Management of Quality in Construction Project

Trainers and Consultants Inc.

Corporate Quality Assurance

The Corporate Quality Assurance is the representative of the project in the higher management and has the overall responsibility in the implementation and maintenance of the Quality Management System of the company.

The Corporate Quality Assurance reports generally to the company CEO/General Manager, depending on the organization's structure.

Role of Corporate Quality Assurance

Responsibilities:

1. Responsible in the preparation, implementation and maintenance of company's QMS
2. Prepare company's QA manual, control and supervise all amendments and revisions
3. Control and distribute all company quality documentation
4. Monitor all quality related activities at the site
5. Supervise all internal and external quality audits

Role of Corporate Quality Assurance

Responsibilities:

6. Verify site Quality documentation submittals
7. Attend Client quality management meetings
8. Prepare and control project quality management plan and documentation prior to project commencement
9. Review quality inspection personnel qualitifcations and training requirements
10. Monitor disposition of all issued NCR

Role of Corporate Quality Assurance

Responsibilities:

6. Coordinate all QA/QC activities with Site QC manager
7. Coordinate all quality related correspondence with the customer’s representatives
8. Action and close all clients complaints
9. Control all achieved documentation upon completion of projects.

Project QA/QC

The Project QA/QC ensures the quality of the site construction, installation and commissioning are consistent with the company's policy requirements together with national and international standards and the customer specifications.

The Project QA/QC reports functionally to the company's QA Manager but administratively top the Project Manager, depending on the organization's structure.

Role of Project QA/QC

Responsibilities:

1. Implement the QA/QC management systems at site
2. Coordinate Quality inspections
3. Perform relevant QA/QC documentation
4. Participate at site Quality Audits
5. Control all Non-Conformance Report and remedial actions
6. Review specifications and standards

Role of Project QA/QC

Responsibilities:

7. Complete and coordinate approval of site's QC technical submittals
8. Coordinate with Site Manager all Quality issues
9. Coordinate and Chair QA/QC Weekly Meetings
10. Elaborate inspection and test programs
11. Assure all technical documents relative to site Quality control are current

Quality Manual

- A quality manual is a set of documents that is used to define an organization's Quality Management System (QMS).

Quality Plan

- A quality plan is a collection of documents, that is used to specify quality standards, practices, resources, specifications, and the sequence of activities related to a particular product, service, project.

Quality Manual

JB Trainers and Consultants Inc.

SITE SPECIFIC QUALITY CONTROL PLAN

- Work Safely - Communicate Clearly
- Build it Right - Document Accurately

Subcontractor Minimum Requirements

Contractor: 12.5

Date Prepared: ___/___/___

Revision: 8

Prepared by:		Office Phone:	
Project Name:		LeChase Project #:	
Location:			
Scope of Services:			
Owner Name:		Project Start: ___/___/___, Finish: ___/___/___	

LeChase Quality Team

Project Manager:		**Phone #:**		**Email:**	
Site Quality Representative:		**Phone #:**		**Email:**	

(Responsible for this project's Job Specific Quality Program)

Subcontractor Quality Team

Project Manager:		**Phone #:**		**Email:**	
Site Quality Representative:		**Phone #:**		**Email:**	

(Responsible for this project's Job Specific Quality Control Plan)

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nsultants Inc.

Project Quality Plan

- The objective is to ensure through a process of self regulation, that the construction works comply with the clients requirements as detailed in the contract documents
- It details the systems which shall be implemented to control and verify requirements of all works directly including subcontractor works under subcontract agreement

Project Quality Plan

- The quality of products originating from off-site manufacturing facilities shall be verified upon delivery and where necessary at the off-site facilities
- The verification activities for on-site and off-site works shall be carried out in accordance with relevant Method Statements (MS) and Inspection and Test Plans (ITPs)

DESIGN A PLAN TO INCLUDE THE FOLLOWING ELEMENTS:

1- Responsibilities of all personnel

2- Required qualifications

3- Quality Training

4- Quality Standards

5- Policies, procedures, and specifications

6- Actions

7- Documentation and recordkeeping

8- Quality assurance steps

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Project Quality Plan

The following is the outline for the preparation of the Project Quality Plan:

1. Purpose of the Project
2. Project Description
3. Site staff organization chart for quality control
4. Quality Control staff and their responsibilities
5. Construction Program and Subprogram specifics
6. Schedule for submission of shop drawings
7. Method Statement for various installation activities

Project Quality Plan

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2. Project Description
3. Site staff organization chart for quality control
4. Quality Control staff and their responsibilities
5. Construction Program and Subprogram specifics
6. Schedule for submission of shop drawings
7. Method Statement for various installation activities

Project Quality Plan

The following is the outline for the preparation of the Project Quality Plan:

8. Quality Control Procedure for all main activities such as:
    - Procurement (direct bought out items)
    - Off-site manufacturing, testing and inspection
    - Inspection of site activities (checklist)
    - Inspection and testing procedure for systems (MEPFS)
    - Procedure for laboratory testing of material
    - Inspection of material received at site
    - Protection of works

Project Quality Plan

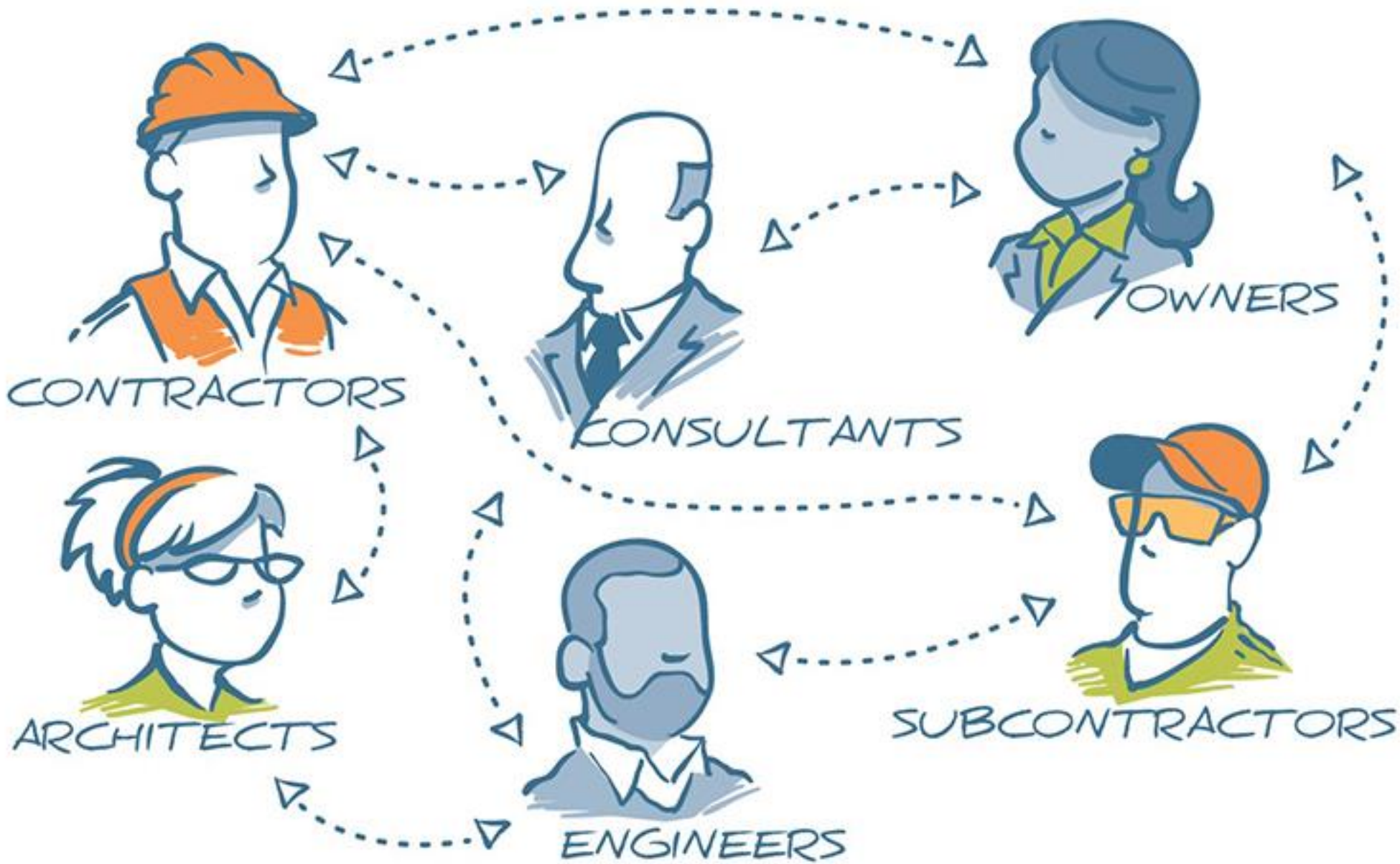
The following is the outline for the preparation of the Project Quality Plan:

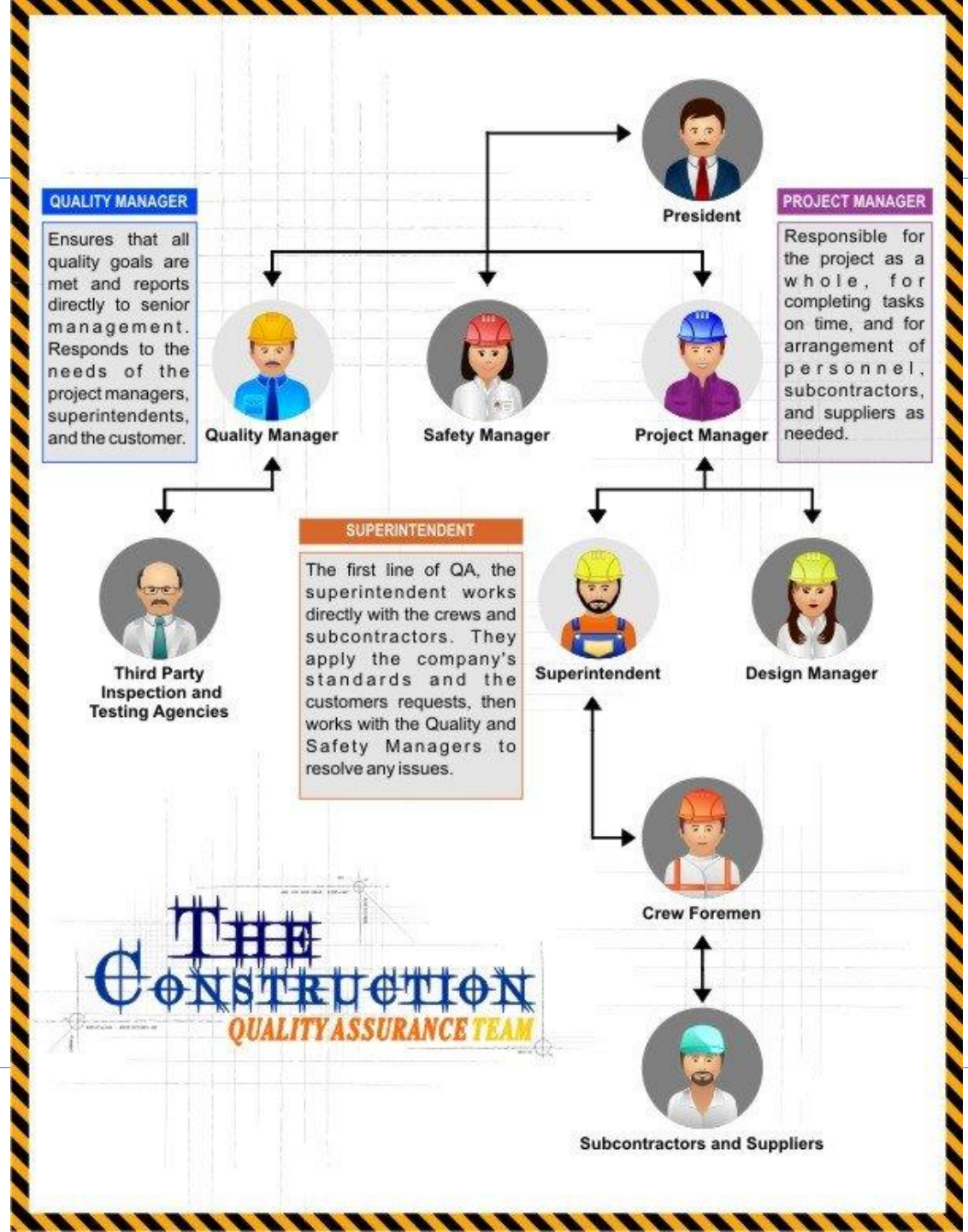
9. Project-specific procedures for site work instructions, and remedial notes
10. Quality Control records
11. List of quality procedures applicable to project in reference to the company's quality manual and procedure
12. Periodic testing procedure for construction equipment and tools

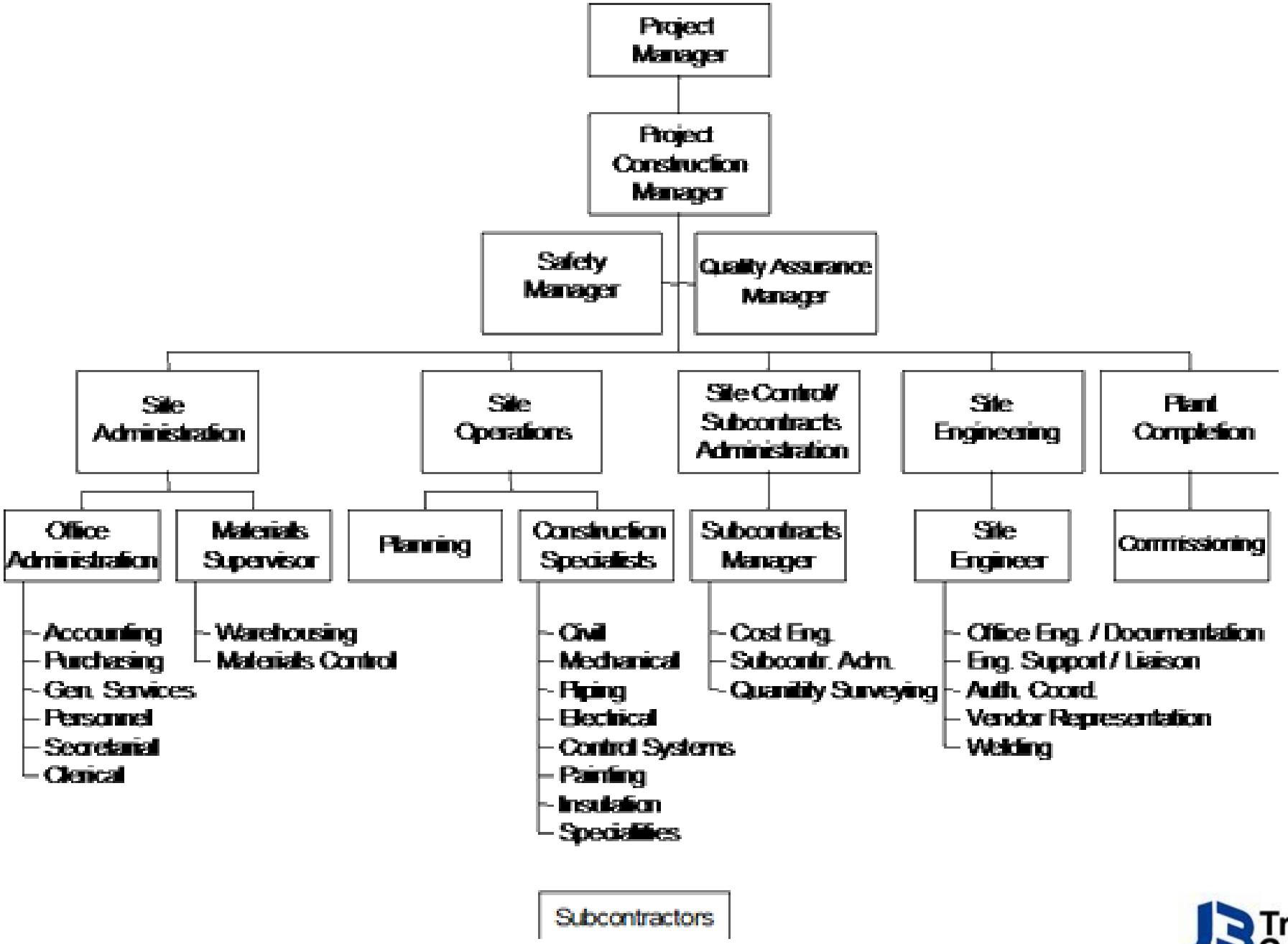
Project Quality Plan

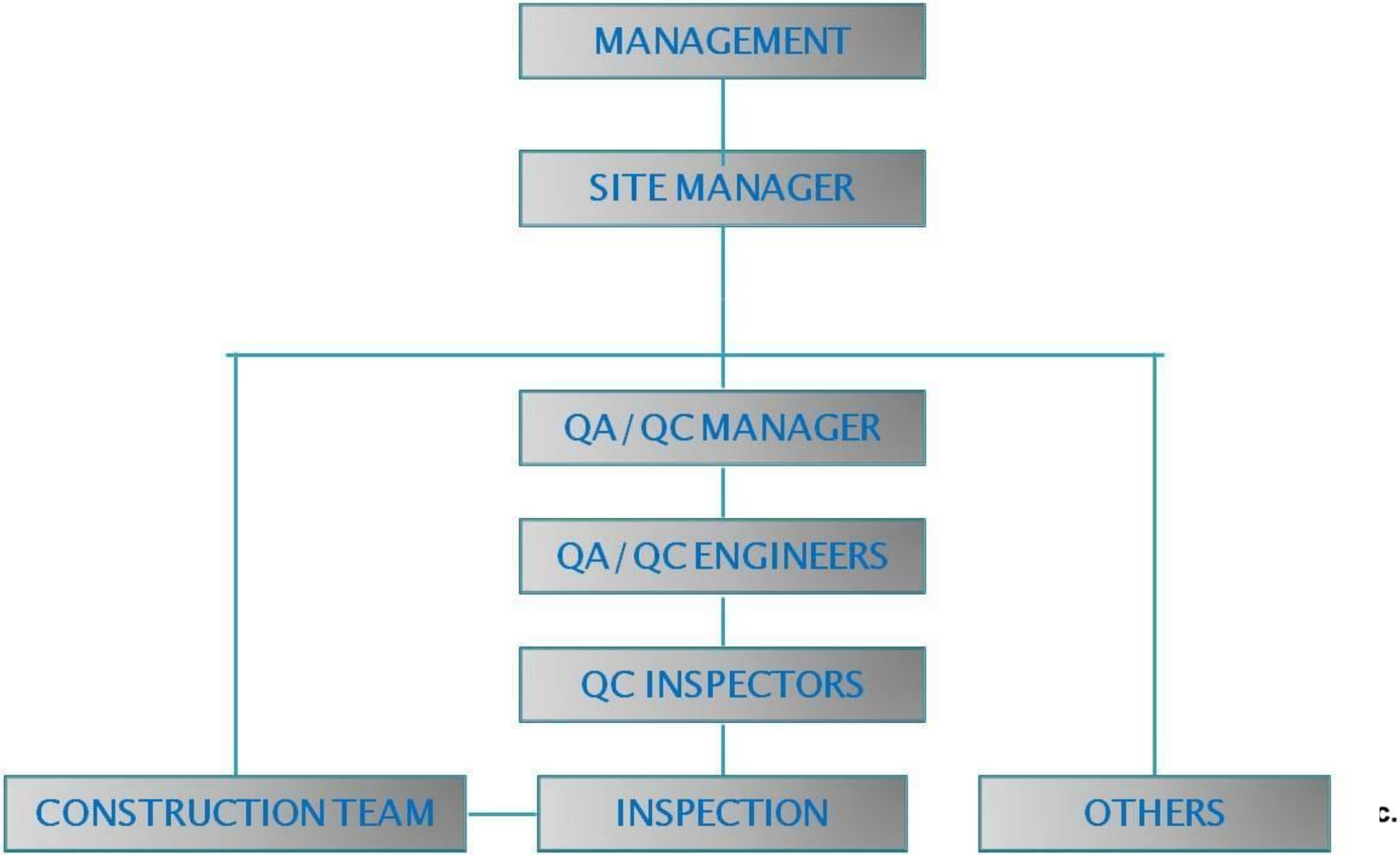
The following is the outline for the preparation of the Project Quality Plan:

