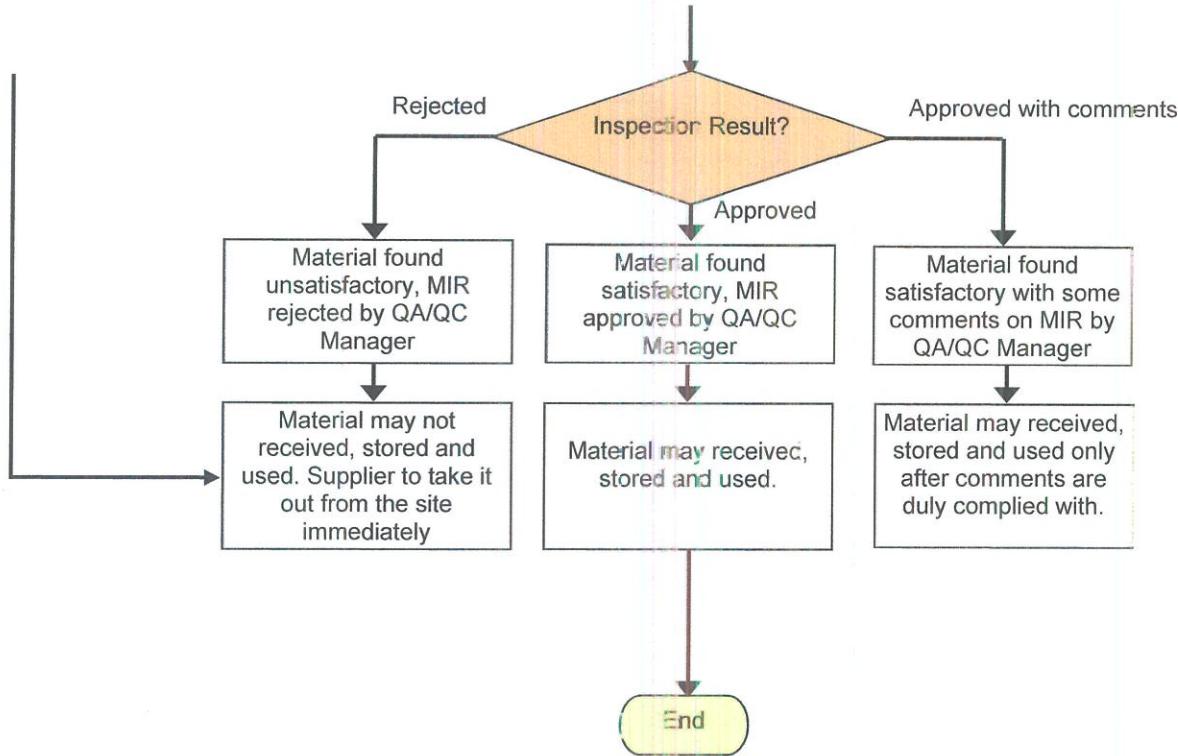
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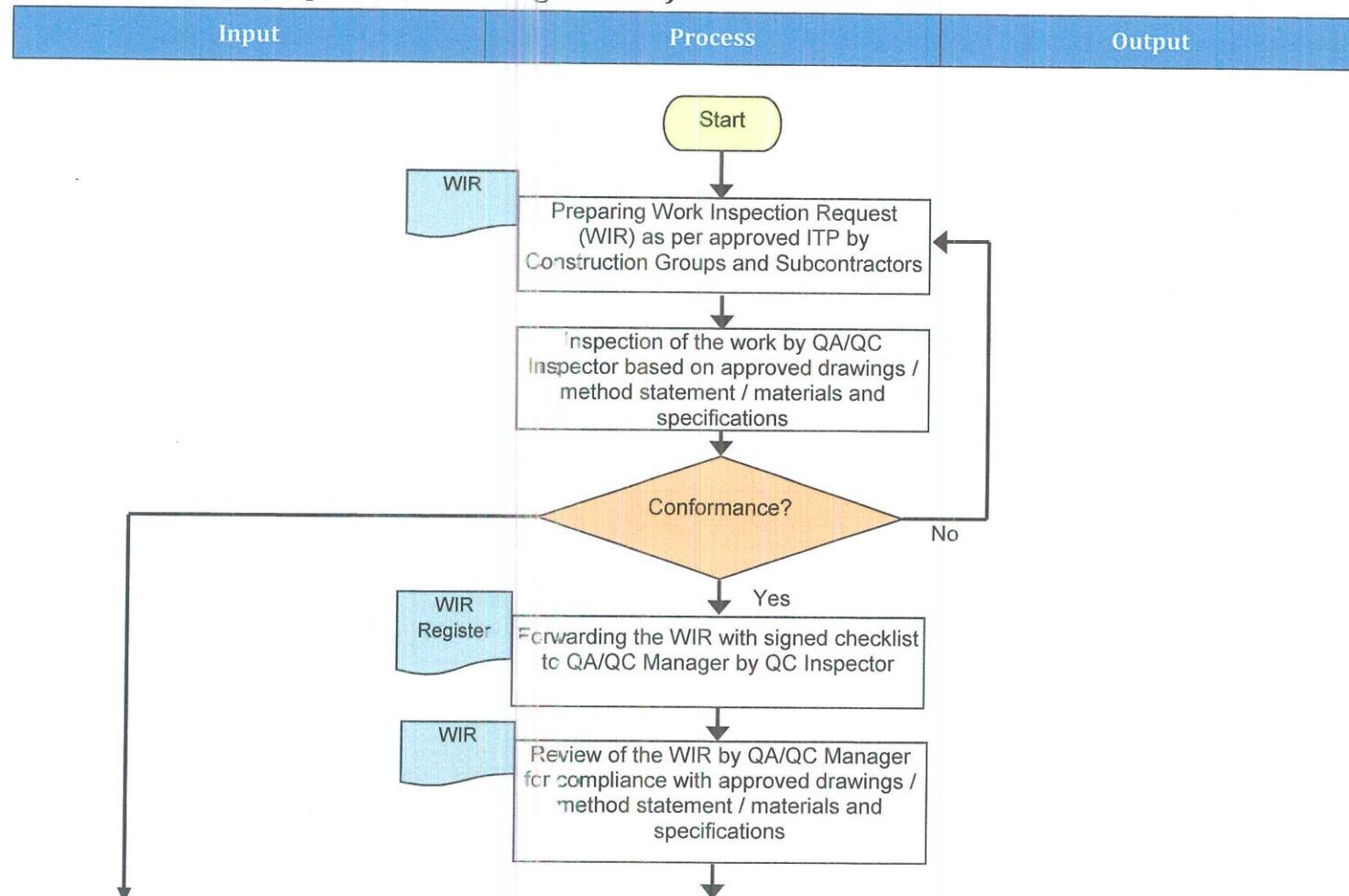
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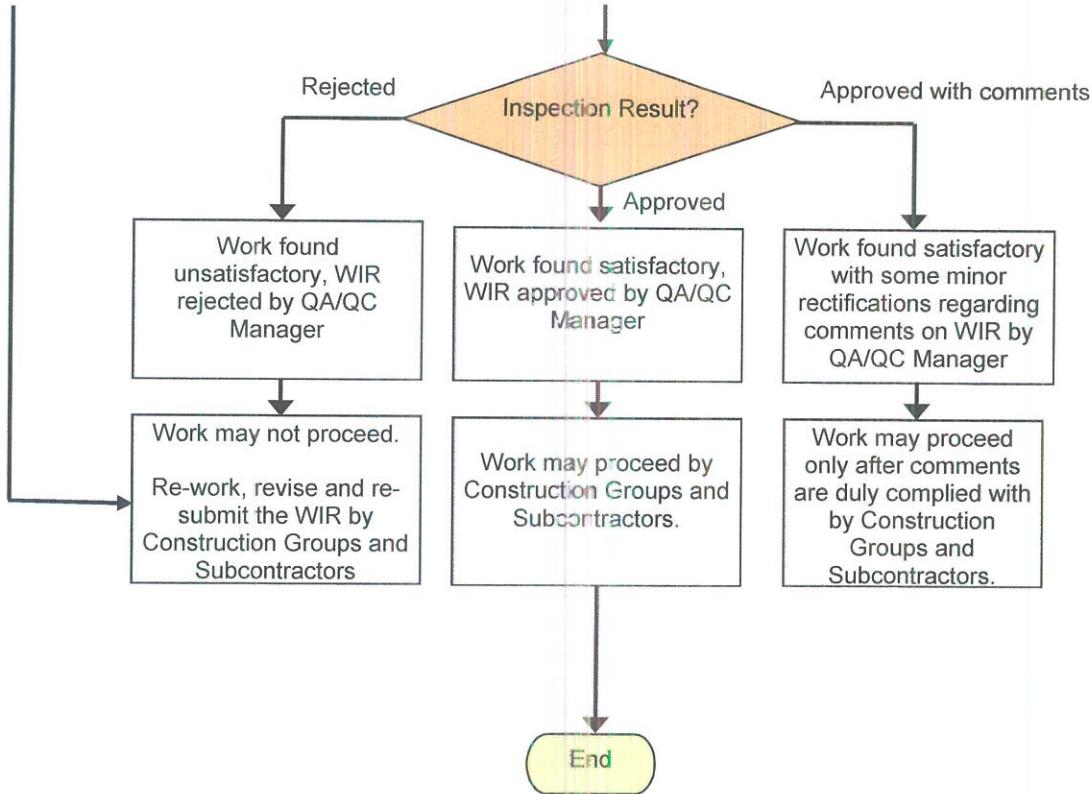
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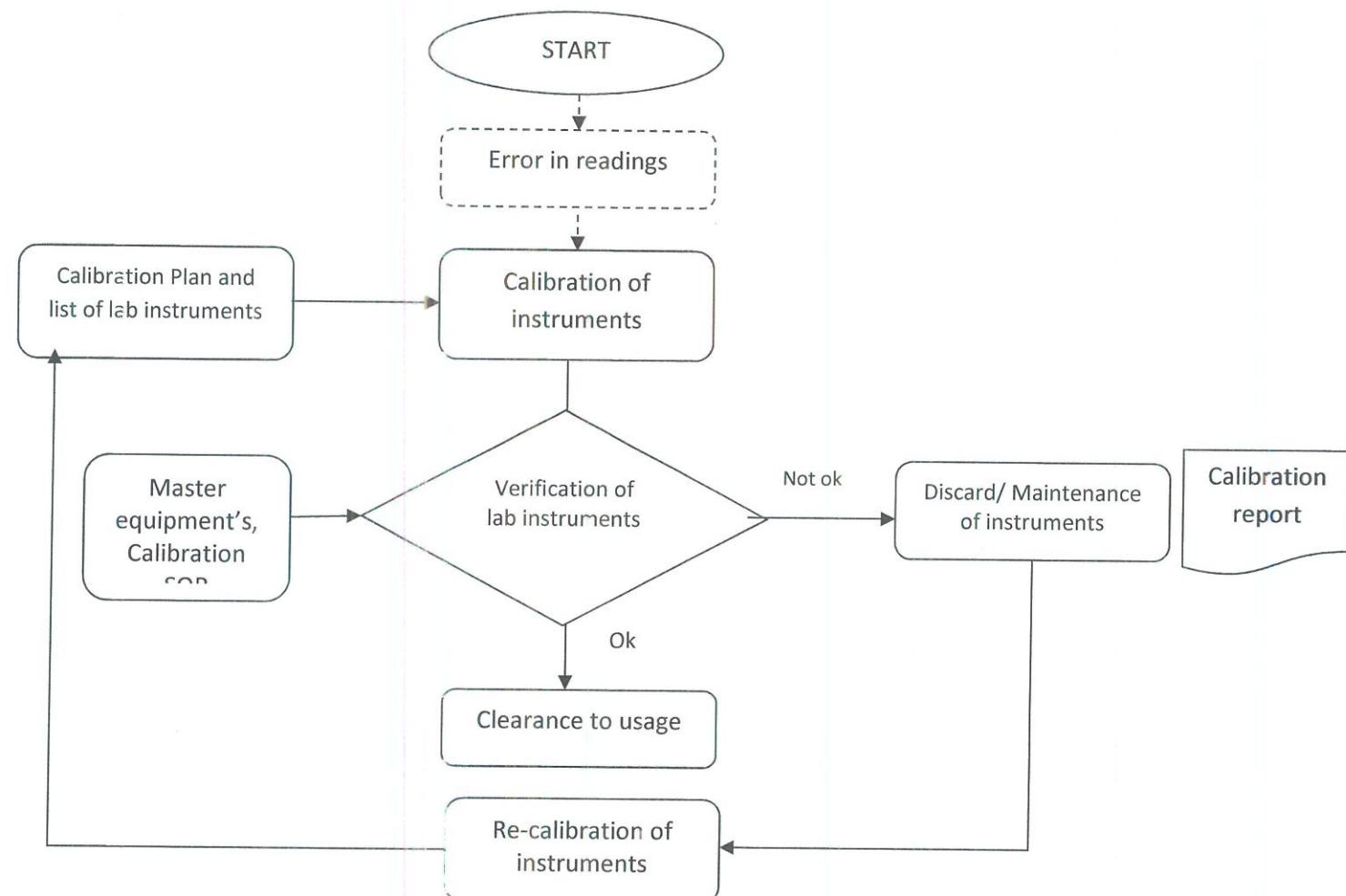