9. Quality auditing program
10. Testing
11. Commissioning
12. Handover

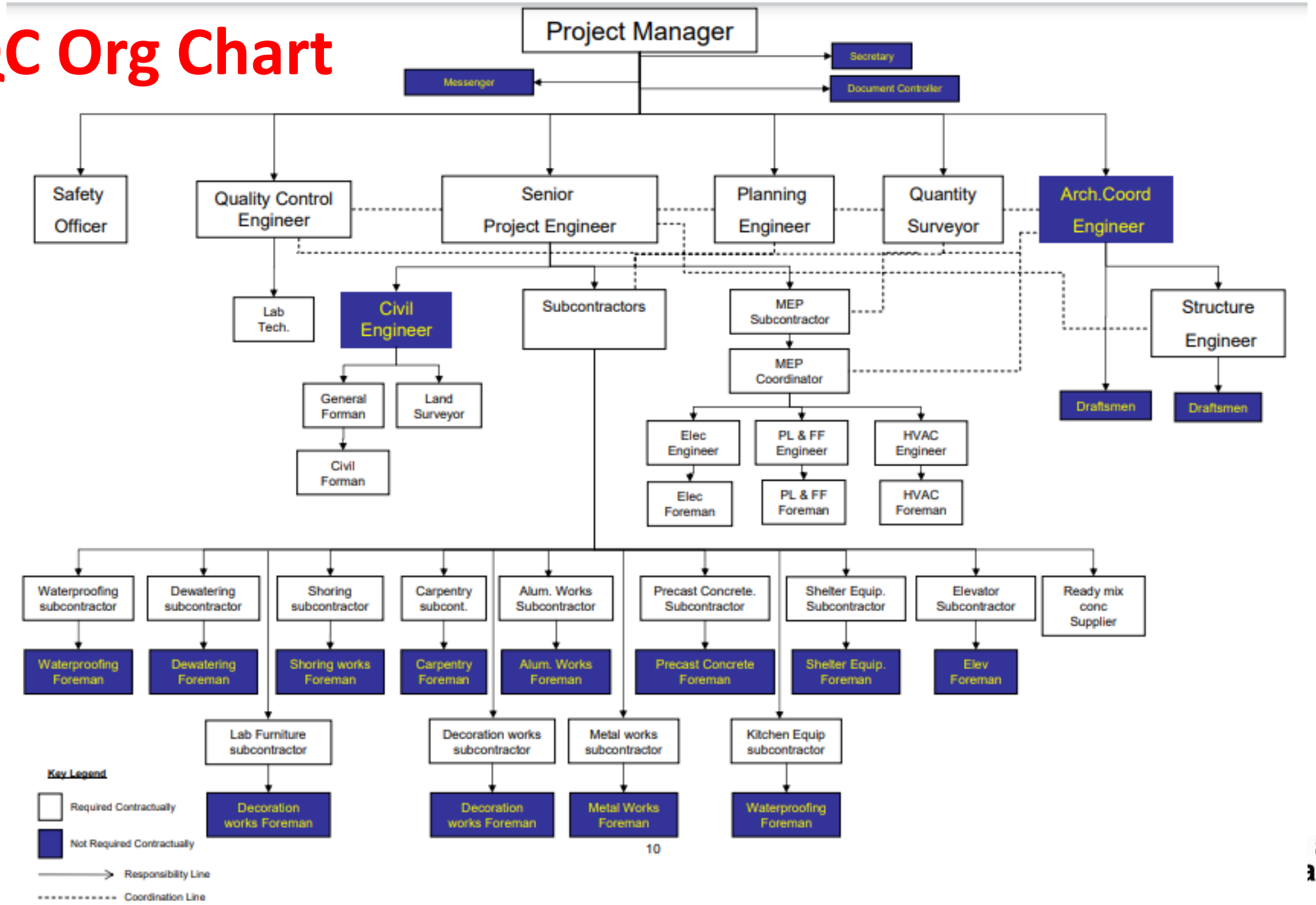







MANAGEMENT
SITE MANAGER
QA / QC MANAGER
QA / QC ENGINEERS
QC INSPECTORS
CONSTRUCTION TEAM
INSPECTION
OTHERS

QA/QC Org Chart



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Construction Manager/Site Manager

Construction Manager

The Construction Manager (CM) is the primary point of contact for GE on all construction management issues. The CM is responsible for the overall management of activities related to the construction program, including the implementation of the CQAP and the health and safety program. As such, the CM will work directly with GE to exercise approval authority over contractor submittals including the CQCP. The CQCP must include the names and qualifications of contractor's QC personnel pursuant to Section 2.3.2 below.

Site Manager

The Site Manager (SM) monitors and works with GE to approve each contractor's quality, and progress submittals to ensure that the project is meeting the contract requirements. The SM will manage the field implementation of the CQAP at the project sites under control of the senior field engineer (FE) and the Construction QA Officer.

c.

Construction Quality Assurance Officer

Construction Quality Assurance Officer

The CQAO is a full-time employee of the CM. The CQAO should have a minimum of five years of experience in related construction and prior QA experience on a project of comparable size and scope to this project. Additional qualifications for the CQAO include one or more of the following requirements:

- P.E. with one year of related construction experience acceptable to GE.
- Engineer in Training (EIT) with two years of related construction experience acceptable to GE.
- Three years of related experience acceptable to GE with a Bachelor of Science Degree in civil engineering, civil engineering technology, or construction.
- Construction materials technician certified at Level III by National Institute for Certification in Engineering Technologies (NICET).

nc.

Construction Quality Assurance Officer

The CQAO reports directly to the CM. The CQAO will have full authority delegated by the CM and GE to institute actions necessary for the successful implementation of the QC/QA program to ensure compliance with the contract plans and technical specifications (including stop-work authority). The CQAO is assigned to the project full time.

The CQAO works with GE to administer and implement the CQAP. This includes controlling this CQAP, making revisions as necessary, and implementing systematic actions to ensure compliance with the plan. The CQAO coordinates activities with the SM to ensure that the FE, inspection staff, third party inspection and testing firms as well as contractor QC staff carry out the requirements of the CQAP.

Construction Quality Assurance Officer

The CQAO is supported by Parsons' QA Services. Parsons QA staff will provide expertise, on an as-needed or as-requested basis, in the investigation and handling of significant or unique quality issues.

The CQAO tracks and reports non-conformances to the CM, SM, and after notification to the CM, to contractor management and contractor QC staff. The CQAO also has full authority to obtain direct access to contractor QC files. Other CQAO responsibilities include:

- Reviewing contractor QC reports, tests, and inspection results;
- Facilitating the implementation of the four-phase inspection program and participating in the required inspections; and
- Ensuring that QA personnel conducting inspections are adequately trained and understand assignment limits and time frames.

Senior Field Engineer

Senior Field Engineer

The Senior Field Engineer (FE) administers the contract requirements, including the CQCP submittals by contractors, and assures that each contractor consistently conforms to its approved CQCP. The FE oversees inspection efforts, provides technical advice, and coordinates support from engineering support, administration, inspection services, safety, and other team members.

The FE coordinates resolution of unsatisfactory work items with contractors through final acceptance. The FE assures open noncompliance report (NCR) items are completed and accepted in a timely fashion. Acting in concert with GE, the SM and CQAO, the FE has the authority to require changes to the contractor's QC organization and plan as required to address apparent trends, to mitigate future NCRs and to obtain the quality specified in the contract documents.

The FE reviews QC and QA testing documentation with contractors, engineers, and inspectors. The FE also reviews plans and specifications for assigned projects and estimates the type and number of QA tests that should be accomplished for each specification section. The FE meets with third-party testing and inspection firms to review test requirements and coordinate testing and inspection services.

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Field Inspector

Field Inspectors

CM Field Inspectors (FIs) are responsible to the FE and support the FE's administration of the construction contracts. The FIs will hold a bachelors degree in engineering or construction and have three years experience in the type of work being performed on this project, or will have at least five years of related experience and will hold the construction materials technician certified at Level III by the NICET. Certification at an equivalent level by a state or nationally recognized organization will be acceptable in lieu of NICET certification. For inspection of the NY Route 196 intersection construction, QA inspectors must meet NICET Level II or higher

Field Inspector

certification in highway construction. Additional experience and training may be substituted for educational requirements, subject to GE's approval.

The FIs will monitor the day-to-day activities of the contractor. This includes ensuring that contractors comply with the plans and specifications, applicable building codes, good workmanship, and the QC requirements of the contract. As part of this effort, FIs will:

- conduct independent inspections to verify the quality of the work;
- participate in contractor four phase inspections;
- review test and inspection reports; and
- ensure that the required documentation is submitted.

The FIs must be alert to detecting, recording, and reporting any deviation from the contract documents, including calling any deficient item to the attention of the FE, the contractor's superintendent, and/or other representative. The FIs must keep accurate and detailed records of the contractor's performance and progress, delivery of materials, and other pertinent matters, including the daily inspection report.

nc.

Responsibility for Site Quality Control

		Linear Responsibility Chart							
		Owner	Consultant	Contractor					
Serial No.	Description	Owner/ Project Manager	Consultant / Designer	Contractor Manager	Quality Incharge	Quality Engineers	Site Engineers	Safety Officer	Head Office
1	Specify quality standards	☐	■						
2	Prepare quality control plan			☐	■	☐			☐
3	Control distribution of plans and specifications			☐	■	☐			☐
4	Submittals			■	☐		■		
5	Prepare procurement documents			☐			■		■
6	Prepare construction method procedures			☐	☐	☐	■		
7	Inspect work in progress		■	■		☐	■		
8	Accept work in progress		■						

(*Continued*)

Responsibility for Site Quality Control

		Linear Responsibility Chart							
		Owner	Consultant	Contractor					
Serial No.	Description	Owner/ Project Manager	Consultant / Designer	Contractor Manager	Quality Incharge	Quality Engineers	Site Engineers	Safety Officer	Head Office
9	Stop work in progress	■	□						
10	Inspect materials upon receipt		■	□	■		■		
11	Monitor and evaluate quality of works		■	□	■	■	■		
12	Maintain quality records			□	■				
13	Determine disposition of nonconforming items	□	□	■					
14	Investigate failures	□	□	■	■	□	■		
15	Site safety			□				■	

Note: ■ = Primary responsibility; □ = Advise/assist

Documents and Records

- Documents are created by planning what needs to be done. Documents can change.
- Records are created when something is done. Records don’t and must not change.

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Document and Records Management

Hardcopy System

1. The master (original) electronic documents are stored as electronic files (ex. Word)
2. Master files are stored as spreadsheet files (ex Excel)
3. Files are managed by a DOCUMENT CONTROLLER
4. When printed, these are distributed to the different identified copyholders in the organization
5. The master list defines the specific documents indicating the Document ID Code, Revision level, Date of Issue, Author, Copyholder

Document and Records Management

6. A “Document Review/Approval Form is used to introduce or initiate revisions to any document:

   - Passes through the approval process
   - Approved changes are implemented in the electronic file
   - Revised document is printed, stamped and replaces the superseded document
   - Superseded document are retrieved and marked as “Obsolete”

Document and Records Management

Electronic System

1. Establish a database for all processes, procedures, work instructions and forms
2. The database is controlled by a System Administrator and must be backed up periodically
3. Access authority defined by levels, rights, usernames and passwords
4. Printing of documents has restrictions
    - Printouts have expiry dates
    - Use watermarks to warn users

Document and Records Management

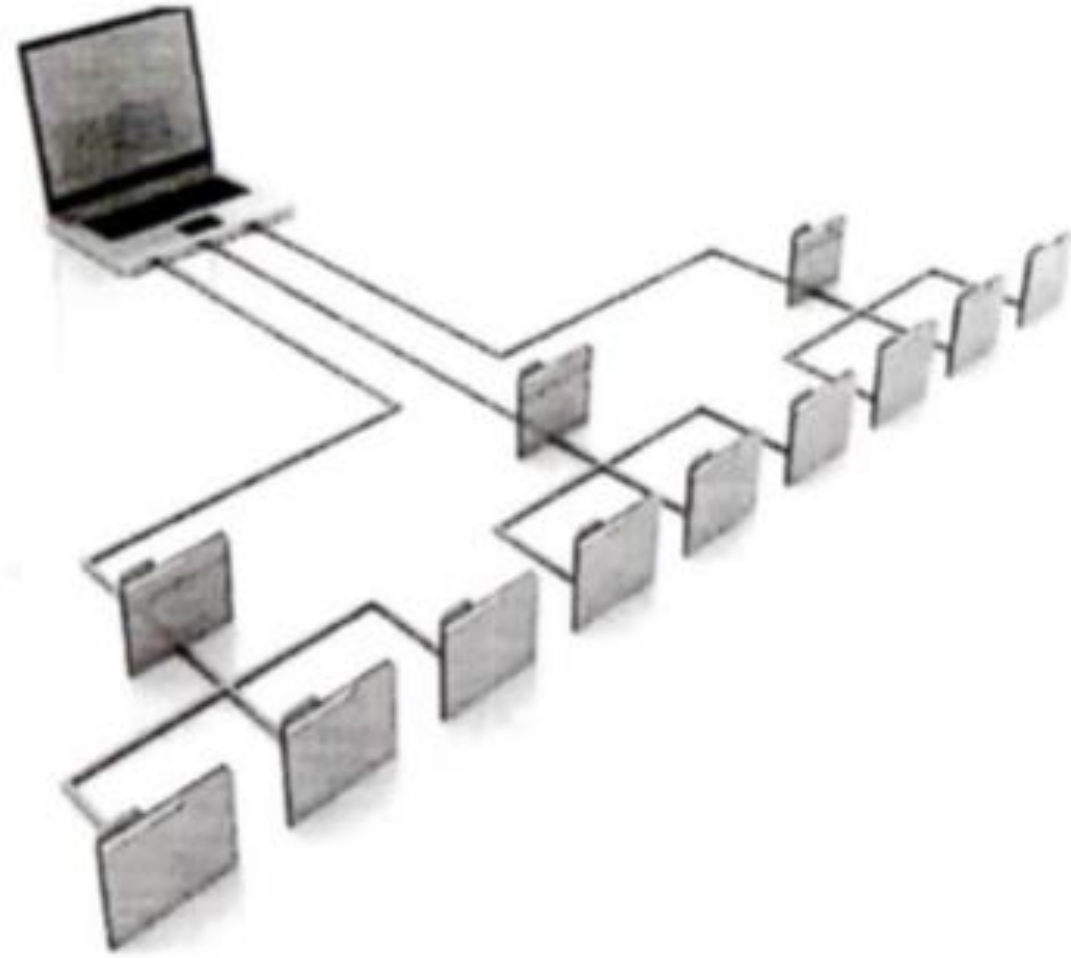
Electronic System

5. Document approval and revision process
   - An “Author” writes and revises document
   - Sent electronically for review and approval
   - Upon approval, document is loaded into the database for access
   - Affected personnel are notified
6. Users of procedures or other documents have electronic access (read only)

THE FILING LIST

A. ADMINISTRATION

A1 Insurance/Bond/Worker's Compensation
A2 Insurance Claims
A3 Daily Site Reports
A4 Memorandum
A5 Miscellaneous
A6 Training Assessment Records Sheets (TARS)
A7 Minutes of Internal Meeting
A8 Petty Cash
A9 Project News Letters
A10 Stationery / Office Equipment Details
A11 Shipping Manifests / Details / Airway Bill
A12 Internal Costing or Commercial
A13 e-mails (Incoming and Outgoing)
A14 C.V's
A15 Weather Forecasts



THE FILING LIST

C. ENGINEERING & DESIGN

C1 Statutory Authority - Temporary Facilities
C1a Drawings Approved by Client - Temp Facilities
C1b Statutory Authority - Permanent Structures
C2 Employer's Requirement/Revision
C3 Specifications
C4 For Construction - Drawings
C5 For Construction - Superseded
C6 Standard Specifications (ASTM)*
C8 Final Design Acceptance
C9 Fabrication Shop Drawings
C10 Concrete Shop Drawings
C11 Design Contractor Document Register and Transmittal

*QA/QC shall maintain files

Filing System

8.0 BID PHASE ACTIVITIES

8.1 Advertisement for Bids

8.2 Bidder List (Documents Issued)

8.3 Bid Opening Reports

8.4 Summary and Evaluation of Bids

8.5 Preaward Submittals

Filing System

9.0 PRECONSTRUCTION PHASE

9.1 Inspection and Testing Manual

9.2 R/W, Easement, and Permit Documents

9.3 Preconstruction Conference

9.4 Contractor Submittals

- **9.4.1** Bonds and Insurance
- **9.4.2** Bid Breakdown (Schedule of Values)
- **9.4.3** Preliminary Schedule (CPM, etc.)

Filing System

9.5 Notices to Contractor

- **9.5.1** Award
- **9.5.2** Proceed

10.0 CONSTRUCTION PHASE

10.1 Inspection Records and Reports

- **10.1.1** Daily Construction Reports
- **10.1.2** Field Diaries
- **10.1.3** Certificates and Delivery Tickets
- **10.1.4** Nonconformance Reports
- **10.1.5** Batch Plant Records
- **10.1.6** Special Inspection Reports

Filing System

10.2 Quality/Materials Testing

- **10.2.1** Pipe
- **10.2.2** Concrete
- **10.2.3** Soils
- **10.2.4** Asphalt Products
- **10.2.5** Welding
- **10.2.6** Other Materials

Filing System

10.3 Changes and Extra Work

- **10.3.1** Change Orders
- **10.3.2** Work Directive Changes
- **10.3.3** Field Orders
- **10.3.4** Estimates of Change Order Costs
- **10.3.5** Requests for Proposals
- **10.3.6** Extra Work Reports
- **10.3.7** Change Order Log
- **10.3.8** Deviation Requests

Filing System

10.4 Payment for Work or Materials

- **10.4.1** Progress Payment Estimates
- **10.4.2** Contractor's Pay Requests
- **10.4.3** Materials Delivered (Not Yet Used)

Filing System

10.5 Progress of the Work

- **10.5.1** Contractor's Work Schedules (Diagrams)
- **10.5.2** Schedule Updates (Computer Printouts)
- **10.5.3** Monthly Progress Reports and Job Status

Filing System

10.5 Progress of the Work

- **10.5.1** Contractor's Work Schedules (Diagrams)
- **10.5.2** Schedule Updates (Computer Printouts)
- **10.5.3** Monthly Progress Reports and Job Status

10.6 Time of Work

- **10.6.1** Delays in the Work
- **10.6.2** Time Extensions
- **10.6.3** Suspension of Work

Filing System

10.7 Contractor Submittals

- **10.7.1** Shop Drawings
- **10.7.2** Samples
- **10.7.3** Certificates
- **10.7.4** Mix Designs
- **10.7.5** Sheeting, Shoring, and Bracing Plans

10.8 Record Drawings

- **10.8.1** Updates During Construction
- **10.8.2** Final Record Drawings

Filing System

10.9 Photographic Records

- **10.9.1** Progress Photos
- **10.9.2** Claims Photos
- **10.9.3** Safety Hazard Photos
- **10.9.4** Accident Photos
- **10.9.5** Public Relations Photos

10.10 Disputes, Protests, and Claims

- **10.10.1** Contractor-Initiated Actions
- **10.10.2** Owner/Engineer Documentation

Filing System

10.12 Beneficial Use/Partial Utilization

10.13 Maps

10.14 Outside Services

- **10.14.1** Surveys
- **10.14.2** Testing Laboratories
- **10.14.3** Special Inspections
- **10.14.4** Consultants

Filing System

11.0 PROJECT CLOSEOUT

11.1 Operational Testing and Evaluation

11.2 Punch Lists

11.3 Final Submittals from Contractor

- **11.3.1** Record Drawings
- **11.3.2** Keying Schedule
- **11.3.3** Spare Parts
- **11.3.4** Tools

11.4 Notice of Completion

11.5 Final Progress Payment

11.6 Release of Retainage and Withholding

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Construction Procedure

A **procedure** is an established method for a specific process, describing step-by-step the activities that constitute the process and indicating the persons responsible for these activities.