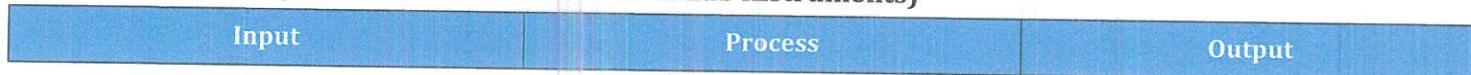
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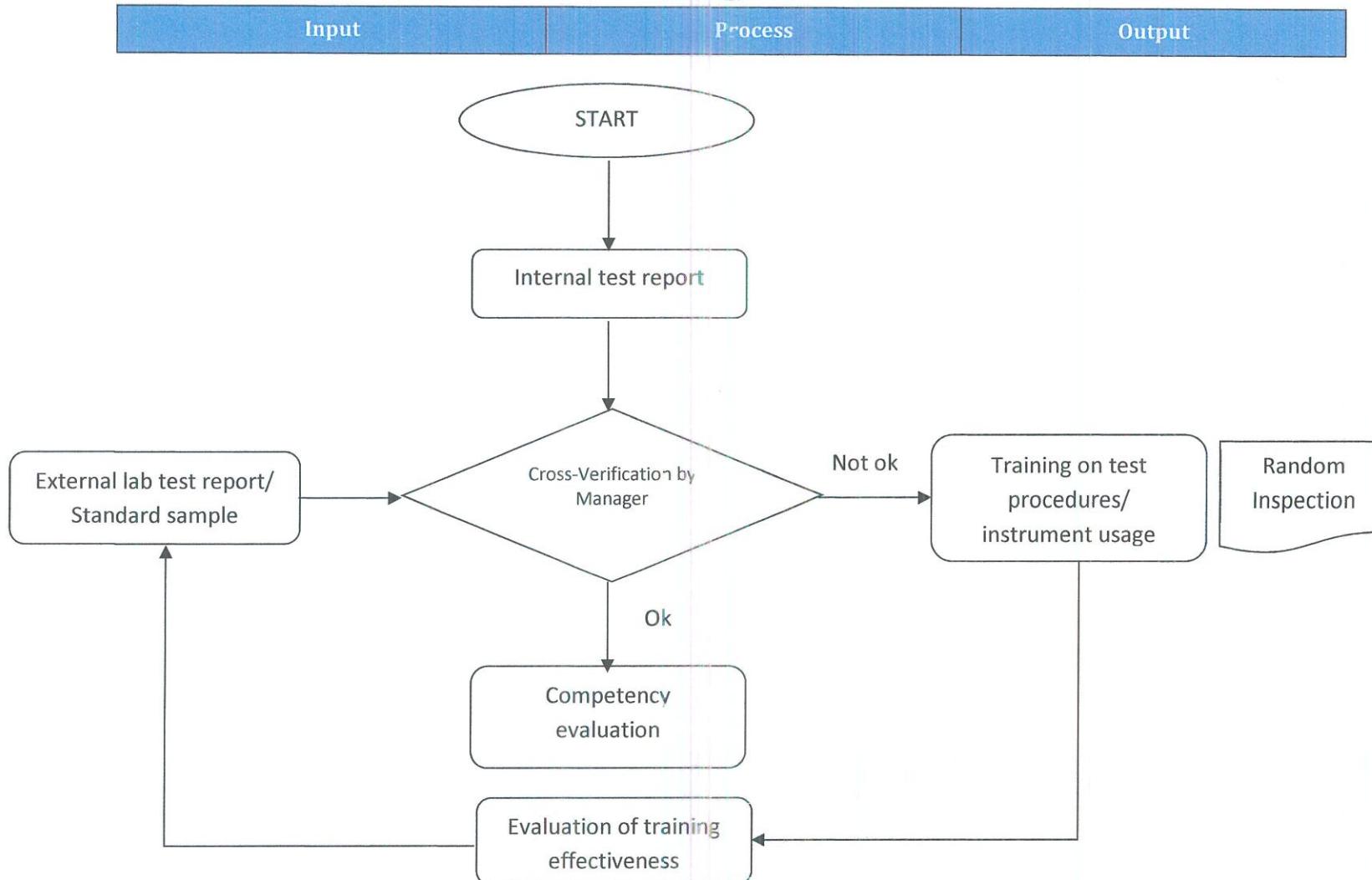