P r o c e d u r e
Quality | Safety | Environmental

JB Trainers and Consultants Inc.

Construction Procedure

The **purpose** of the procedure is to ensure that construction works are conducted in compliance with applicable regulations, meeting schedule, milestones and set quality requirements satisfying applicable codes, standards, approved drawings, design and other specifications.

“write what you do; do what you write”.

JB Trainers and Consultants Inc.

Construction Procedure

Categories of Procedures:

1. **System procedures** are used to rationalize the administrative processes such as document control, contract review and internal quality audit.

2. **Technical procedures** are prepared, where necessary, to standardize the construction and installation processes.

Construction Procedure

The following is the outline for the preparation of the Construction Procedure:

1. Introduction
2. Purpose and Scope of Work
3. Definitions
4. Reference Specifications and Standards
5. Safety/Health Environment
6. Responsibilities
7. Procedure

INDEX OF CONSTRUCTION PROCEDURES

Report Date: Apr.01, 2008

C.P. NO.	Item No.	TITLE	Rev. No.	SUBMISSION DATE	APPROVAL DATE	ORIGINATOR	STATUS
SSA-QCD-3-013	1	Civil Works	0	28-Jan-08	-	MMG	B
			1	5-Feb-08	9-Feb-08	MMG	A
SSA-QCD-3-030	2	Structural Steel Works	0	29-Jan-08	-	MMG	B
			1	2-Feb-08	5-Feb-08	MMG	A
SSA-QCD-3-046	3	Underground Metallic Piping	0	28-Jan-08	-	MMG	B
			1	31-Jan-08	5-Feb-08	MMG	A
			2	10-Mar-08	11-Mar-08	MMG	A
SSA-QCD-3-047	4	Underground Non-Metallic Piping Works	0	27-Jan-08	-	MMG	B
			1	31-Jan-08	5-Feb-08	MMG	A
SSA-QCD-3-002	5	Welding Consumables Control	0	29-Jan-08	-	MMG	B
			1	8-Mar-08		MMG	B
SSA-QCD-3-007	6	Above Ground Metallic Piping Works	0	27-Jan-08		MMG	B
			1	27-Mar-08			
SSA-QCD-3-003	7	Painting Works	0	27-Jan-08		MMG	B
			1	27-Mar-08			
SSA-QCD-3-003	8	Electrical & Instrumentation	0	29-Mar-08		MMG	B
SSA-QCD-3-019B	9	Stationary Equipment	0	29-Mar-08		MMG	B
SSA-QCD-3-019A	10	Rotating Equipment	0	29-Mar-08		MMG	B
SSA-QCD-3-016	11	HVAC	0	29-Mar-08		MMG	B
SSA-QCD-3-020	12	PWHT	0	29-Mar-08		MMG	B

STATUS INDICATOR:

A = Approved for Construction

B = Submitted to Client for Approval

C = For revision

D = To be Documented Prior to Commencement of the Work, Activity, or Process

d
s Inc.

CONSTRUCTION PROCEDURE FOR
CIVIL WORKS

☐ APPROVED ☐ WITH COMMENT
☐ REVIEWED ☐ RESUBMIT

THIS APPROVAL OR REVIEW DOES NOT RELIEVE THE VENDOR/SUBCONTRACTOR OF HIS RESPONSIBILITIES TO MEET ALL OF THE SPECIFIED REQUIREMENTS OF THE PURCHASE ORDER.

	ORIGINATOR	CHECKED	APPROVED
NAME			
SIGNED			
DATE			

ENGINEERING CO., LTD

REV.	DATE	DESCRIPTION	MADE BY	CHECKED BY	APPROVED
3					
2					
1	05.Feb.08	For approval	A.V.Zulueta	A.V.Zulueta	R.F.Dangal
0	28.Jan.08	For approval	A.V.Zulueta	A.V.Zulueta	R.F.Dangal

(SUBCONTRACTOR NAME)

DEPARTMENT	JOB NO	DOCUMENT NO	REV NO
QA/QC	SC-2142	SSA-QCD-3-013	1

e) Mixing and pouring activities have been conducted in accordance with manufacturers instructions and project specifications.

f) Check the grout temperature if its in accordance with the manufacturer's recommendation and project specification.

g) Pouring of grout shall be controlled to avoid air entrapment and subsequent voids.

h) Where required, ensure Portland cement mixture is applied to blend grout to a uniform colour.

i) Ensure grout samples were taken for compressive test verification.

j) Verify grout acceptable condition on formwork removal after specified curing period.

7.17.3 Acceptable grouting results will be recorded on form QCD-4-303. On completion the QC Civil Inspector shall sign the report, obtain any approval signatures and place records in project drawing work scope file.

7.18 Concrete Flooring

7.18.1 The QC civil inspector shall review the actual requirements of the project approved QCIP, associated procedures and specifications.

Where applicable he will consider the following points during his surveillance's:

a) All latest revision of IFC drawings are available and in use.

b) All materials have been inspected and conform to the specified requirements. Handling and storage requirements are followed and no deterioration has occurred.

c) Ensure all areas have been prepared and compacted in accordance with the specification and that they have been inspected and accepted.

d) Ensure that where required the formwork and steel reinforcement is conducted and inspected in accordance with sections 6.10 and 6.11 of this procedure.

e) Concrete pouring shall be completed in accordance with section 6.12 of this procedures.

f) Ensure that the final surface finish is treated as specified, i.e. floated, scratched, steel trowelled and broomed finishes.

g) Ensure defects are trowelled after floor saturation of the materials and final repairs shall be subjected to review during floor final inspection.

7.18.2 The civil QC inspector records concrete activities on the applicable sections of QCD-4-302: Concrete Inspection Record. After required endorsements this shall be placed in the drawing work scope project files.

7.19 Masonry Wall Construction

7.19.1 Materials

All materials should meet the requirements of the referenced specifications, shall be free from damage or contamination; and stored in a manner that will not cause deterioration.

Method Statement

Method Statement (MS)

A narrative description of work methodology or procedure that will be applied in a specific construction operation where details are required

Method Statement

Method Statement (MS)

The method statement explains in detail the works to be undertaken and that the productivity rates of the combination of equipment, manpower construction methods and techniques conform with the engineering assumptions in the development of the project schedule.

Method Statement

Method Statement (MS)

The method statement explains in detail the works to be undertaken that it conforms to the necessary remedial measures that are needed to be in place inorder to protect the site work force and in some cases members of the public who may be affected by work actions.

Method Statement

No definite format and may vary with work processes, It may contain the following:

1. Details of the organization in control of the activity
2. A description of the activity
3. A description of how the work will be managed
4. The location of the activity, its boundaries, means of access and how it is separated from other activities
5. Plant and Equipment required
6. A step by step description of the activities to be undertaken

Method Statement

No definite format and may vary with work processes, It may contain the following:

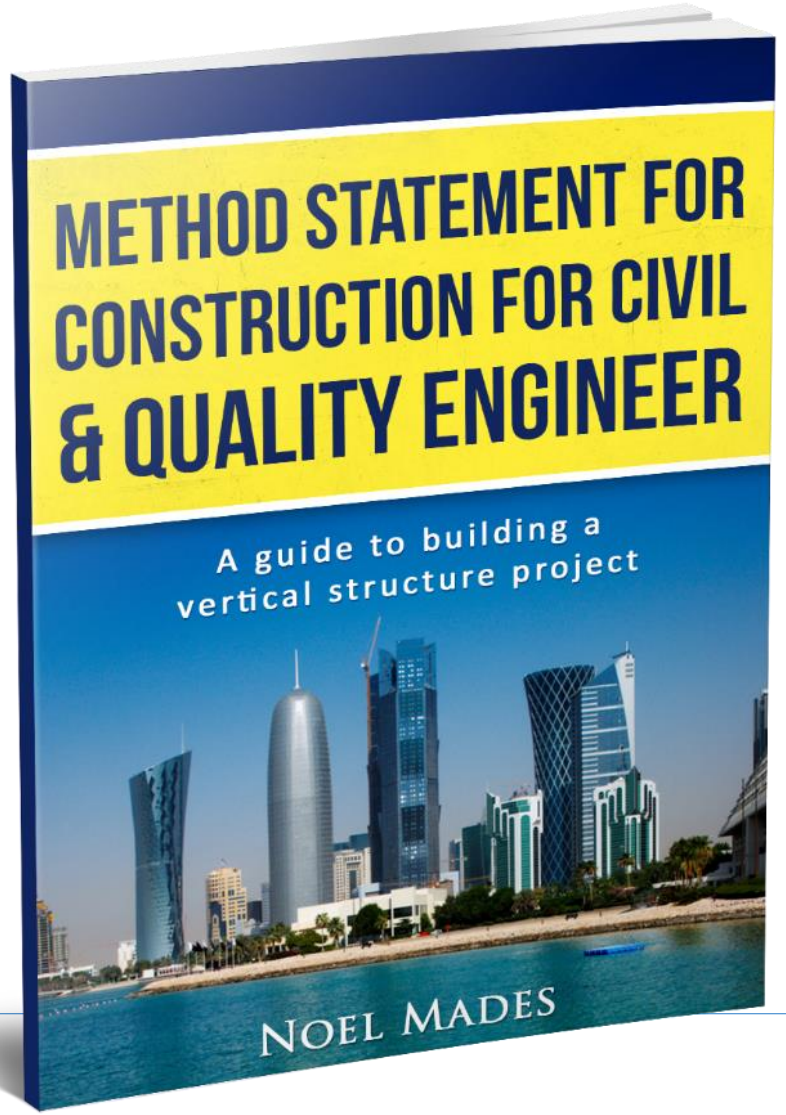
7. Precautions necessary to protect workers and other people that could be affected, including PPE and ventilation requirements
8. Training requirements
9. The need for some specialty operators in some activities
10. Emergency Procedures
11. Handling and storage of wastes
12. Method of safeguarding existing structures, temporary works

Method Statement

The following is the outline for the preparation of the Method Statement:

1. Introduction
2. Purpose and Scope of Work
3. Reference Specifications and Standards
4. Responsibilities
5. Required Equipment/tools
6. Materials
7. Work Execution
8. Attachment

Method Statement



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INDEX OF METHOD STATEMENTS

MS NO.	ITEM NO.	TITLE	Rev. No.	SUBMISSION DATE
C001L	1	Construction of Pile Caps	0	13-Nov-07
			2	27-Nov-07
			2	13-Dec-07
			3	6-Mar-08
C002L	2	Dewatering Works	1	-
			2	13-Dec-07
			3	16-Dec-07
C003L	3	Earth Excavation Works	0	13-Nov-07
			1	13-Dec-07
C004	4	Sheet Piling Works	0	29-Nov-07
P001	5	Shop Fabrication of Piping System	0	1-Dec-07
Scaffolding	6	Scaffolding Works	0	1-Jan-08
Tempfacil	7	Dismantling of Existing Warehouse	0	24-Dec-07
C006	8	Application of Nitocote ET 401	0	13-Dec-08
			1	2-Jan-08
			2	14-Jan-08
			3	3-Feb-08
C007	9	Fireproofing of Piperacks	0	31-Jan-08
			1	21-Feb-08
			2	*****
		Portland Cement Fireproofing of Piperacks	3	12-Mar-08
P012	10	Underground Cooling Water Pipeline Installation	0	15-Jan-08
			1	11-Mar-08
			2	27-Mar-08
C008	11	Repair of Pipe Rack Pedestal	0	22-Jan-08
			1	24-Jan-08
C009	12	Construction of Sump Pit	0	14-Jan-08
			1	29-Jan-08
C010	13	Application of Thioflex 600 GG	0	10-Feb-08
			1	11-Feb-08
C013	14	Levelling Plate Setting of Pipe Racks Column	0	2-Mar-08
C013	15	Repair of Nitocote ET401 Coating	0	13-Feb-08
C014	16	Reducing of Concrete Cracks	0	14-Feb-08
C015	17	Backfilling Works	0	17-Feb-08
			1	27-Feb-08
			2	19-Mar-08
C016	18	Erection of Structural Pipe Racks	0	9-Mar-08
P017	19	Coating of U/G Piping Weld Joints	0	

STATUS INDICATOR
A = Approved For Construction
B = Submitted to Client for Approval
C = 1 or revision
D = To be Documented Prior to Commencement of the Work, Activity, or Process
E= Cancelled

☐ APPROVED ☐ WITH COMMENT
☐ REVIEWED ☐ RESUBMIT

THIS APPROVAL OR REVIEW DOES NOT RELIEVE THE VENDOR/SUBCONTRACTOR OF HIS RESPONSIBILITIES TO MEET ALL OF THE SPECIFIED REQUIREMENTS OF THE PURCHASE ORDER.

	ORIGINATOR	CHECKED	APPROVED
NAME			
SIGN			
DATE			

ENGINEERING CO., LTD

REV.	DATE	DESCRIPTION	MADE BY	CHECKED	APPROVED
3					
2					
1	12 Aug 2008	For Approval	J.Z.A.	A.V.Z	A.S.H.
0	06 Aug 2008	For Approval	J.Z.A.	A.V.Z	A.S.H.

DEPARTMENT	JOB NO	DOCUMENT NO.	REV NO
Civil	SC-2141	MS-C069	1

Liaison with the field superintendent ensuring that work is carried out in accordance with project Safety Plan/procedure.

ENGINEERING DEPARTMENT

Provide technical support to MMG site operation section and do the required concrete pouring plan. Provide IFC drawings, standard and technical specifications. Review drawings/data of the client and prepare method of statement and remedial measure of technical work execution problems.

5.0 REQUIRED EQUIPMENT/TOOLS :

- Concrete Pump
- Concrete Vibrators (pneumatic and mechanical, plus extra)
- Rubber Mallet

6.0 MATERIALS:

- Ready Mixed Concrete, 35Mpa at 28 days with micro silica fumes.
- Nitobond PVA, Concrete Adhesive

7.0 WORK EXECUTION

- Before pouring of concrete will commence make sure that access platforms and railings linking the columns of the structure are sufficient and properly installed.
- Inspection of reinforcing bars, formworks, embedded items installations, and any other related works shall be carried out by QA/QC before concrete pouring.
- Provide two (2) sliding windows (300mm x full width of the column – both sides of column) on each column per elevation, (2000 mm, and 4000 mm from the construction joint, as per demonstration); this will serve as access windows for monitoring the levels of concrete and access for mechanical vibrators.
- The window openings (300mm x 300mm) on both sides of the column at the construction joint, will serve as access for cleaning and outlet for removal of dirt.
- All materials, tools/equipments to be used shall be mobilized before scheduled time and provide extra unit (in accordance with the pouring plan which also

includes manpower and supervision) to ensure continuous operation in case of equipment failure.

- Existing concrete will be soaked with water within an interval of 24 hrs/12 hrs before concrete pouring
- Apply Nitobond PVA on all construction joints one (1) hour before concrete pouring.
- The initial onset of concrete shall be controlled at minimum pump pressure to control the rebound of aggregates.
- During concrete placement, vibrate fresh concrete for every 600mm lift height.
- At 600 mm level, manual vibration will be applied on all corners and sides of the column at an interval distance of 30 cm. The pneumatic vibrator will be applied on all areas of the center. Vibration shall be done at 10-15 seconds per point.
- For the succeeding levels, vibration shall be done similarly using the pneumatic vibrator.
- Provide length markers starting from the tip of the vibrators pin which will indicate as guide on how deep the vibrator penetrates thru the fresh concrete. Similarly, this shall also be done on the concrete conveying hose in order to determine the falling height of concrete during pouring.
- The column's formwork shall also be marked to determine the pouring level at 500 - 600 mm. The signal man shall then inform to the pumpcrete operator to properly control the rate of pouring .
- Pouring sequence:

  a. Concrete pouring at first level, up to elevation 600 mm
  b. Vibrate corners and sides
  c. Check pouring level
  d. Proceed to next pouring level when all windows are closed and secured
  e. Pouring is transferred to another column after pouring at 2m level
  f. Repeat and follow sequence of pouring

- The method for mixing, preparation of concrete, transporting, depositing and consolidation of concrete shall be in accordance with the project specification.
- Concrete mix which are not applied after 90 minutes will be disposed

Proj

Based o

Inspection and Testing

An inspection and testing is an activity such as measuring, examining, testing or gauging one or more characteristics of a product and comparing the results with specified requirements in order to establish whether conformity is achieved for each characteristic.

Inspection and Testing

- Insp and Test - Materials and Equipt
-
-
-

Inspection and Testing

- Insp and Test - Materials and Equipt
- Insp and Test During Installation
-
-

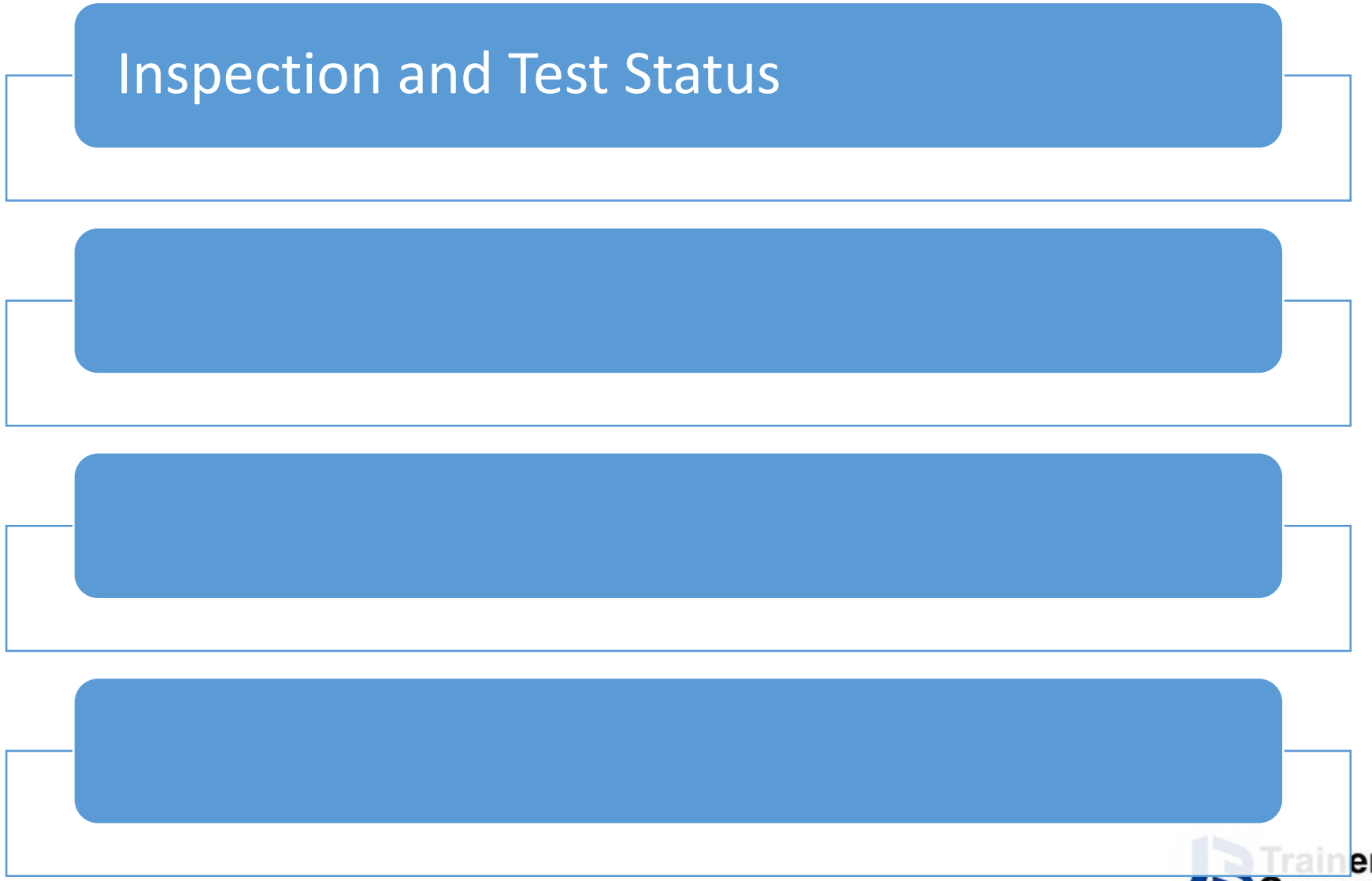
Inspection and Testing

- Insp and Test - Materials and Equipt
- Insp and Test During Installation
- Final Inspection and Testing
-

Inspection and Testing

- Insp and Test - Materials and Equipt
- Insp and Test During Installation
- Final Inspection and Testing
- Inspection and Test Records

Inspection and Testing



Inspection and Test Plan

Inspection and Test Plan (ITP)

A document detailing a systematic approach to testing a system or product (ex. Material, Component, machine, package etc..) through visual inspection, dimensional measurement, NDT, function test, factory acceptance test, with the participation of all involved parties.

Inspection and Test Plan

Inspection and Test Plan (ITP)

It is used to validate the inspection and test results against design and work specification according to the sequence of operations which are witnessed and verified by the client/owner's representative hand in hand with the fabricator/constructor.

Inspection and Test Plan

Inspection and Test Plan (ITP)

It is the program of inspection, testing of materials, and survey that shall be prepared and submitted by the contractor to the Client or his Representative for approval before usage and application to the site.

Inspection and Test Plan

Preparation, Review, Approval and Implementation:

1. ITP and Checklist are prepared and issued by the Quality Engineer
2. Reviewed by the Quality Manager and Construction Manager
3. Approved by the Project Manager
4. Submitted to the Client or his Representative for approval
5. QA/QC Engineer shall maintain a Register of all approved ITPs and Checklists
6. Copy of the approved ITPs and checklists are provided to Quality Inspectors and contractor for implementation

Inspection and Test Plan

Checklist

A list of items that shall be noted or checked in a completed activity. It is always attached to the Inspection Request. To be signed by concerned parties once the inspection is conducted.

Common Categories of Inspection/Test Activity

Verification Activity Points:

H (Hold Point) – work shall not proceed the Hold Point until released by the organization imposing the Hold Point

W (Witness Point) – an inspection point that may be witnessed by the organization imposing the Witness Point. Contractor to advise prior to proceeding

Common Categories of Inspection/Test Activity

Verification Activity Points:

I (Inspection) – formal verification to be undertaken and recorded

S (Surveilance) – an activity verification that is subject to an ongoing monitoring

(AU) Audit – independent, and documented examination and verification of records, processes, and other elements of a quality system to determine their conformity with the requirements of a standard.

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INSPECTION AND TEST PLAN

Form No.
F001-017-100

Project Name: **Client:** **Project No.:** 2574

Construction Process: Concrete Works **ITP No.:** 017-W003-2574 **Rev** 0

Contract No.: 6243-C-53568

LEGEND

Verification Activity

H – Hold Point	-	work shall not proceed past the Hold Point until released by the organisation imposing the Hold Point.
W – Witness Point	-	an inspection point that may be witnessed by the organisation imposing the Witness Point. Contractor to advise prior to proceeding.
I – Inspection	-	formal inspection activity to be undertaken and recorded.
S – Surveillance	-	an activity that is subject to ongoing monitoring.
R – Review	-	review of text reports/records or other evidence of compliance.

Responsible Inspectorate (RI) *(may be modified to meet site specific requirements)*

PM – Project Manager
CM – Construction Manager
SUP – Supervisor
SQN – Subcontractor Quality Nominee
PQMR – Project Quality Management Representative
ENG – Project Engineer
PDC – Project Document Controller

REFERENCE DOCUMENTS

Development:

SPEC- 000-C-0102_16 Concrete Work
SPEC-000-C-00130_1 Concrete - Anchor Bolts
PP-17-100 Rev 1 Contractor's Quality Assurance Requirements

Implementation:

010-Y-013-2574 Project Quality Plan
AS 3600:2009 Concrete structures
AS 3610:1995 Formwork for concrete
AS 1379:2007 Specification and supply of concrete
AS 1012: 1993 Methods of Testing Concrete
AS/NZS 4671:2001 Steel Reinforcing Materials
AS 4100:1998 Steel Structures

APPROVAL/REVISION

Rev	Date	Details	App'd (MCD)		App'd (Client)
A	17/12/13	Issued for Client's Approval	AZulueta	MFaulkner	
B	28/02/14	Issued for Client's Approval	AZulueta	MFaulkner	
0	07/04/14	Issued for Client's Approval	AZulueta	MFaulkner	

INSPECTION AND TEST PLAN

Construction Process:	Concrete Works				ITP No.:	017-W003-2574			Rev 0
Item	Basic Job Step	RI	Acceptance Criteria	Applicable Standard	Inspection Test		Verification Activity by			Verifying Records
					Method	Frequency	SubCon	MCD	Calibre	
1.0	**Approvals & Methodologies**									
1.1	Submit ITP & Mix Designs for approval	PM PQMR	Client approved	SPEC- 000-C-0102 Rev 16	Review	Prior to start	H	H/R	H/R	Approved ITP and Mix Design
2.0	**MATERIALS**									
2.1	Testing of concrete materials (cement, aggregates, admixtures, water)	PQMR SQN	SPEC- 000-C-0102 Rev 16 Sec 4.1	SPEC- 000-C-0102 Rev 16 Sec 4.1	Various Tests	Prior to start	H/R	R	R	Concrete Supplier's Certificates
2.2	Conduct trial of concrete mix design	PQMR SQN	SPEC- 000-C-0102 Rev 16 Sec 4.2 & 4.3 AS 3600:2009	SPEC- 000-C-0102 Rev 16 Sec 4.2 & 4.3 AS 3600:2009 Table 1	Trial Mix and/or Fully documented compliance concrete mix	Prior to start	H/R	W	R	Approval Letter
2.3	Verify compliance of reinforcing steel bars	PQMR SQN	AFC Drawings Steel Reinforcing Materials	SPEC- 000-C-0102 Rev 16 Sec 4.6 AS/NZS 4671:2001	Tensile/Strength Test	One test per 50T	R	R	R	NATA Test Report Supplier's Test Certificates
					Bend Test	One test per batch	R	R	R	
2.4	Ensure formworks complies to design/fabrication/erection/stripping requirements	ENG PQMR	SPEC- 000-C-0102 Rev 16 Sec 5.0 AS 3610:1995	SPEC- 000-C-0102 Rev 16 Sec 5.0 AS 3610:1995 Formworks for Concrete	Visual	Once	I	I	R	Temporary Works Design

INSPECTION AND TEST PLAN

Construction Process:	Concrete Works				ITP No.:	017-W003-2574			Rev 0
Item	Basic Job Step	RI	Acceptance Criteria	Applicable Standard	Inspection Test		Verification Activity by			Verifying Records
					Method	Frequency	SubCon	MCD	Calibre	
2.5	Ensure compliance on embedded/cast-in items requirements	ENG PQMR	SPEC- 000-C-0102 Rev 16 Sec 9.0 AFC Drawings and/or AS 4100:1998	SPEC- 000-C-0102 Rev 16 Sec 9.0 AFC Drawings and/or AS 4100:1998	Visual	Once	I	S	S	Supplier's Certificates
2.6	Ensure compliance on curing compound requirements, if applicable	PQMR	SPEC- 000-C-0102 Rev 16 Sec 12.0 AS 3799:1998	SPEC- 000-C-0102 Rev 16 Sec 12.0 AS 3799:1998	Documents Review	Once	R	R	R	Approved Product's Technical Data Sheet & Manufacturer's Recommendation
2.7	Repair materials, if applicable	PQMR	SPEC- 000-C-0102 Rev 16 Sec 14.0	SPEC- 000-C-0102 Rev 16 Sec 14.0	Documents Review	Once	R	R	R	Approved Product's Technical Data Sheet & Manufacturer's Recommendation
3.0	**FABRICATION**									
3.1	Review & accept bar bending schedules	ENG	SPEC- 000-C-0102 Rev 16 Sec 6.0 AFC Drawings	SPEC- 000-C-0102 Rev 16 Sec 6.0 AS 3600:2009 Sec 17.2 & 13.1	Review	Each schedule	H	S	R	Relevant AFC Drawings
3.2	Reinforcement bar bending	ENG	SPEC- 000-C-0102 Rev 16 Sec 6.0 AFC Drawings Manufacturer's Schedule	Manufacturer's Schedule AS 3600:2009 Sec 17.2 & 13.1	Dimensional/ Visual	Each bar	H	S	R	Relevant AFC Drawings
4.0	**CONSTRUCTION**									
4.1	Ensure formworks calculation have been verified prior to installation of formwork	ENG	Conforms to CEP & AFC Drawings	SPEC- 000-C-0102 Rev 16 Sec 5.3 AFC Drawings	Review	Each Lot / Pour	R	R	R	Concrete Pre-Pour Checklist F023-017-2574
4.2	Ensure pre-pour survey undertaken on the falsework and formwork set-up, positions and surface finish acceptable	SUP	Conforms to Specifications and AFC Drawings	SPEC- 000-C-0102 Rev 16 Sec 11.0 AFC Drawings Manufacturer's Schedule	Visual / Dimensional Check	Each Lot / Pour	I	W	W	Concrete Pre-Pour Checklist F023-017-2574

INSPECTION AND TEST PLAN

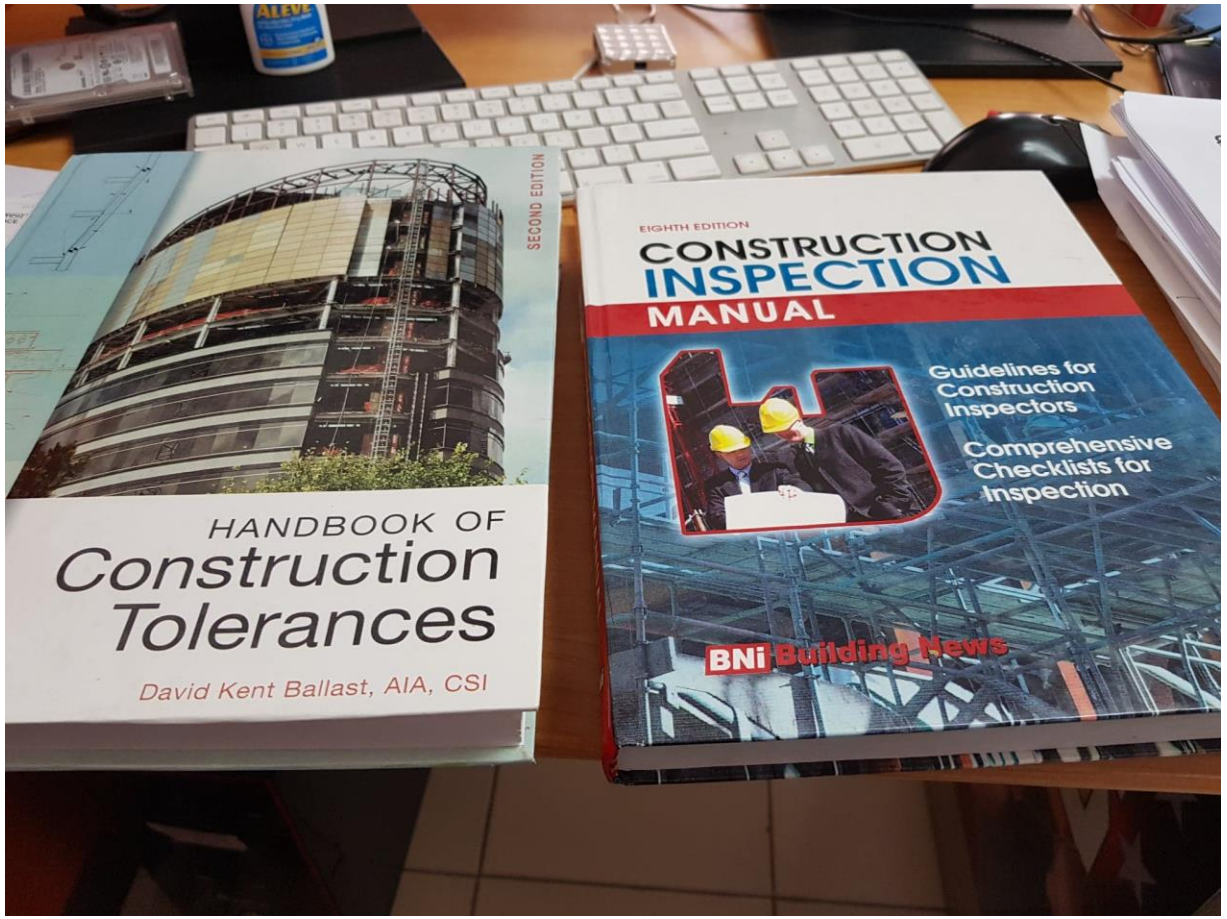
Construction Process:	Concrete Works				ITP No.:	017-W003-2574			Rev 0
Item	Basic Job Step	RI	Acceptance Criteria	Applicable Standard	Inspection Test		Verification Activity by			Verifying Records
					Method	Frequency	SubCon	MCD	Calitre	
4.10	Stripping	SUP	Conforms to Drawings & Specifications	SPEC- 000-C-0102 Rev 16 Sec 12.2.4	Visual	Each cast item	I	S	S	Concrete Test Report F004-017-2574
4.11	Repair and patching, if applicable	PQMR	AFC Drawings & Approved Repair Materials & Application	Product Manufacturer's Recommendation	Visual	Each cast item	I	W	S	Concrete Placement Inspection F021-017-2574
4.12	Final Inspection	PQMR	No damage, Concrete Final Inspection signed	Conforms to Specifications and AFC Drawings	Visual	Each cast item	H	H	W	H&W Request F001-017-2574 Concrete Final Inspection F024-017-2574
5.0	**Quality Control**									
5.1	Compile/Check Quality records for inclusion in MDR	PQMR	• All checklist • test reports/records	• 010-Y-013-2574	Review	Progressive -ly	R	R	R	All records listed above
5.2	Check completion of MDR	PQMR	• All test reports checked for compliance with specification • All checklists signed off and compiled	• 010-Y-013-2574	Review	Completion of works	H	H	R	All records listed above

Inspection and Test Plan

Preparing a Good Inspection Report:

1. Read work specification requirements
2. Refer to drawings, method statements and material specification requirements
3. Have knowledge of the activities/job steps
4. Be familiar with the test and inspection requirements
5. Test/Inspection – method and frequency
6. Familiarity with the code or specification reference
7. Awareness of the acceptance criteria
8. Verification point by concerned parties
9. Complete Checklist and signed by all parties

Construction Tolerances



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Construction Specifications

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Construction Specifications

Construction specifications

are a part of the contract. They detail the work, materials, and installation required to complete a project. The specs are the contractor's field guide on what materials to use, how to install them, and the desired level of quality.

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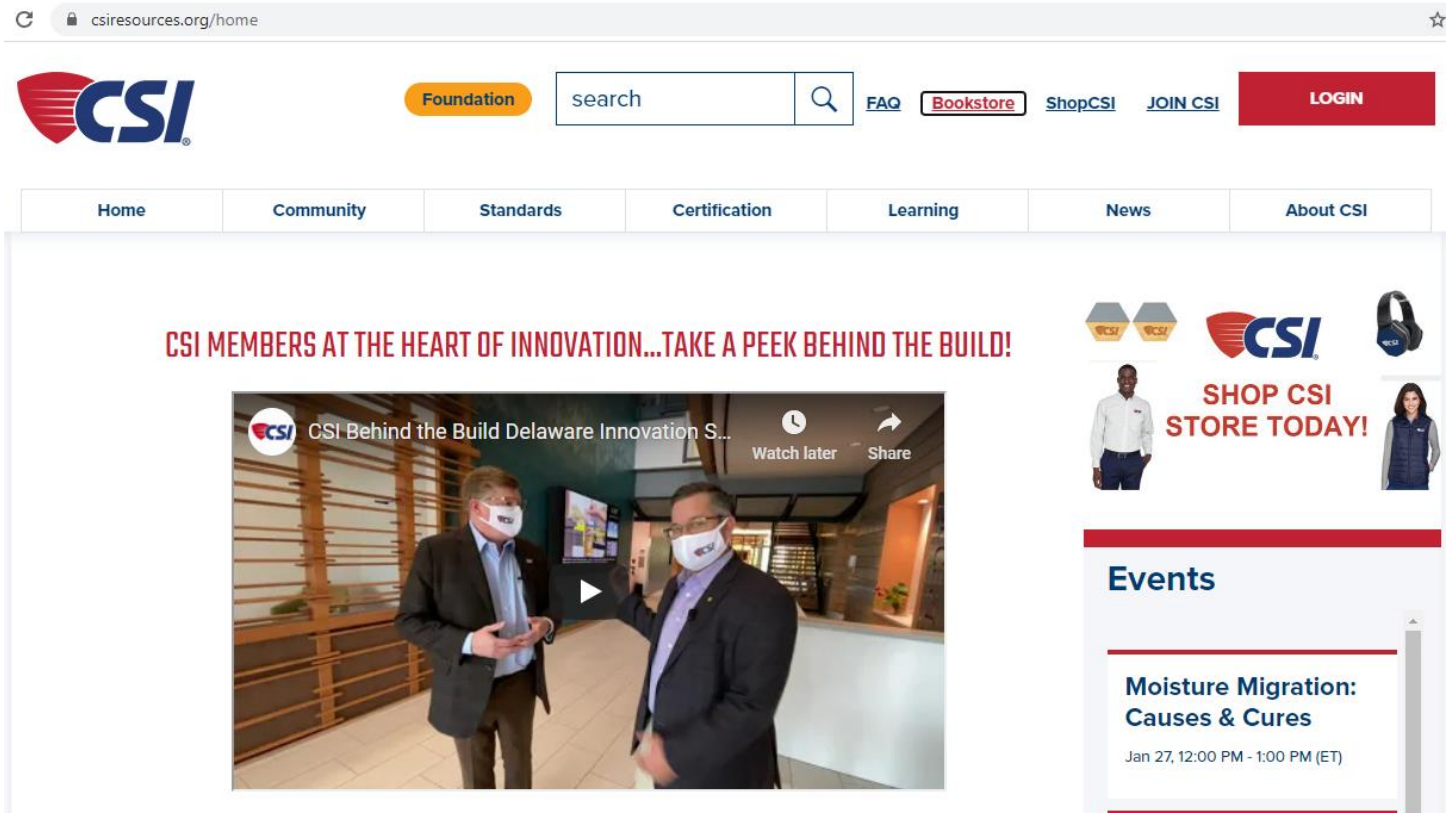

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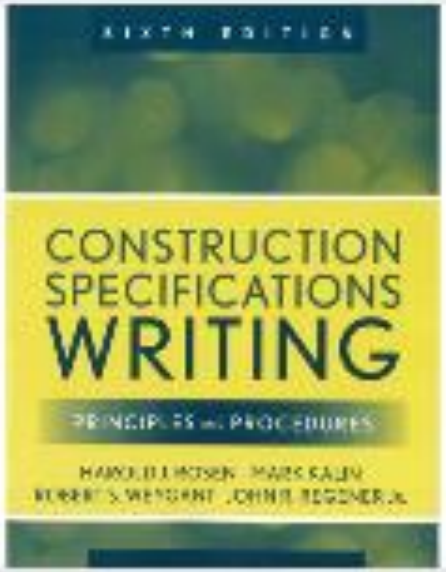
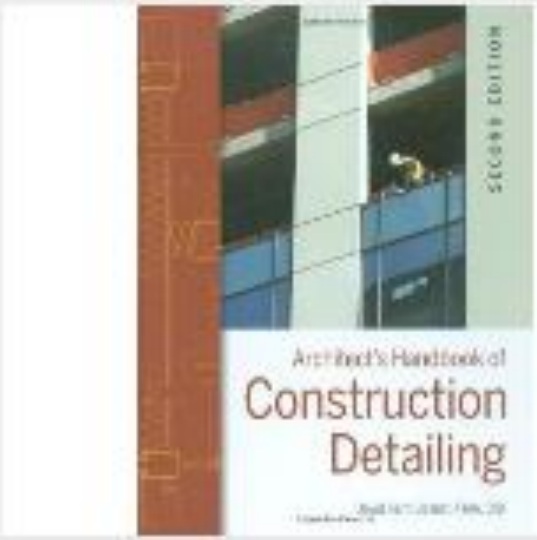


Construction Specifications Writing: Principles and Procedures, 6th ed.