5.2 Process flow diagram (Inspection and Testing of Works)



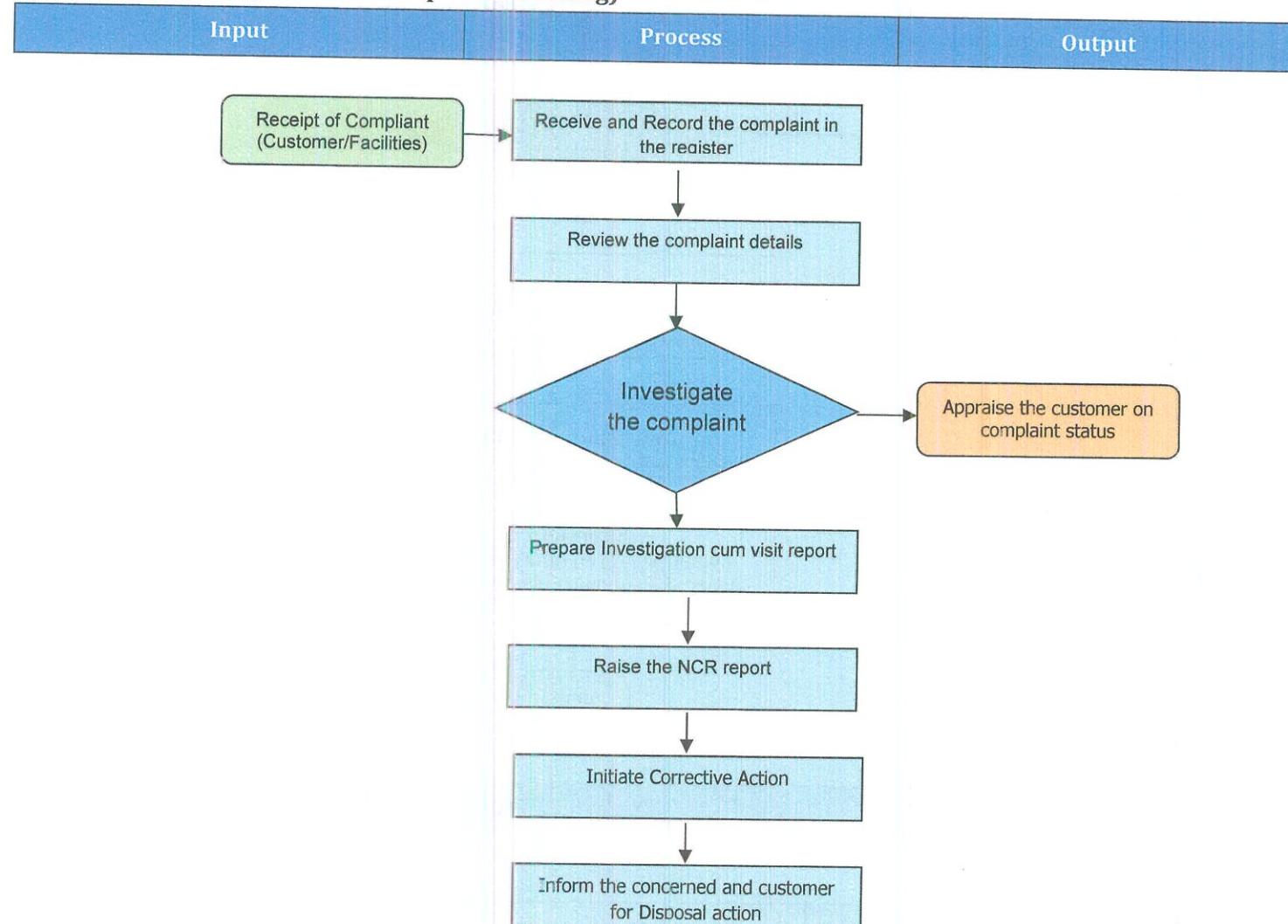


5.3 Process flow diagram (Maintenance & Calibration of Lab Instruments)