$110.00



Architect's Handbook of Construction Detailing, 2nd Ed

$95.00

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Construction Planning, Programming and Control, 3rd Edition

$62.99

Project Delivery Practice Guide (PDPG) 3rd Edition (electronic only)

$139.00

Construction Contract Administration Practice Guide (CCAPG) 2nd Edition (print + digital)

$169.00

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MasterFormat 2004 Division Numbers and Titles

Procurement and Contracting Requirements Group

Division 00 Procurement and Contracting Requirements

Specifications Group

General Requirements Subgroup

Division 01	General Requirements

Facility Construction Subgroup

Division 02	Existing Conditions
Division 03	Concrete
Division 04	Masonry
Division 05	Metals
Division 06	Wood, Plastics, and Composites
Division 07	Thermal and Moisture Protection
Division 08	Openings
Division 09	Finishes
Division 10	Specialties
Division 11	Equipment
Division 12	Furnishings
Division 13	Special Construction

Figure 4-14 CSI 50-Division Format

Specification Subgroups Sections

Procurement and General Requirements Subgroup
- Division 00: Procurement/Contracting Req.
- Division 01: General Requirements

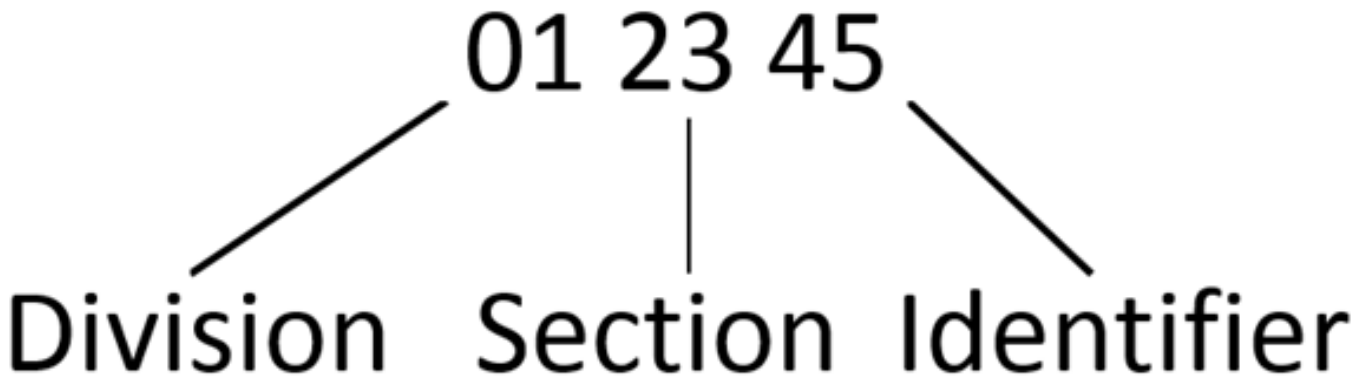
Facility Construction Subgroup
- Division 02: Existing Conditions
- Division 03: Concrete
- Division 04: Masonry
- Division 05: Metals
- Division 06: Wood, Plastics & Composites
- Division 07: Thermal & Moisture Protection
- Division 08: Openings
- Division 09: Finishes
- Division 10: Specialties
- Division 11: Equipment
- Division 12: Furnishings
- Division 13: Special Construction
- Division 14: Conveying Equipment
- Division 15: Reserved for Future Expansion
- Division 16: Reserved for Future Expansion

Facility Services Subgroup
- Division 20: Reserved for Future Expansion
- Division 21: Fire Suppression
- Division 22: Plumbing
- Division 23: Heating, Ventilating & Air Conditioning
- Division 24: Reserved for Future Expansion
- Division 25: Integrated Automation
- Division 26: Electrical
- Division 27: Communications
- Division 28: Electronic Safety & Security
- Division 29: Reserved for Future Expansion

Site and Infrastructure Subgroup
- Division 30: Reserved for Future
- Division 31: Earthwork
- Division 32: Exterior Improvements
- Division 33: Utilities
- Division 34: Transportation
- Division 35: Waterways & Marine Construction
- Division 36: Reserved for Future Expansion
- Division 37: Reserved for Future Expansion
- Division 38: Reserved for Future Expansion
- Division 39: Reserved for Future Expansion

Process Equipment Subgroup
- Division 40: Process Integration
- Division 41: Material Processing & Handling Equipment
- Division 42: Process Heating, Cooling & Drying Equipment
- Division 43: Process Gas & Liquid Handling, Purification & Storage Equipment
- Division 44: Pollution Control Equipment
- Division 45: Industry-Specific Manufacturing Equipment
- Division 46: Water & Wastewater Equipment
- Division 47: Reserved for Future Expansion
- Division 48: Electrical Power Generation
- Division 49: Reserved for Future Expansion

Construction Specifications



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Construction Specifications

Construction specifications

A **Section** is divided into **three Parts**—"general," "products," and "execution." Each **Part** is further organized into a system of Articles and Paragraphs.

SECTION 03 1513
WATERSTOPS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Waterstops for construction and control joints in cast-in-place concrete.

B. Install waterstops of the type specified herein in the following locations, whether or not the drawings indicate the presence of waterstops in such locations:
   1. Construction and control joints in footings.
   2. Construction and control joints in foundation walls.
   3. Construction and control joints in elevator pit slabs and walls.
   4. All other construction and control joints that are below grade, other than basement slabs.

C. If other portions of the contract documents indicate PVC or rubber waterstops to be employed in construction and control joints, obtain instructions from the Architect before proceeding.

D. Section Does Not Include: Waterstops for expansion joints.

1.02 SUBMITTALS

A. Product Data.

B. LEED Documentation: Submit information required by Section 01 3531 for the following targeted credit:
   1. Credit MR 5: Materials and Resources - Regional Materials.

C. Submit final certification in the form included at the end of this section.

PART 2 PRODUCTS

2.01 SUBSTITUTIONS

A. Refer to Section 01 6000 - Product Requirements.

2.02 WATERSTOPS

A. Adcor ES; W.R. Grace & Co.

B. Henry HF302-Hydro-Flex Waterstop; Henry Company.

C. Volclay Waterstop-RX"; American Colloid Company.
   1. RX 101": 1 inch x 3/4 inch flexible strip of compounded bentonite and butyl material.
      a. Use in concrete at least 8 inches thick with 2 rows of reinforcement.
   2. RX 102": 3/4 inch x 3/8 inch flexible strip of compounded bentonite and butyl material.
      a. Use in vertical concrete at least 5 inches thick with 1 row of reinforcement.
      b. Use in horizontal concrete at least 4 inches thick.

D. Fasteners: Concrete nails with washer heads as recommended by manufacturer.

E. Adhesive: Manufacturer's standard product.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verification of Conditions:
   1. Ensure that joint surfaces are dry and clean and free of debris, dirt, and rocks.
   2. Correct any voids or projections using concrete repairs methods specified elsewhere.

Figure 4-14 CSI 50-Division Format

Specification Subgroups Sections

Procurement and General Requirements Subgroup
- Division 00: Procurement/Contracting Req.
- Division 01: General Requirements

Facility Construction Subgroup
- Division 02: Existing Conditions
- Division 03: Concrete
- Division 04: Masonry
- Division 05: Metals
- Division 06: Wood, Plastics & Composites
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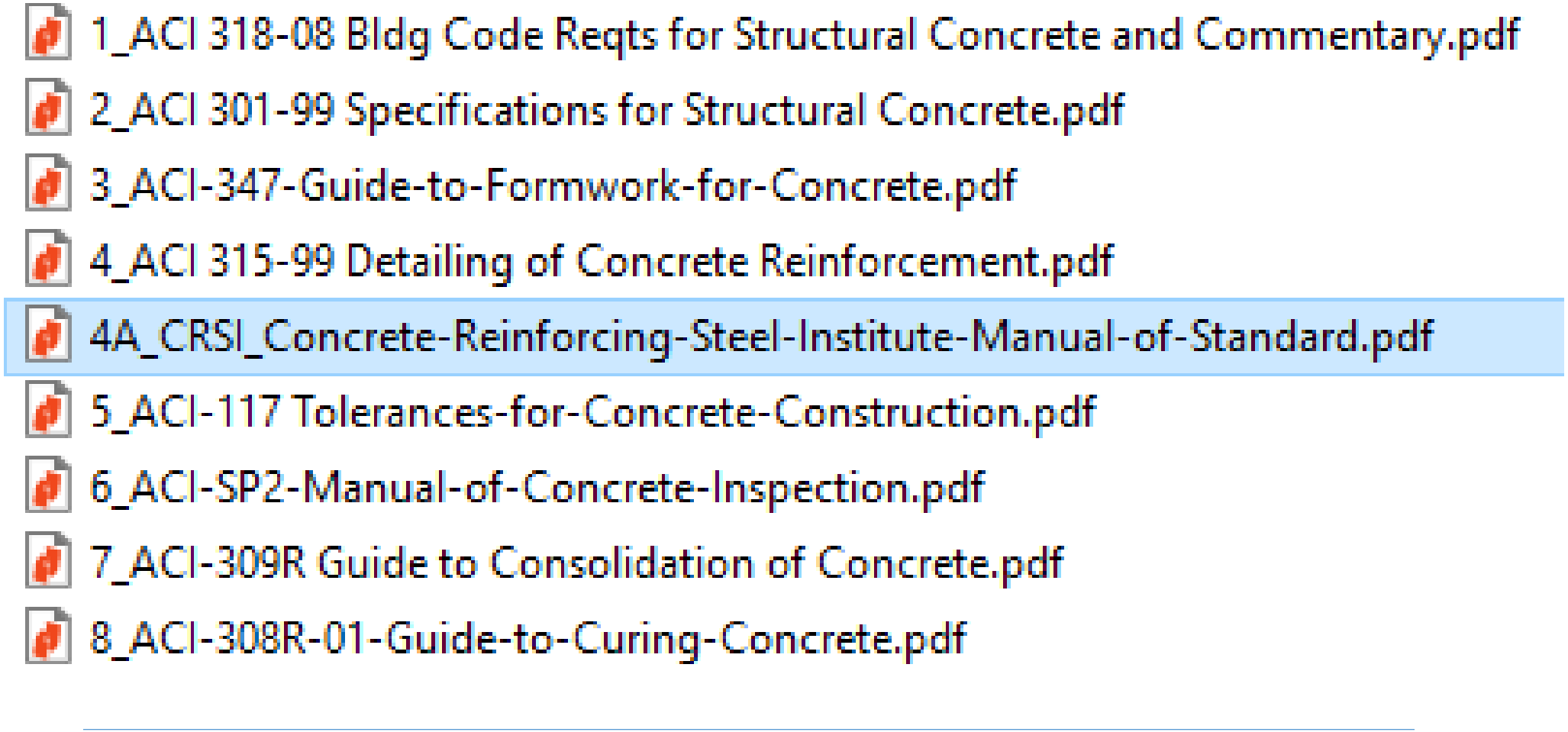

Construction Standards

A standard is a level of quality or achievement, especially a level that is thought to be acceptable. ... A standard is something that you use in order to judge the quality of something else.

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Construction Standards

Standards Organization

Organizations that produce standards

- International Organization for Standardization (ISO)
- International Electrotechnical Commission (IEC)
- American National Standards Institute (ANSI)
- American Society for Testing and Materials (ASTM)
- Institute of Electrical and Electronics Engineers (IEEE)
- National Fire Protection Association (NFPA)
- British Standards Institute (BSI)

TABLE 2.1

Most Common Standards Used in Building Construction Projects

Serial No.	Related Division	Section	Related Standards
1	Concrete	Reinforcement	BS 4449, ASTM A615/A615M
		Cement	ASTM C150, ASTM C295, ASTM C33
		Concrete	ASTM C94, ACI 301, ACI 117
2	Masonry	Concrete masonry units	ASTM C140, ASTM C1314, ASTM C270, ASTM C1019
3	Metals	Material fabrication	ASTM A6/A6M, ASTM A36, ASTM 490, AISC 89
4	Wood and plastic	Material, treatment, paneling	BSEN 942, BSEN 636, BS 1203, BS 1088, BS 4079, BS 1282, BSEN 301, BSEN 302, ASTM E84, AWI Quality Standards
5	Thermal and moisture protection	Liquid waterproofing, bituminous waterproofing, membrane waterproofing	ASTM C836, D412, D570, D903, ASTM D1187, ASTM D312, ASTM D1227, ASTM D4479
		Building insulation	ASTM C558, ASTM C578, ASTM C612, ASTM 665
6	Doors and windows	Steel doors	SDI 105, SDI 108, SDI 111
		Aluminum doors	AAMA 101, AAMA 603
		Wooden doors	NWWDA-ISI –A
		Curtain wall	AAMA 101, ASTM E283
		Glazing	AAMATIR A7, ANSIZ 971

7	Finishes	Gypsum plaster	ASTM C11, ASTM E119, ASTM E90, ASTM E413
		Cement plaster	ASTM C150, ASTM C260, ASTM C897, ASTM C926, ASTM C932, ASTM C1063, ASTM E488, ASTM A641M, ASTM A653M, ASTM C847
		Tiling	ANSI A137.1
		Acoustic ceiling	ASTM E1264, ASTM E795, ASTM E1264, ASTM C635, ASTM E488, ASTM B633, ASTM A641
		Metallic ceiling	ASTM B209, ASTM 591, ASTM E1264, ASTM E795, ASTM C635, ASTM C636, ASTM A641, ASTM A653
8	Specialties	Partitions	
		Landscape	
9	Conveying systems	Elevators, escalators	EN 81, 95/96/EC, 89/336/EEC, 89/106/EEC, ANSI/ASME/A17.1, BS 5655/BSCP 407
10	Fire suppression	Firefighting system	NFPA 10, NFPA 13, NFPA 14, B 5274
		Firefighting pumps	NFPA 20

TABLE 2.1 (Continued)

Most Common Standards Used in Building Construction Projects

Serial No.	Related Division	Section	Related Standards
11	Plumbing	Plumbing piping	ISO 2531, BS 4660, BS 4514, ASTM B88, ASTM B 306, ASTM A6.A8, ASTAM 16.22, API 600, ASTM A-74, ASTM A-53, ASTM A-106, ANSI B 16.3, ASTM D1785, ASTM D2729, ASTM D2665, ISO R161
		Hydronic piping	ASTM B 16.9, ASTM 16.3
		Hydronic pumps	DIN 24255, EN 733, ISO 2858, ISO 5199, BS 3829, BS 5257, BS 3456, ANSI 316
		Plumbing equipment	ASTM B16.9, ASTM B16.3, BS 3829, BS 5257, BS 3456, ANI 316
		Water distribution pumps	UL 778
12	HVAC	Chillers	ASHRAE 15, ARI, UL 465
		Chiller piping	ANSI/ASME B-31.1
		Chilled water pumps	DIN 24255, EN 733, ISO 2858, ISO 5199, BS 3829, BS 5257, BS 3456, ANSI 316
		Cooling towers	CTI 201
		Air handling unit	EN 1216, ARI
		Fan coil units	ARI 410, ARI 440
		Fans and ventilators	UL 705
13	Automation	Building automation systems	

14	Electrical	Conduit, trunking, cable tray, raceways	BS 4568,BS 46O7, BS 6099, BS 4678, BS 1449, BS 1494, BS 729 (for galv.), BS 21767, BS 31, BS 731
		Wiring accessories	BS 3676, BS 1363, BS 4343, BS 5420, BS 4662, BS 5733, BS 5419, BS 546, BS 7001, IEC 309
		Wires and cables	BS 6387,BS 6724,BS 6207, BS 7629, BS 4533, BS 6007, BS 6500, IEC 502, IEC 331, BS 6234, BS 6346, IEC 227, IEC 540
		Bus duct	IEC 439
		Structured cabling	ANSI EIA/TIA-568, ANSI EIA/ TIA-569, ANSI EIA/TIA 606, ANSI EIA/TIA 607,IEC 11801, EN 50173, IEEE 802.3ab, IEEE 802.3z
		Lighting fixtures	IEC 598.BS 4533, BS 5042, BS 1853, BS 4782
		Grounding, lightning protection	BS 6651, EN 62305, BS 7430

TABLE 2.1 (Continued)

Most Common Standards Used in Building Construction Projects

Serial No.	Related Division	Section	Related Standards
		Main low tension panels, switch boards, distribution boards, motor control centers	IEC 185, IEC 186, IEC 269, IEC 292, IEC 439, IEC 529, IEC 947, BS 5486, IEC 5750, BS 5420, BS 159, BS 37, IEC 1008
		Motor starters	IEC 292
		Disconnect switches	BS 5419, AC 23, BS88, IEC 408
		Emergency power supply	ISO 8528, NFPA 37, NFPA 99, NFPA 101, NFPA 110, BS 5514, BS 4999, BS 649, BS 5000
		Automatic transfer switch	IEC 947, UL 508, UL 1008, NFPA 70, NFPA 99, NFPA 110, IEEE 446, NEMA Standard ICS 10
		Fire alarm system	NFPA 70, NFPA 71, NFPA 72, BS 5839
15	Communication	Communication system	ISO/IEC 11801, EN 50173, EIA/TIA 568, EIA/TIA 569

Codes

Codes are generally accepted sets of rules that tell you what you need to do. The main purpose of codes is to protect the public by setting up the minimum acceptable level of safety for buildings, products and processes.

Codes can be approved by local, state or federal governments and can carry the force of law.

Codes

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Codes can be approved by local, state or federal governments and can carry the force of law.

CODE
VERSUS
STANDARD

CODE	STANDARD
Model that is adaptable by law	Set of technical definitions, specifications, and guidelines
Clarifies what needs to be done	Clarifies how something should be done
Can be adopted into law	Is not legalized
Examples include International Building Code and ASME Boiler and Vessel Code	Examples include ASTM International standards and ISO standard

What is the Difference Between Codes and Standards in the Fire Safety Industry?