5.4 Process flow diagram (Competency Evaluation & Training)


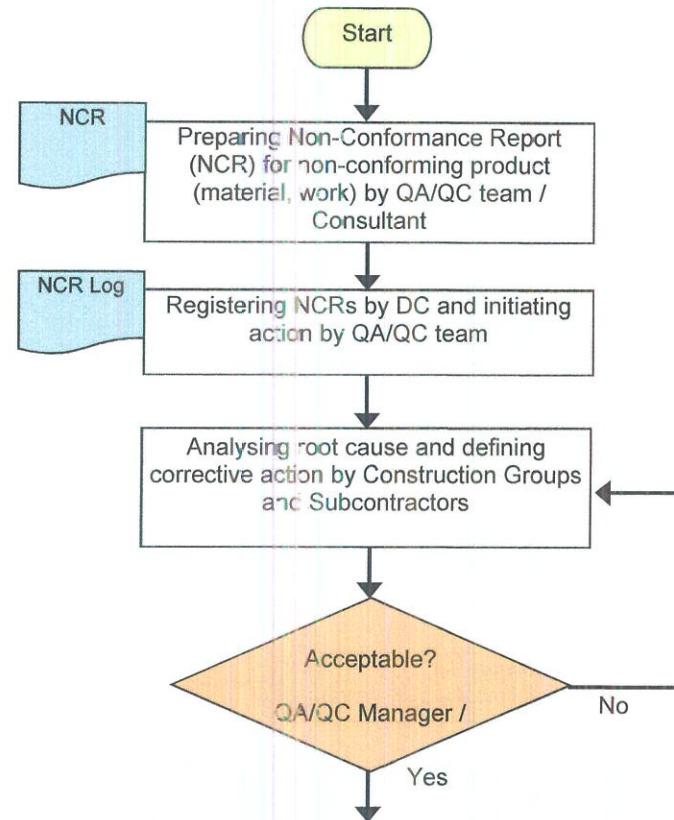


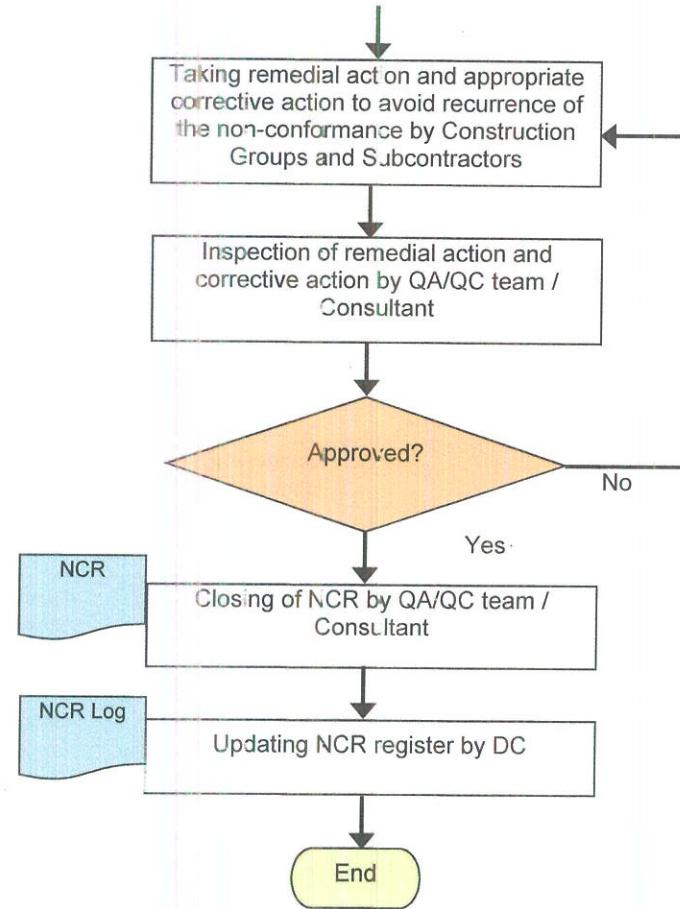
5.5 Process flow diagram (Customer complaint Handling)



5.6 Process flow diagram (Control of Non-conformance outputs)

Input	Process	Output
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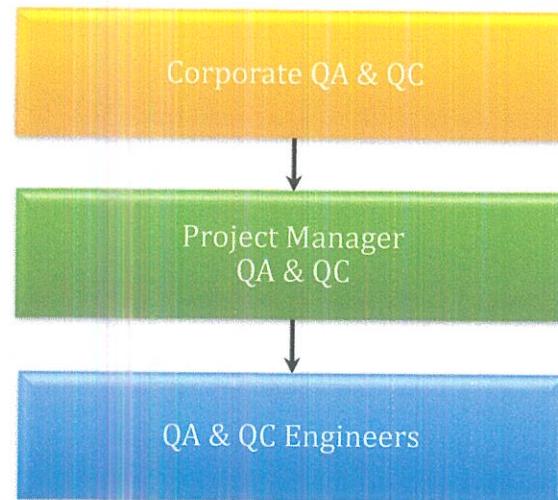
6. Objectives

Q/ E/ S	Objective(s)	UOM	Current status	Targe t	Time Line	Planning			Monitoring			Respon sible
						What	Reso urces	How	Where	Frequency	Method	
Q	Material inspections (MIR) approved VS Actual submitted	%	NA	>95%	FY	Routine Incoming Materials Inspection	QA/QC engineer	Physical Inspection and Document review	Stores	Each Consignment	$\frac{\text{No. of Material Inspections Approved}}{\text{No. Of Material Inspections Submitted}} \times 100$	
Q	Work inspections (MIR) approved VS Actual submitted	%	NA	>90%	FY	Inspection of Construction Activities	QA/QC engineer	Physical Inspection and Document review	Location of Works	As per Inspection and Test Plan	$\frac{\text{No. of Work Inspections Approved}}{\text{No. Of Work Inspections Submitted}} \times 100$	
Q	Compliance to Calibration Schedule	%	NA	100%	FY	Measuring & Test Equipment	Outsourcing	Standard Calibration Procedure	Each Test/Measuring Instrument	Monthly	$\frac{\text{No. of Equipment Calibrated}}{\text{No. of Equipment to be Calibrated}} \times 100$	QA & QC Engineer
Q	Repeat Non-Conformances	%	NA	<20%	FY	Materials & Works	QA/QC Engineer	Inspection	Project	Weekly	$\frac{\text{No. of Repeat NCs}}{\text{No. of NCs}} \times 100$	QA & QC Engineer
Q	Compliance to internal audits	%	NA	100	FY	Auditing as per the Schedule	NA	Preparing the Checklist, Train the auditors	HO & Projects	Every project	$\frac{100 - \text{No. of deviations}}{100} \times 100\%$	IMS Coordinator
S	Reduction of LTIs for the current year	%	0	5	FY	Occurrence of Incidents	NA	Training, TBT, PEP talk & PPE compliance	Projects	Every project	$\frac{100 - \text{No. of incidents}}{100} \times 100\%$	Inspector QA/QC

*Q - QMS, E - EMS, S - OH&SMS, FY - Financial Year, PA - Per Annum, PM - Per Month, NMT - Not More Than, NLT - Not Less Than, NA - Not Available



7. Departmental Chart



Note: Detailed Project-wise organization chart is available in Annexure-1 of Project QA/QC guidelines

7.1 Role, Responsibility, Accountabilities and Authority:

Role	Responsibility	Authority	Accountabilities
HOD - QA&QC	<p>Set and Provide the Project QA/QC Guidelines for all projects.</p> <p>Reviews and approves the Project Quality Management System (PQMS), which includes Quality Management guidelines for each project, at the outset of the work.</p> <p>Supports the project by providing trained, qualified and certified (when required) staff</p> <p>Provides leadership in establishing project goals and reviews performance metric information.</p>	Provider, Approver	Effective implementation of Quality Management System/Project QA/QC Guidelines



Role	Responsibility	Authority	Accountabilities
	<p>Management</p> <p>Determines adequacy of orientation</p> <p>Ensures that the required resources are available to perform and verify contracted construction works.</p> <p>Reviews the audit results and recommend resources to the project manager for taking effective corrective actions.</p> <p>Monitors audit results and encourages timely corrective actions.</p> <p>Provides project management with continuous improvement strategies, goals, and objectives through management reviews.</p> <p>Coordinates review of the lessons submitted by the respective project QA/QC managers.</p> <p>Monitors the client feedback program to ensure that input is entered in the database and actions are taken, as necessary.</p>		
Project Manager (QA&QC)	<p>Establishes Quality Management practices in the PQMS appropriate for the work processes and ensures implementation.</p> <p>Establish Project Orientation Plan and orient every employee to the project specific requirements.</p>	Establisher, Reviewer, Supporter & Evaluator	Effective implementation of Project Quality Management System