OnlineSafetyDepot.com

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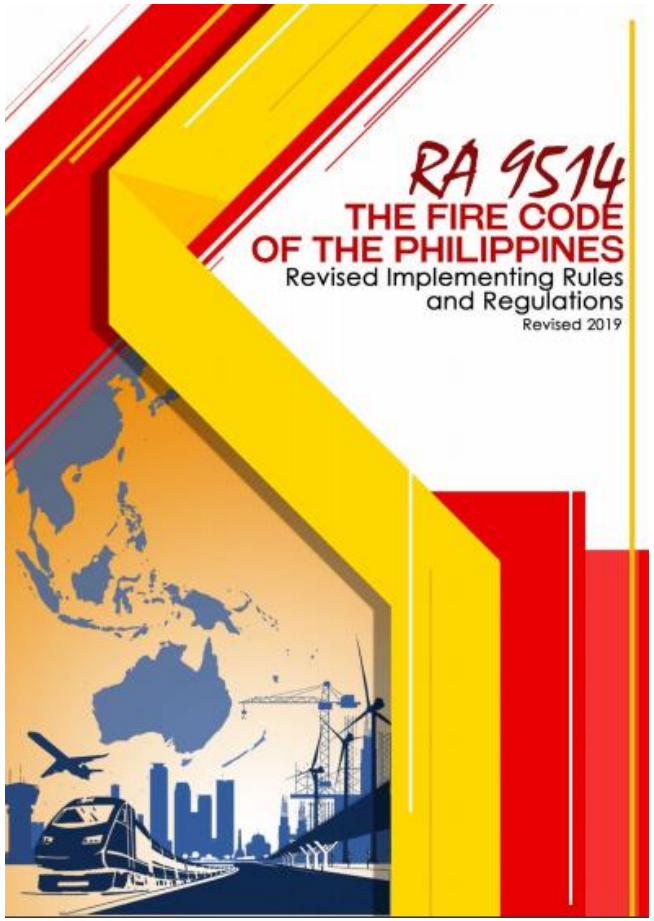
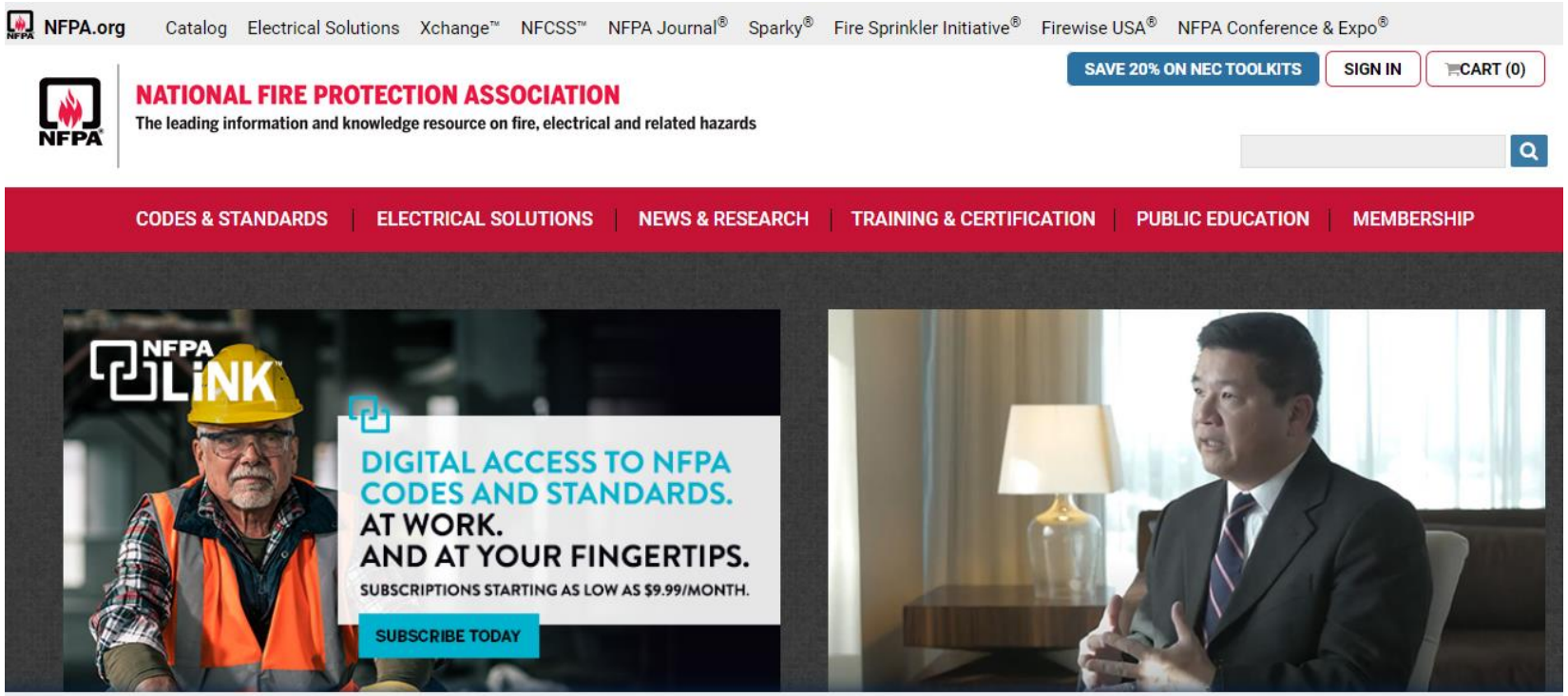
Codes





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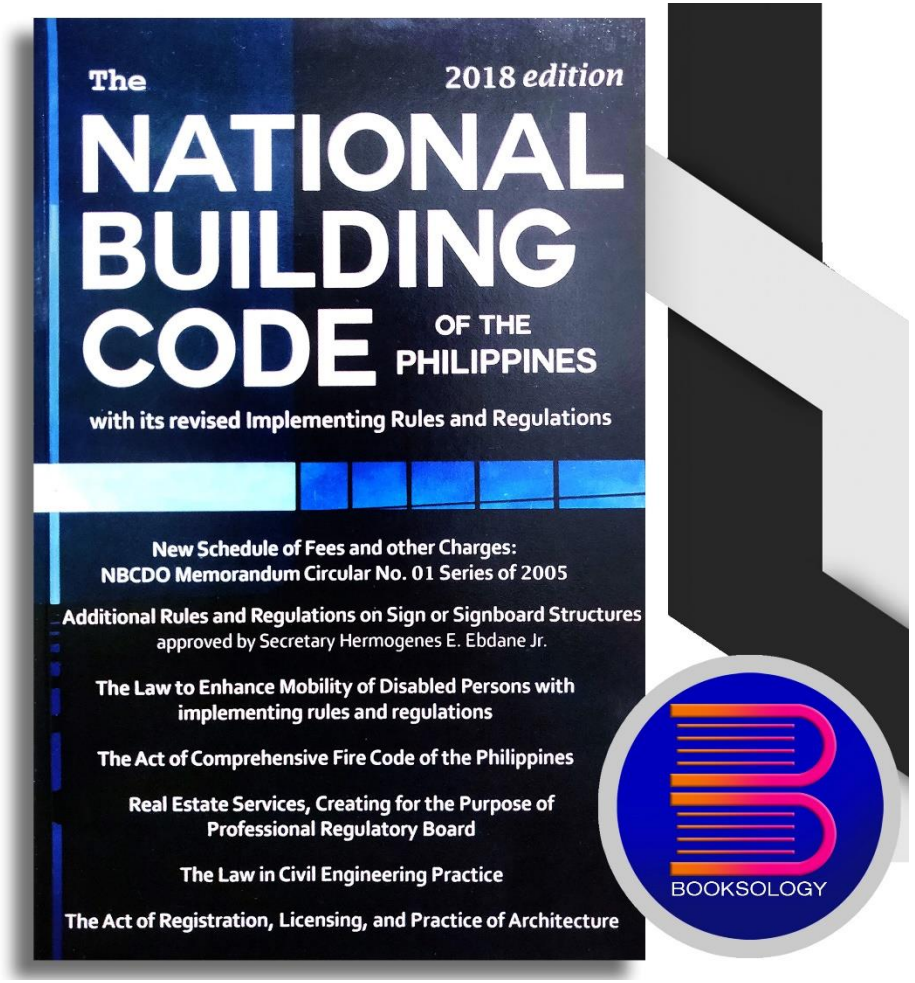
Codes



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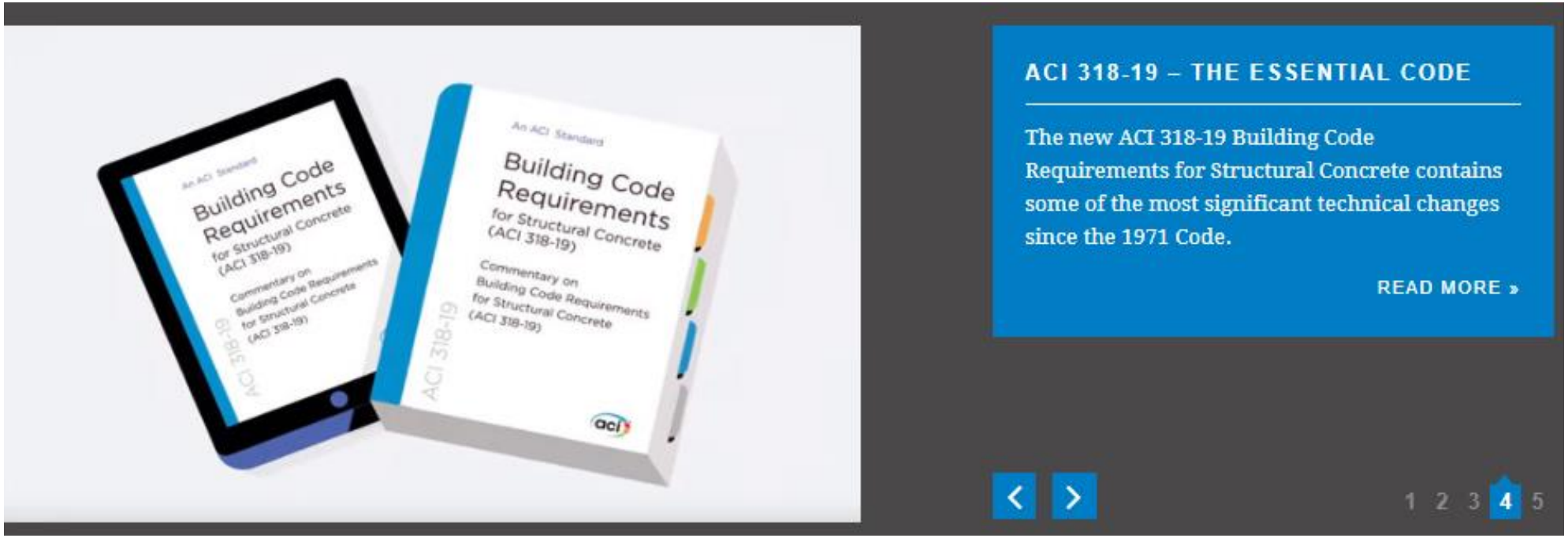

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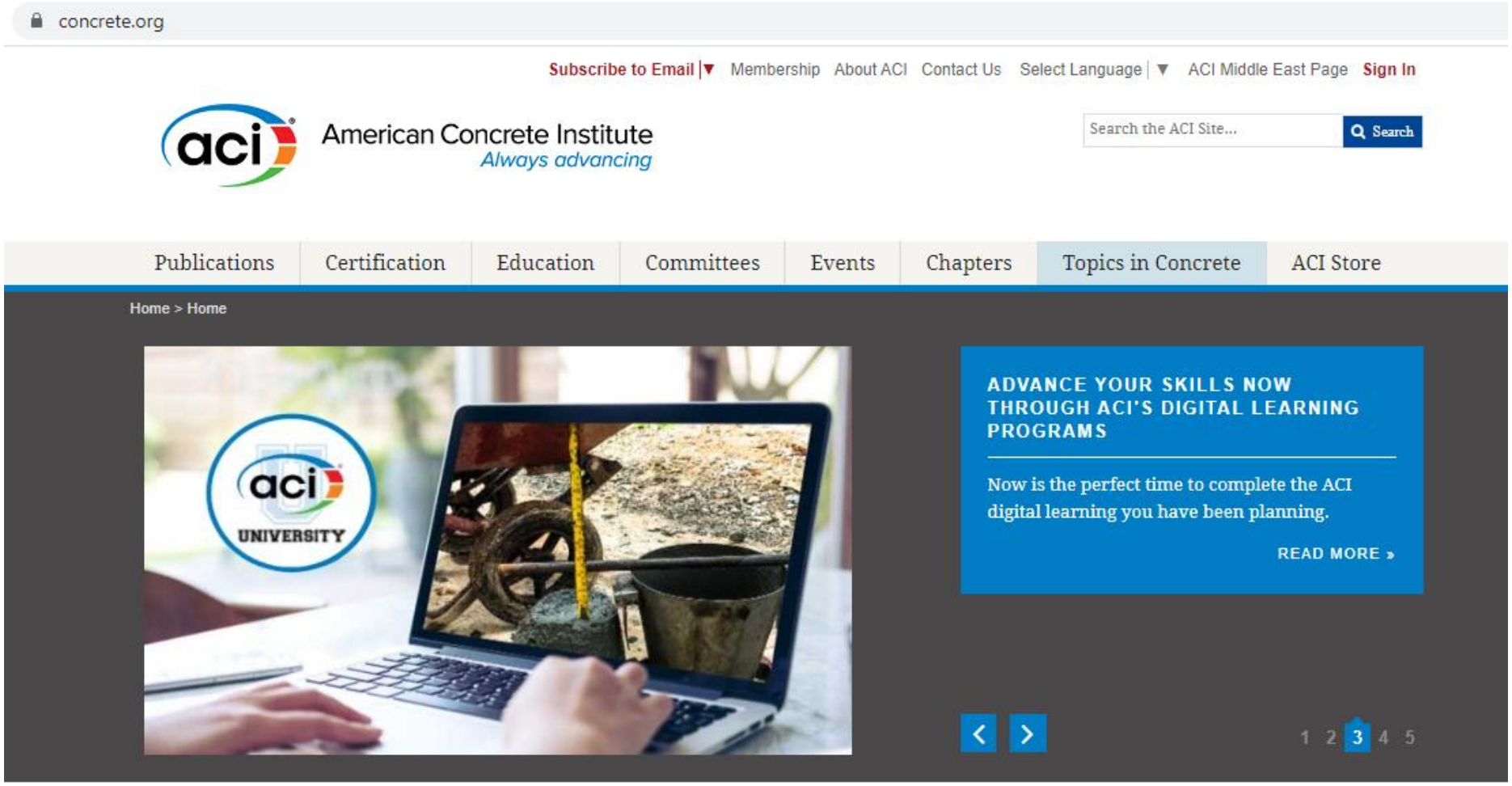

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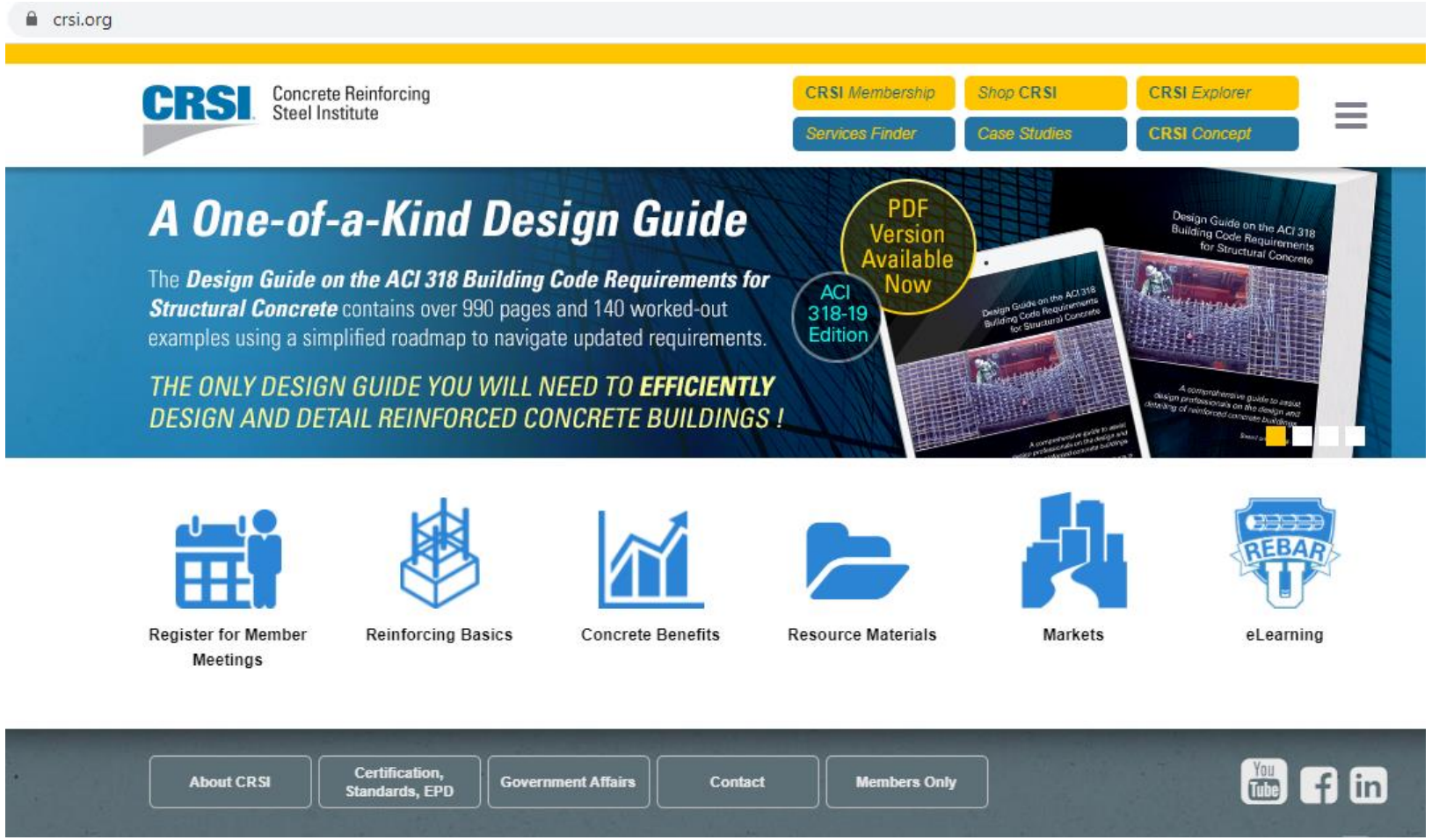