Role	Responsibility	Authority	Accountabilities
	<p>Assist contract manager while evaluating potential/existing Contractor/Vendor Quality programs and their implementation as when required.</p> <p>Identifies construction work activities and the definable features of work involved. Prepares the ITP for each Construction activity, and issues these to project personnel and clients (when required by contract).</p> <p>Ensures that Contractors prepare and submit ITPs for their scope of work.</p> <p>Reviews Contractor ITP. Identifies all hold and witness points.</p> <p>Preparing the M&TE control plan.</p> <p>Assists the project manager in developing project performance criteria.</p> <p>Monitors compliance with the work flow requirements, procedures, and policies referenced in the IMS Manual and related processes.</p> <p>Verifies compliance of the product and activities with the PQMS.</p> <p>Supports the project manager in creating the corrective and preventive action system and tracking nonconformance to resolution.</p>		



Role	Responsibility	Authority	Accountabilities
	<p>Ensures that latest approved documents are issued and that superseded documents are removed from use in accordance with periodic surveillance. Ensures that the records are maintained in compliance with the procedures.</p> <p>Produces and maintains a document control plan. Trains staff in good document management including the capture, storage, and retrieval of documents and records.</p> <p>Verifies that a check and review process is implemented and is effective for technical and other work product review.</p> <p>Ensure that Purchase orders & Work Orders were incorporated with the project specific Quality requirements to be complied by Contractors & Vendors.</p> <p>Performs inspections and reviews of Vendor products and services at source or at the project site to ensure that they comply with specified requirements</p> <p>Issue QA/QC Clearance to Contractors' monthly Running Account Bills and Vendor Invoices.</p> <p>Reviews inspection reports and verifies that inspections are conducted in accordance with inspection and test plans.</p>		



Role	Responsibility	Authority	Accountabilities
	<p>Ensures that construction activities are being coordinated and performed in accordance with project requirements.</p> <p>Reviews test reports and verifies that tests are conducted in accordance with testing plans.</p> <p>Reviews daily QC reports and ensures that construction activities are being performed in accordance with project requirements.</p> <p>Supports the continuous improvement process by measuring Quality program performance of the project.</p> <p>Provides this information to the project manager and staff to assist in their performance of management review.</p> <p>Encourages the project staff to submit lessons learned.</p> <p>Coordinates review with Head QA&QC. Implements applicable lessons learned after processes are modified.</p> <p>Ensures that appropriate corrective actions are taken in response to the Client feedback</p>		
QA&QC Engineer	<p>Supports project QA/QC manager in developing project goals and performance criteria.</p> <p>Provides input to the project QA/QC manager in determining controls for the M&TE.</p>	Perform	100% Compliance with Inspection & Test Plan



Role	Responsibility	Authority	Accountabilities
	<p>Identifies nonconforming product using IMS project procedures.</p> <p>Implements corrective and preventive actions.</p> <p>Implement the appropriate section of the PQMS and reports any implementation problems to the Project Quality Manager</p> <p>Conducts inspections in compliance with the Inspection and Test Plan and Material Test Plan (@specified frequencies)</p> <p>Verifies by witnessing, surveillance, and audit that testing by contractors, Vendors or third-party test laboratories is conducted in accordance with approved procedures and by appropriately qualified personnel.</p> <p>Performs project audits as performance dictates.</p> <p>Reviews results of audits and corrective and preventive actions with the project</p> <p>Inspect and approve the actions taken by Project team, necessary to respond to client feedback</p>		
QA Auditor	<p>Conducts audits of PQMS implementation.</p> <p>Creates correction and corrective action procedures.</p> <p>Measures correction and corrective action program performance of Head office and projects, and assists project managers with program implementation.</p>		100 % Compliance with Audit schedule



Role	Responsibility	Authority	Accountabilities
	<p>Issues audit findings where noncompliance is indicated during the performance of an audit.</p> <p>During audits, validates compliance with the PMP requirements for document control and record retention.</p> <p>Management</p> <p>Verifies during scheduled project audits that the appropriate purchase process is implemented.</p> <p>Verifies during scheduled project audits that testing is conducted in accordance with approved procedures and contract requirements.</p> <p>Conducts audits of projects.</p> <p>Reports results to project managers & top management.</p> <p>Conducts periodic trend analysis of audit results and provides this information to top management for consideration in management reviews.</p>		

7.2 Competency Requirement:

Level	Role(s)	Qualification	Experience	Skillset
Level - 1	HOD - QA&QC	M. Tech Civil Engineering, ISO9001 Lead Auditor	Above 20 years	Team Leader, Management, QA Auditing, Training, Effective Communication, Networking Analytical
Level - 2	Project Manager (QA&QC)	B. Tech Civil Engineering & ISC 9001 Internal QA Auditor	Above 15 years	Team Leader, Management, QA Auditing, Training, Effective Communication, Analytical



Level	Role(s)	Qualification	Experience	Skillset
Level - 3	QA&QC Inspector(s)	B. Tech Civil/Electrical/Mechanical Engineering	Above 2 years	Review drawings, Knowledge of Indian and International standards related to construction materials and works

8. Issues – Risks & Opportunities:

8.1 External Issue:

Q/E/S	Area	Issue	Risk	Opportunities	Existing controls	P	S	RR	Action plan	Evaluation
Q	Work Inspection & Testing	Work inspection request not raised by contractor	Rework/ Delay in work progress	--	Awareness to contractor	3	2	6	Establishing and effective implementation of Inspection and test plan	W – Weekly H – Weekly quality report R – QA&QC Project Manager
Q	Inspection & Testing	Influence from vendor/ contractor	NC material/ work may pass to next stage	--	Cross verification of the material/ work by the QA&QC Manager	1	3	3	Nil	Nil

8.2 Internal Issue:

Q/E/S	Area	Issue	Risk	Opportunities	Existing controls	P	S	RR	Action plan	Evaluation
Q	Manpower availability	Pending of inspection work/ material	Delay in work progress	--	Manpower planning	1	2	2	Nil	Nil
Q	Inspection & Testing	Material/ Work passed without inspection	NC product/ work passed to next stage	--	Verification of WIR/ MIR closer report	1	2	2	Nil	
Q	Competency	Competency of the inspectors/ Accuracy of the analysis	NC product/ work passed to next stage or	--	Training to the inspectors	1	3	3	Proficiency test to the QA&QC inspectors	W – Annually H – Proficiency test Analysis



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Q/E/S	Area	Issue	Risk	Opportunities	Existing controls	P	S	RR	Action plan	Evaluation
			Conformance material/ work may be held							R - HOD QA&QC

Probability (P): (1) Once in a year/ per 10 projects and above, (2) Once in a quarter/ per 3 projects, (3) Several times in a month or every project,

Severity (S): (1) No quality/ delivery/ environment/ occupational health & safety issue,

(2) Slight quality/delivery/environment/ occupational health & safety effect, (3) Leads to quality/ environmental issues/ incidents/ customer complaints,

Risk Rating (RR) = Probability (P) X Severity (S); If is RR ≤ 5 Acceptable and if RR > 5 Not Acceptable

W - When, H - How, R - Responsible

9. Interested Parties – Risks & Opportunities:

9.1 External Interested Parties

Q/E/S	Interested Parties	Needs & Expectations	Risk	Opportunities	Existing controls	P	S	RR	Action plan	Evaluation
Q	Vendor/ Contractor	Inspection & testing of material/ work and approving	Rejected material/ work out of specification	Acceptance/ Acceptance with comments or suggestions of the work/ material	Inspection & testing as per the plan	1	1	1	Nil	W - Weekly H - Weekly report R - QA&QC Manager

9.2 Internal Interested Parties

Q/E/S	Interested Parties	Needs & Expectations	Risk	Opportunities	Existing controls	P	S	RR	Action plan	Evaluation
Q	Stores	Inspection & testing of material	Rejected material which are out of specification	Acceptance/ Acceptance with comments	Inspection & testing as per the plan	1	3	3	Nil	W - Weekly H - Weekly report R - QA&QC Manager
Q	Projects	Inspection & testing of work	Rework of out of specification	Acceptance/ Acceptance with comments	Inspection & testing as per the plan	1	3	3	Nil	W - Weekly H - Weekly report R - QA&QC Manager



Probability (P): (1) Once in a year/ per 10 projects and above, (2) Once in a quarter/ per 3 projects, (3) Several times in a month or every project,

Severity (S): (1) No quality/ delivery / environment/ occupational health & safety issue,

(2) Slight quality/delivery/environment/ occupational health & safety effect, (3) Leads to quality/ environmental issues/ incidents/ customer complaints,

Risk Rating (RR) = Probability (P) X Severity (S); If is RR ≤ 5 Acceptable and if RR > 5 Not Acceptable

W – When, H – How, R - Responsible

10. Documented Information

10.1 Supporting Documented Information to be Maintained (DIM) Including External Origin

S. No.	Document Information Maintained	DIM No.	Document Origin	Revision Status	Approval Authority	Controlled copy issued to	Disposal Authority	Mode of disposal
1	Project QA&QC Guidelines	MHCPL-QA&QC-GL	Internal	00	Director Projects	All HODs & Sites	HOD	Tearing

10.2 Supporting Documented Information to be Retained

S. NO.	DIR Name	DIR No.	Revision status	Indexing	Mode	Storage	Retention	Disposal Authority
1	Material Inspection Request Form	MHCPL-FP-STR-4.5	R1	PRO-MIR-XX	hard & soft copy	hard & soft copy	2 Years after handing over	HOD
2	Work Inspection Request Form	MHCPL-QA&QC-F02	00	PRO-WIR-XX	hard & soft copy	hard & soft copy	2 Years after handing over	HOD
3	Non-Conformance Report Form	MHCPL-QA&QC-F03	00	PRO-NCR-XX	hard & soft copy	hard & soft copy	2 Years after handing over	HOD

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