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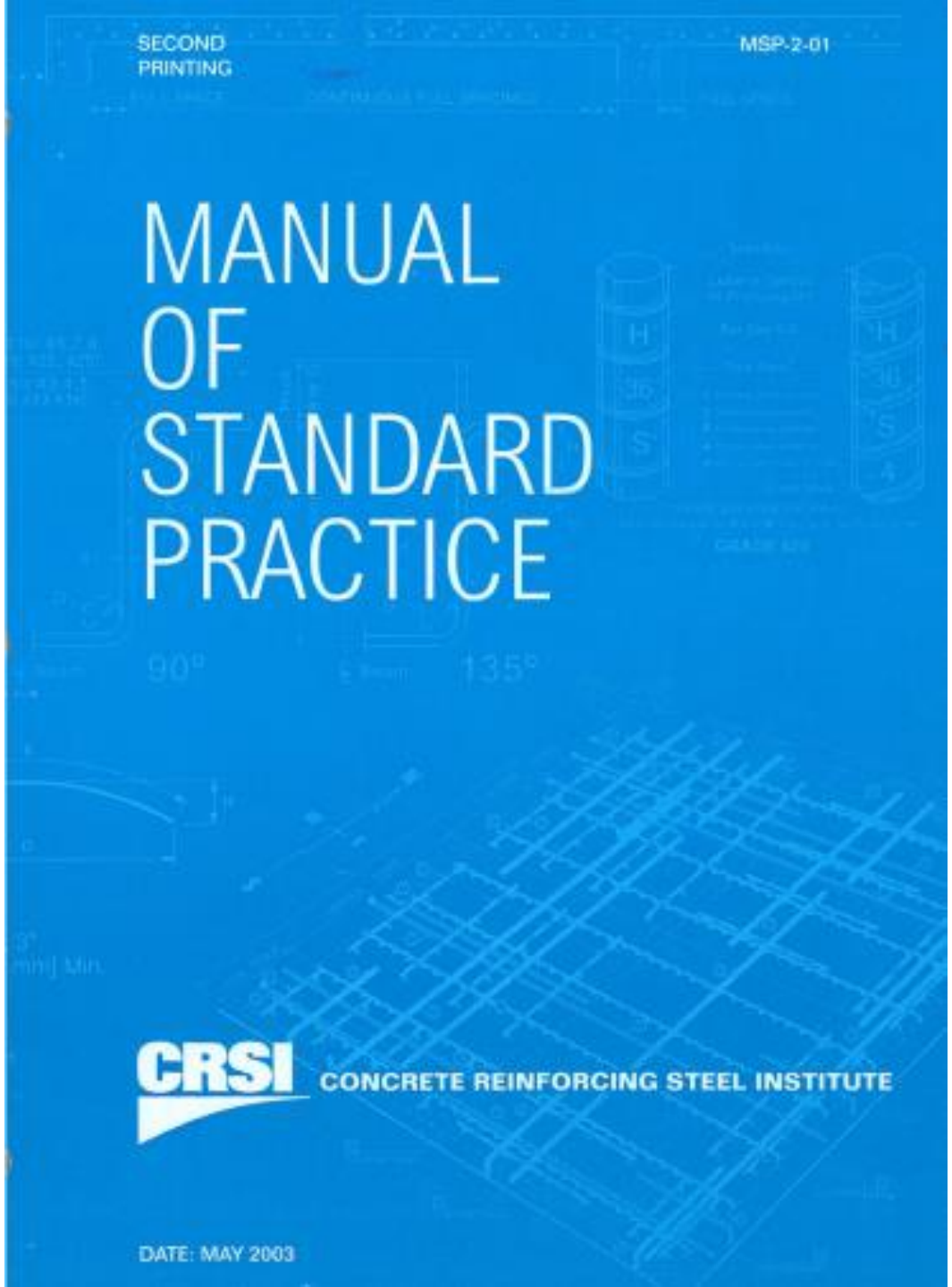

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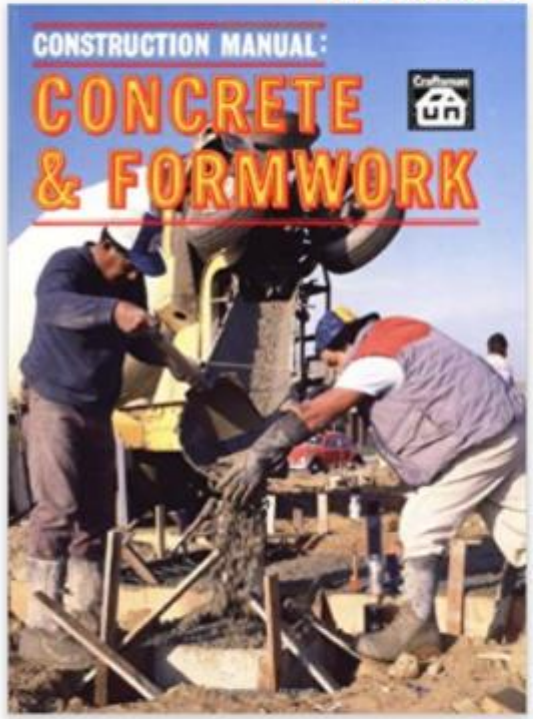
Construction Manual: Concrete and Formwork Illustrated Edition

by T. W. Love (Author)

★★★★☆ 20 ratings

Look inside



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HEADLINES

2 dead, 11 hurt as Taguig condo flooring collapses

By: Daxim L. Lucas, Kristine Felisse Mangunay - @inquirerdotnet Philippine Daily Inquirer / 12:31 AM February 05, 2015

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According to Hong, the foundation was set on reclaimed land near the Manila Bay. Since the deadline of the structure was tight, it required 4,000 workers, working in 3 shifts across 24 hours. One thousand workers constructed the lobby in 72 hours, a job which would normally entail six weeks of labor. The Film Center opened in 1982 costing an estimate of $25 million.

An accident occurred around 3:00 a.m. on November 17, 1981 during the construction of the Manila Film Center. Its scaffolding collapsed, and at least 168 workers fell and were buried under quick-drying wet cement. A blanket of security was immediately imposed by the Marcos administration, and neither rescuers nor ambulances were permitted on the site until an official statement had been prepared. The rescuers were eventually permitted to go inside the accident site 9 hours after the collapse.

Construction Tolerances

Tolerances in **construction** are generally a variation in a dimension, **construction** limit, or physical characteristic of a material. They are a practical variation related to the function of the material or finished work and commonly accepted standards of the **construction** industry.

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ACI-117 Tolerances for Concrete Construction

ACI Tolerances for Slab Work

In the absence of other contract provisions, slab forms should be built to produce slabs meeting ACI 117 tolerances (published in the *ACI Manual of Concrete Practice*). These requirements include:

Elevation of formed soffit before removal of shores not more than ±¾ in. from specified elevation

Variation in the slab thickness

−¼ or +⅜ in. for thickness less than 12 in.
−⅜ or +½ in. for thickness from 12 to 36 in.
−¾ or +1 in. for thickness more than 36 in.

Variation in size of openings, not more than −¼ or +1 in.

JB Trainers and Consultants Inc.

ACI-117 Tolerances for Concrete Construction

ACI Column Tolerances

ACI 117 gives tolerances for *completed structures*; such tolerances give the form builder guidance as to the level of accuracy required in forming concrete columns. Variations of 1 in. from plumb are permitted for structures up to 100 ft high. *Variation in cross sectional dimensions* is limited to:

−¼ or +⅜ in. for thickness 12 in. or less
−⅜ or +½ in. for thickness 12 to 36 in.
−¾ or +1 in. for thickness over 36 in.

For a more detailed discussion of tolerances, see the ACI 117 standard reprinted in the *ACI Manual of Concrete Practice*.

Beam and Girder Form Tolerances

Beam and girder forms should be built to insure completed work within the specified tolerances for completed construction. In the absence of other stated tolerances, the recommendations of ACI Committee 117 may be followed for building construction. These include the following:

1. *Variation from the level or from the specified grade for beam soffits* before removal of shores should not exceed ±¾ in.
2. *Variation from level or specified grade for exposed parapets* should not exceed ±½ in.

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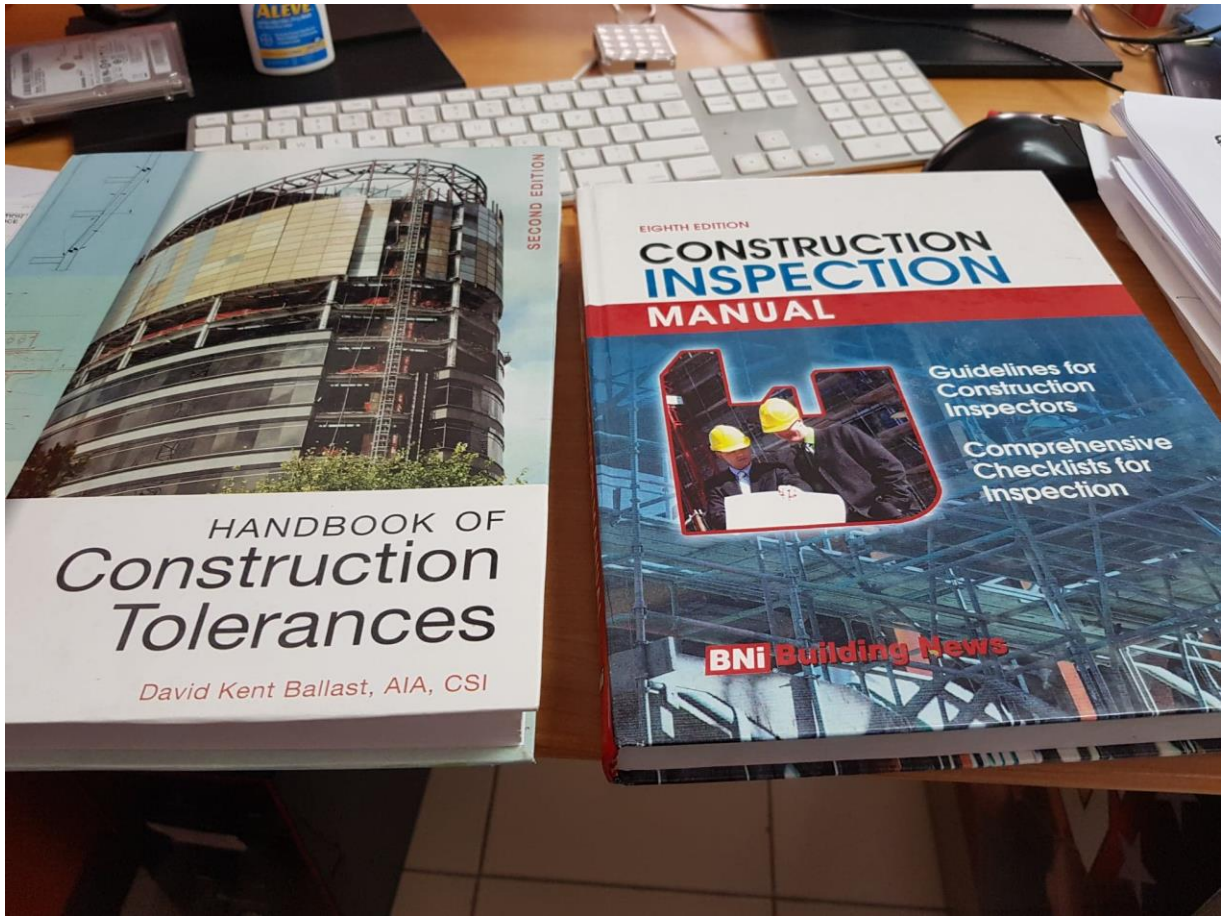
Construction Tolerances



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Shop Drawings and Submittals

Shop drawings and material submittals (submittals) are a critical element of every construction project. The contractor has to submit the specifications to the owner/consultant for review and approval. They are essential to identify materials which may have a long lead time that could impact the proposed schedule for the project.

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Shop Drawings

A **shop drawing** is a detailed and precise diagram of an equipment or building component meant to be manufactured by a fabrication shop or installed by a trade specialist. Since shop drawings are instrumental to the process of prefabrication design, they are sometimes called **“prefabrication drawings.”**

Submittals

Submittals are those shop drawings, material data, samples, and mock-ups to be delivered to the design professional (the architect or engineer) for review and action as required by the contract documents to verify that the correct products will be installed on the project.

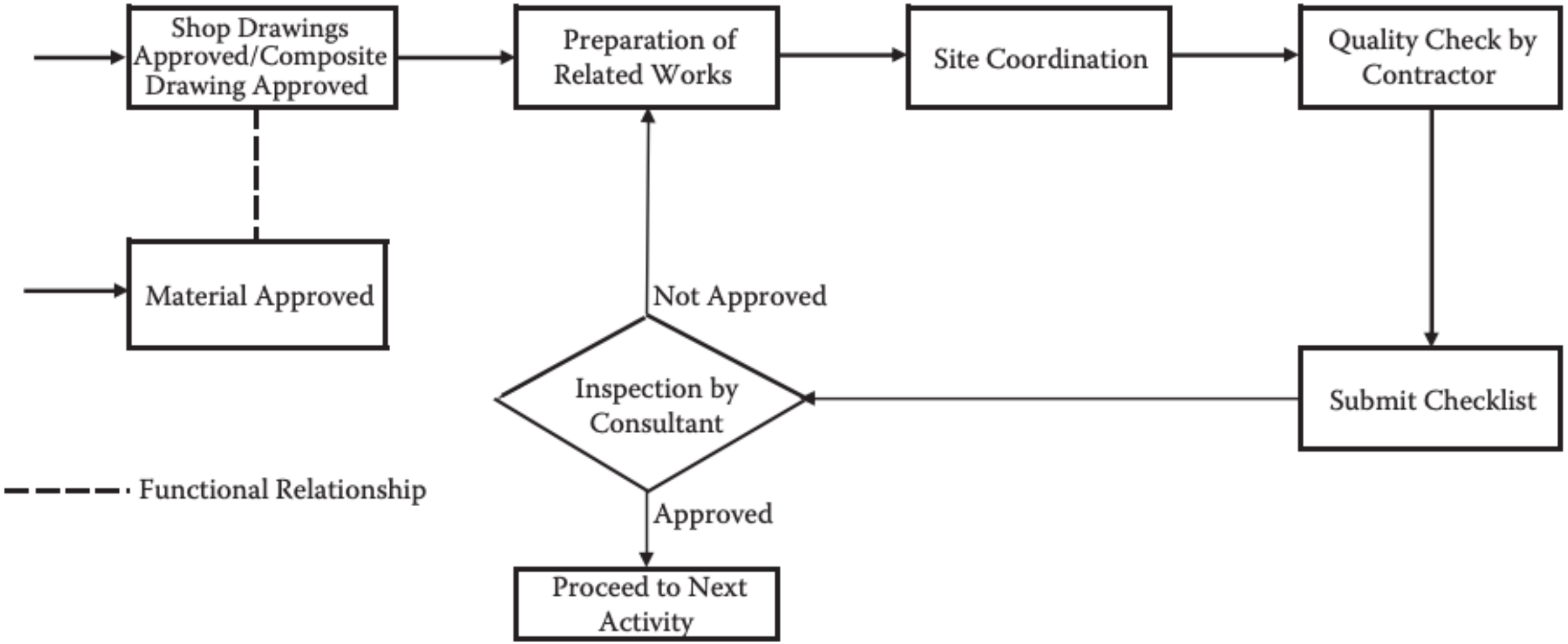

FIGURE 4.79
Sequence of execution of works.

B. Doors and windows: The shop drawings for doors and windows shall include

- Size of doors and windows
- Type of material
- Thickness of frames
- Details of door leaves
- Details of glazing
- Fixing details
- Schedule of doors and windows

C. Cladding: The shop drawings for cladding shall include

- Type of cladding material
- Size of panels/tiles and thickness
- Elevations
- Fixation method, anchorage and supports
- Openings for other services

D. Partitioning: The shop drawings for partitions shall include

- Type of partitioning material
- Size of panels
- Frame size and its installation details
- Partition support system
- Fixation details of panels

NCR/CAR/PAR

Non Conformance Report (NCR)

A non-conformance or non-conformity report or NCR, is a document that addresses specification deviation or work that fails to meet quality standards. The report is used as part of quality control processes by detailing the problem, how it occurred, and how to prevent it from happening again.

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Non Conformance Report (NCR)

Non-Conformance Report must include at a minimum the following information:

- What is the main reason for the NCR or what went wrong
- Why the work doesn't meet specifications
- What can be done to prevent the problem from happening again
- Explanation of corrective action taken or to be taken
- Key players involved in the NCR and specifications affected under the NCR

Non Conformance Report (NCR)

There are many common scenarios in the construction industry that require the issuance of an NCR:

- Work that fails to meet specified tolerances as established in the project specifications
- Work that is being performed using non-approved methods or standards
- Failure to follow the approved testing and inspection plan
- Testing results demonstrate that the product does not meet established and approved standards

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Non Conformance Report (NCR)

There are many common scenarios in the construction industry that require the issuance of an NCR:

- Material used that has not been approved as a substitute (equal or similar)
- Design is not accurate and does not represent actual field conditions
- Approved procedure was not followed, and quality defects have been identified by the project team

Reasons for Rejection of Executed Works

Serial No.	Description of Work	Probable Reasons for Rejection
Shoring		
1	Shoring	No adequate support for shoring. Vertical plumb level not proper. No proper bracing. Not enough depth. Anchor test not approved.
2	Dewatering	Water level not under control.
Earthworks		
1	Excavation	Not per specified level. Surface is not even. Excavated material not removed from the site.
2	Backfilling	Compaction is not proper. Backfilling thickness is not as specified. Soil is rubbish and loose. Soil test (strength) failed.

Concrete substructure

1	Blinding concrete	Thickness not as specified. Concrete stength not as specified.
2	Termite control	Uneven spray.
3	Reinforcement of steel	Reinforcement arrangement not as specified. Support not proper. Water stops are not provided. Construction joints are not provided.
4	Concrete casting	Concrete strength not as specified.
5	Shuttering for beams and columns	Shuttering dimensions not as specified. Shuttering is not strong enough. Shutters are not vertical. Shuttering height not proper.

Concrete superstructure

1	Reinforcement of steel for beams and columns	Reinforcement arrangement not as specified. Support not proper.
2	Shuttering for columns and beams	Shuttering dimensions not as specified. Shuttering is not strong enough. Shutters are not vertical. Shuttering height not proper.
3	Concrete casting of beams and columns	Concrete strength not as specified.
4	Formwork for slab	Props spacing not correct. Props are not sturdy. Formwork surface is not clean.
5	Reinforcement for slab	Reinforcement arrangement not as specified. Reinforcement is not properly placed and secured. Spacers, or minimum concrete cover, or construction joints are not provided.
6	Concrete casting of slab	Concrete strength not as specified. Casting level is not proper.
7	Precast panels	Panels are not fixed properly. Load test on panel not performed before erection.

Reasons for Rejection of Executed Works

Serial No.	Description of Work	Probable Reasons for Rejection
Masonry		
1	Block work	Block alignment is not proper. Joints are not aligned. Guidelines are missing. Anchor beads are not provided. Reinforcement mesh is not provided. Mortar is not as specified.
2	Concrete unit masonry	Block alignment is not proper. Joints are not aligned. Reinforcement mesh is not provided. Mortar is not as specified.
Partitioning		
1	Installation of frames	Stud spacing not correct. Fixation method is not as specified. Insulation is not provided.
2	Installation of panels	Alignment not proper. Joints are not proper. Panels are not painted.

Metalwork

1	Structural steel work	Anchorage and fixing not proper. Method of erection not as specified. Fire protection is not applied. Finishing is different than specified.
2	Installation of cat ladders	Fixation is not proper. Alignment is not done. Finishing is not as specified.
3	Installation of balustrade	Fixation is not proper. Alignment is not done. Finishing is not as specified.
4	Installation of space frame	Fixation is not proper. Alignment is not done. Finishing is not as specified.
5	Installation of handrails and railings	Fixation is not proper. Alignment is not done. Finishing is not as specified.

Internal finishes

1	Plastering	Cracks in the plaster. Voids are observed. Specified accessories not used. Hollow sound observed. Curing is not enough.
2	Painting	Number of layers not as specified. Color and texture is not proper.
3	Cladding-ceramic	Alignment, angles and joints are not proper. Grouting is not done properly. Color and texture pattern do not match.
4	Cladding-marble	Fixation is not proper. Alignment, angles and joints are not proper. Lines are not matching.
5	Ceramic tiling	Alignment, angles and joints are not proper. Grouting is not done properly. Color and texture pattern is not matching.
6	Stone flooring	Fixation is not proper. Alignment, angles and joints are not proper.
7	Acoustic ceiling	Suspension system is not as specified. Alignment, levels and joints are not proper. Services openings are not provided. Ceiling height not matching with approved level.

Non Conformance Report (NCR)

If you are the recipient of an NCR, you must act promptly and at a minimum follow these steps for a quick resolution:

- Meet with the person issuing the NCR.
- Respond with a formal letter or another document, outlining the process that led to the action that triggered the NCR, documenting the action to solve the issue, and explaining the steps taken to prevent the problem from recurring.

Non Conformance Report (NCR)

If you are the recipient of an NCR, you must act promptly and at a minimum follow these steps for a quick resolution:

- Implement the corrective action and make sure through an inspection process that the issue has been solved adequately.
- Make sure that your counterpart agrees and signs off on your action plan.

NCR/CAR/PAR

Corrective Action Report (CAR)

A report of action taken that ensure that the cause which has resulted in a non-conformance is identified and corrected (i.e a non-conformance has occurred)

The purpose of this report is to describe the method to be used to prevent/avert conditions which are adverse to quality or environment

JB Trainers and Consultants Inc.

NCR/CAR/PAR

Preventive Action Report (PAR)

Action taken to ensure that the cause which may result in a non conformance is identified and corrected identified and corrected. (i.e. the potential for a non-conformance to occur exist)

The purpose of this report is to describe the method to be used to prevent/avert conditions which are adverse to quality or environment

JB Trainers and Consultants Inc.

QA/QC Reporting Requirements

TABLE 4.14

Contents of Progress Report

1.0 Contract Particulars
- 1.1 Project Description
- 1.2 Project Data

2.0 Construction Schedule

3.0 Progress of Works
- 3.1 Temporary Facilities and Mobilization
- 3.2 Summary of Construction Progress
  - 3.2.1 Status
  - 3.2.2 On-Shore Progress
  - 3.2.3 Off-Shore Progress

4.0 Time Control
- 4.1 CPM Schedule-Level One (Target vs. Current) — Summary by Building/Marine
- 4.2 CPM Schedule-Level Two (Target vs. Current) — Summary by Building/Division
- 4.3 30 Days Look-Ahead Schedule
- 4.4 Time Control Conclusion

QA/QC Reporting Requirements

5.0 Cost Control
- 5.1 Financial Progress
- 5.2 Cash Flow Curve and Histogram
- 5.3 Work-in-Place S-Curve and Histogram
- 5.4 Cost Control Conclusion

6.0 Status of Contractor's Submittals
- 6.1 Material Status
- 6.2 Shop Drawing Status

7.0 Subcontractors

8.0 Consultant's Staff

9.0 Quality Control

10.0 Meetings

11.0 Site Work Instructions

12.0 Variation Orders

13.0 Construction Photographs

14.0 Contractors Resources

15.0 Other Matters
- 15.1 Safety
- 15.2 Weather Conditions
- 15.3 Important Developments/Proposals/Submissions

Testing, Commissioning & Handover

Testing, commissioning, and handover is the last phase of a construction project's life cycle. During this Closeout, the project is transferred/handed over to the owner/end user for his or her use

Testing, Commissioning & Handover

This Phase involves:

- punchlisting
- testing of electromechanical systems
- commissioning of the project
- obtaining authorities' approval,
- training user's personnel
- handing over technical operating & maintenance (O&M) manuals, records, and as-built drawings to the owner/owner

Testing

During services installation various tests will be undertaken known as 'static testing'. This TESTING is normally undertaken to prove the quality and workmanship of the installation. Such work is undertaken before a certificate is issued to 'enliven' (i.e. to make live) services whether electrically or otherwise.

Examples of this sort of testing are:
Pressure testing of pipework (ex. waterlines, fire suppression)
Undertaking resistance checks (ex. cabling)

Commissioning

Commissioning is carried out to prove that the systems operate and perform to the design intent and specification.

This work is extensive and normally commences by issuing a certificate permitting the installation to be made 'live', i.e. electrical power on. After initial tests of phase rotation on the electrical installation and checking fan/pump rotation performance, the more recognized commissioning activities of balancing, volume testing, load bank testing, etc. begin

Commissioning

Commissioning is a process for validation (installed/completed equipment or facility is tested) of building equipment and systems in coordination with operations personnel and third parties.

Commissioning Plan is a living document and a supporting document to the Project Mngt Plan. This document has to be prepared by the Commissioning Manager under direction by the PM

Commissioning Plan

- The plan provides guidance and details the key elements of the commissioning process, critical equipment list, OFE (Owner Furnished Equipment), integrated testing, safety and security and emergency preparedness. O&M manuals, training, as-built drawings, and the warranty administration.

- The plan is prepared with significant input from all internal and external stakeholders in close coordination with the design and construction teams

Commissioning Plan

- The plan provides guidance and details the key elements of the commissioning process, critical equipment list, OFE (Owner Furnished Equipment), integrated testing, safety and security and emergency preparedness. O&M manuals, training, as-built drawings, and the warranty administration.

- The plan is prepared with significant input from all internal and external stakeholders in close coordination with the design and construction teams

RA 9514-RIRR

DID YOU KNOW?

Rule No. 09 Enforcement and Administration of Fire Safety Measures

Section 9.0.3.5

Fire Safety Practitioners- any qualified person, recognized by the BFP, engaged in, but not limited to, the design, construction, installation, repair and maintenance, assessment, and rehabilitation of fire safety construction, suppression and control systems, protective and warning systems and life safety related services, or employed as a safety officer of public and private establishments/companies.

Only FSP issued with Certificate of Competency (COC) shall be allowed to prepare, sign and certify the FSCR, FSCCR and FSMR.

JB Trainers and Consultants Inc.

RA 9514-RIRR

DID YOU KNOW?

Rule No. 09 Enforcement and Administration of Fire Safety Measures

Section 9.0.3.1 Applicability

Under the RIRR, Submission of FSCR,FSCCR and FSMR are now required for

A. All private and public buildings, facilities and structures to be constructed, altered or modified, which by reason of their use, size and height are required to install any or combination of the following:

(1) wet standpipe system,
(2) automatic fire suppression system and
(3) automatic fire detection and alarm system.

B. Those covered by para "A" is also required to submit FSMR annually when securing FSIC for business permit, certificate of annual inspection, DOH license to operate and other permits or licenses.

- The Fire Safety Compliance Report (FSCR)

_The FSCCR is required prior to the issuance of FSIC for Occupancy Permit.

- The FSMR is required for renewal of FSIC for business permit and other permits.

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DID YOU KNOW?

Rule No. 09 Enforcement and Administration of Fire Safety Measures

Section 9.0.3.2

What is Fire Safety Compliance Report (FSCR) ?

-A written report composed of plans, specifications and design analysis for building prepared by its Engineer Architect-of-Record and Fire Safety Practitioner.

-The Fire Safety Compliance Report is a pre-requisite in granting Fire Safety Evaluation Clearance and FSEC is a pre-requisite for the issuance of Building Permit

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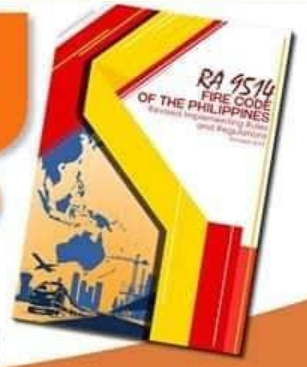
DID YOU KNOW?



Rule No. 09 Enforcement and Administration of Fire Safety Measures

Section 9.0.3.3

What is Fire Safety Compliance and Commisioning Report (FSCCR)?

A compilation report of all approved submittals, test and acceptance forms of all fire protection and life safety features, which shall form part of the “as-built” documents turned over by the contractor to the building owner.

FSCCR is a prerequisite for granting of FSIC for occupancy.

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DID YOU KNOW?

Rule No. 09 Enforcement and Administration of Fire Safety Measures

Section 9.0.3.4

What is Fire Safety Mainenance Report (FSMR)?

A written report prepared by the building owner, his/her fire safety practitioner or authorized representative. This is a compilation of the maintenance and testing records kept by the building's engineering and maintenance department,as a pre-requisite for the issuance of FSIC for Business or Mayor's Permit renewal, Certificate of Annual Inspection for Hospitals, DOH License to operate and other permits or licenses being issued by other government agencies.

-

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Owner Furnished Materials (OFE)

Owner Furnished Materials (OFE) can be any equipment that is not furnished and installed by the construction contractors but will require installation facilities by the contractor or is required by the project to be operational.

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Integrated Testing & Start-up

The objectives of integrated testing is verification of the proof of design and construction tests done by the contractor and witnessed by the Construction Manager.

Test types include: factory/plant tests, installation check out tests, inspection and acceptance tests to provide verification of functional performance and contract compliance.

Operating and Maintenance Manual (O&M)

Operation and Maintenance manual (O&M manual), contains the information required for the operation and maintenance of a facility. The owner's manual is prepared by the contractor or the sub-contractor with additional information from the designers (in particular, the services engineer) and suppliers.

A draft version of the document should be provided for the client as part of the handover procedure prior to certifying practical completion.

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As-Built Documentation

As-Built Drawings are revised set of drawing submitted by a contractor upon completion of a project or a particular job. They reflect all changes made in the specifications and working drawings during the construction process, and show the exact dimensions, geometry, and location of all elements of the work completed under the contract. Also called record drawings or just as-built.

As-Built Documentation

Relevance of the As-Built drawings during Commissioning:

- **The commissioning manager will use the As-Built documentation in commissioning the project**
- **The commissioning manager will review the final As-Built drawings and assure they are part of the commissioning report**

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Punch List

A punch list is a document prepared near the end of a construction project listing work not conforming to contract specifications that the general contractor must complete prior to final payment.

The work may include incomplete or incorrect installations or incidental damage to existing finishes, material, and structures.

Punch List

2 ways of organizing punch list:

- Listing tasks based on room name or area
- Organizing list by trades (ex electrical, painting, HVAC, etc)

Punch list capture and record:

- Damaged, defective, missing and incomplete items
- Non-conformance to specifications and standards

Punch List Categories

CATEGORY A – Items that are safety based in nature or items that prevent commissioning or production operations. These items should be completed by Contractors before handover to Commissioning

- Missing bolts
- Leaked pipes in Fire Suppression systems
- Loose wires
- Loose bolts in flanges

Punch List Categories

CATEGORY B – Items that can be finished during Commissioning prior to hand over to operations. These items should be completed by the Contractor after handover to commissioning, as they prevent commissioning from handing the completed equipment or plant over to operations.

- Long bolts in flanges
- Missing piping labels
- Missing or temporary labels

Punch List Categories

CATEGORY C – Items do not prevent plant or equipment from working and are purely cosmetic, and do not prevent plant or equipment start-up and can be handed over to operations aon an agreed basis.

- Paint scratches
- Missing non-safety related signs

These items can be completed after the equipment or plant installation is running but should still be completed and acted upon.

Punch List

Preparing a Punch List:

- Prepare a Punch List form and keep a clear list punch items, assign responsibility, selct a due date, and track its current status (*Create directly punch list from the field*)
- Use codes for areas or systems to start your quick punch process
- Drop punch list items directly unto a drawing

Punch List

Preparing a Punch List:

- Filter by status (unresolved, resolved, open or closed)
- Maintain a real time history of all actions including when it was created, when the responsible party took action, and where it stands now
- Create a template of common punch list items for efficient reporting
- Sign-off closed punch items

Project Closeout

Closing contractual activities requires the Owner's Project Manager to oversee :

- **Final settlement of project contracts,**
- **Acceptance of Contract Deliverables**
- **Collection of Contract Documents and records (ex. As-built Drawings, O&M manuals, warranties**
- **Approval of final payments and Final Inspection**
- **Resolve Outstanding Change/claim disputes**
- **Evaluation of project success and lessons learned**

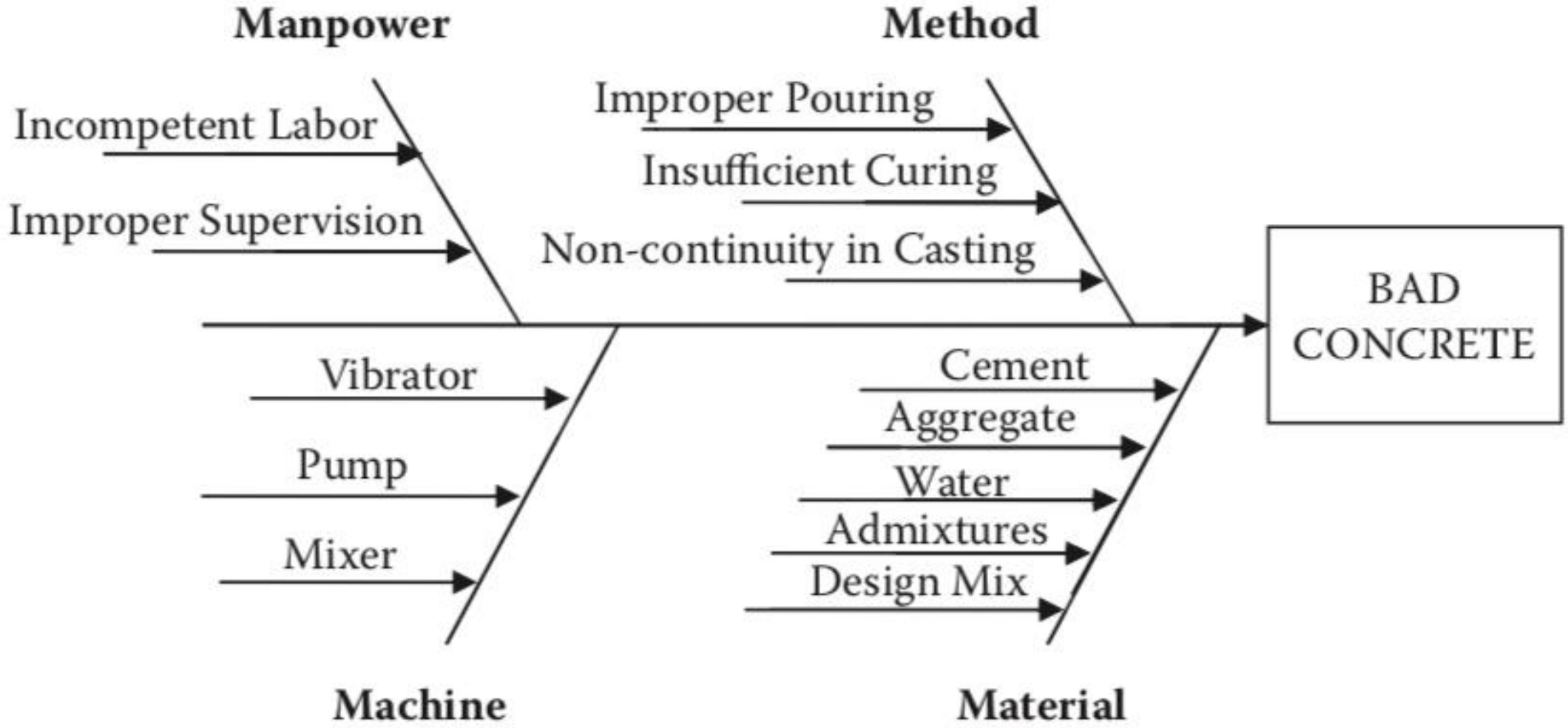
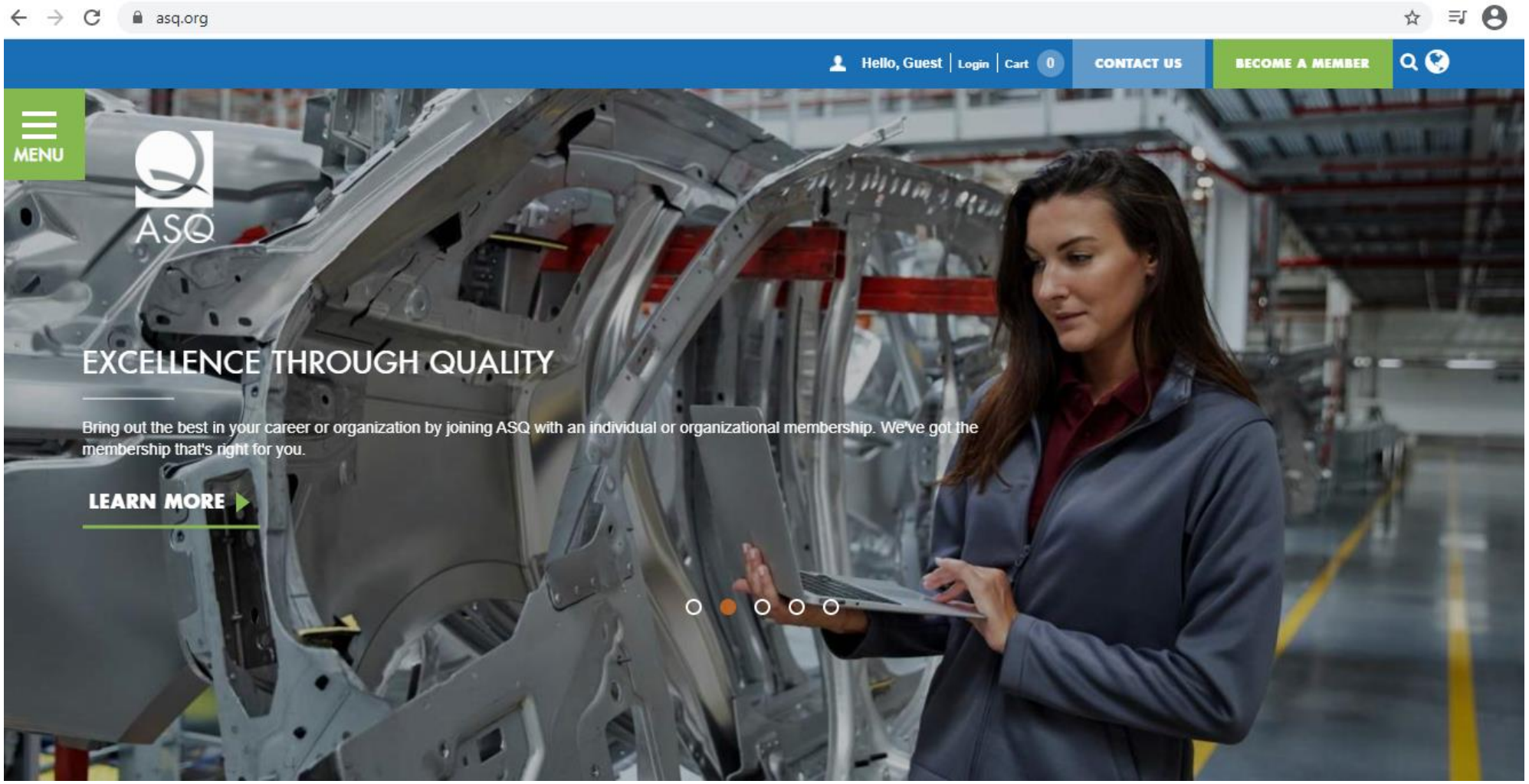


FIGURE 1.4
Cause-and-effect diagram for bad concrete.

https://asq.org/



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Certified Quality Engineer (CQE)

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Reference Book

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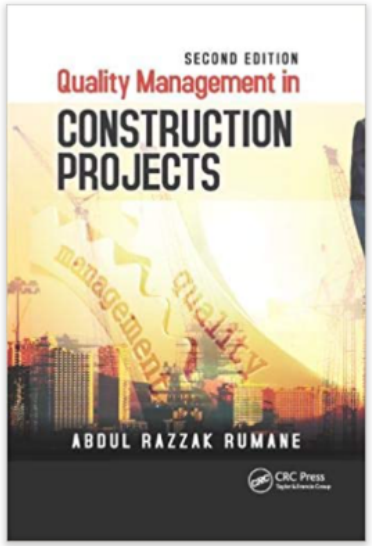
by Abdul Razzak Rumane (Author)

3 ratings

Look inside



ISBN-13: 978-0367890032
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