

# TRANSPORT FOR NSW (TfNSW)

## QA SPECIFICATION Q4

### QUALITY MANAGEMENT SYSTEM (TYPE 4)

#### NOTICE

This document is a Transport for NSW QA Specification. It has been developed for use with roadworks and bridgeworks contracts let by Transport for NSW or by local councils in NSW. It is not suitable for any other purpose and must not be used for any other purpose or in any other context.

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#### REVISION REGISTER

Ed/Rev Number	Clause Number	Description of Revision	Authorised By	Date
Ed 1/Rev 0		Model for RTA Q4 using RTA Q5 Edition 1 / Revision 6.	GM, RNIC	18.05.99
Ed 1/Rev 1	1.2, 3.2, 3.3, 3.4, 4.1.2, 1.1, 2.3, 3.1, 3.1.2, 4.6.1 1.2, Annex Q/1 4.6.2 Table Q.4 Annex Q/9 A4.20	Minor editorial changes 4.6.3, 4.10.1, 4.13 Clarifying requirements Reference to RTA G2 added New subclause Deleted and moved to Annexure Q/5 Q <sub>U</sub> and Q <sub>L</sub> introduced for upper and lower characteristic value.	GM, RNIC	30.09.99
Ed 1/Rev 2	1.2, A4.20.3 1.2 4.10.3	Minor editorial changes 1997 version of AS 3905.2 applies. Opportunity added for reducing minimum testing frequency.	GM, RNIC	09.01.01
Ed 1/Rev 3	1.3, 6, Annex Q/5, A4.9.2.4.	References to Conditions of Contract changed to suit C1.	GM, RNIC	30.05.01
Ed 1/Rev 4	10.4.2 10.4.5	Superintendent and NATA may exchange documents All test reports to be submitted, test records to be accessible.	GM, RNIC	17.06.02
Ed 2/Rev 0		Redraft based on RTA Q6	GM, RNIC	29.01.04
Ed 2/Rev 1	Various 4.2, 7.3, Table Q/A.1	Minor editorial changes Submission of Contractor's Documents to comply with GC21	GM, RNIC	11.06.04

<b>Ed/Rev Number</b>	<b>Clause Number</b>	<b>Description of Revision</b>	<b>Authorised By</b>	<b>Date</b>
Ed 2/Rev 1 (cont'd)	4.2.4, E1.2. E1.3.1, E1.4.2  7.4.3  E1.3.1, K5, L2.2.3, L3.1  E1.3.5  K4  Annex Q/M	AS 4390 replaced by AS ISO 15489  New clause added  Minor editorial changes  New subclause  Survey must be in a uniform pattern  New references added		
Ed 2/Rev 2	Foreword  1.4, 7.5.1,C2, Q/K, Q/M  A2, E1.2, L3.2, Q/F(xii)	New clause after Table of Contents  Text referring to survey transferred to RTA G71  Minor editorial changes.	GM, RNIC	09.02.05
Ed 2/Rev 3	Annex Q/B	Clause revised to deal with payment for Primary Testing.	GM, RNIC	31.01.06
Ed 2/Rev 4	Foreword  4.2.6 8.2.2.2, E1.4.1, L1	Foreword (Q5/Q7 to Q6) removed.  “Construction Program” changed to “Contract Program”	GM, IC	09.11.06
Ed 2/Rev 5	Notice  Global 4.2.6(c) 7.3 7.5.5  Annex C2  Annex E E1.3.1, E1.3.5  Annex L, L3.1  Annex M	“Notice” changed to “Guide Notes”.  Guide notes re-written to clarify when Q4 is to be used.  Minor editorial changes to improve clarity  “process” changed to “work processes”.  “the Contractor’s” changed to “your”.  Words “identification” and “packaging” inserted.  Clause reference “8.2.4.3” changed to “8.2.4.2”.  “Design control” changed to “Design and Development”.  “Disaster Management (Recovery Plan)” changed to “Disaster Recovery Plan”.  Entire clause under “Disaster Recovery Plan” rewritten.  Clause reference “8.2.4.1” changed to “L2.2.3”. Additional words “unless directed otherwise by the Principal” added.  References updated.	GM, IC	02.05.08
Ed 2/Rev 6	“Notice”	RTA PO Box and fax numbers updated.	GM, IC	30.04.10

<b>Ed/Rev Number</b>	<b>Clause Number</b>	<b>Description of Revision</b>	<b>Authorised By</b>	<b>Date</b>
	Guide Notes, 1.3, Annex D & M	Reference to ISO 9001 updated. Guide Notes on use of Q4 corrected.		
Ed 2/Rev 7	8.3	Requirements for control of nonconforming product expanded. Hold Point details amended.	GM, IC	26.11.10
Ed 2/Rev 8	Annex E, E2.2	Requirements for work-as-executed drawings revised to accord with those in Spec G2-C41.	GM, CPS	26.09.13
Ed 2/Rev 9	Global	References to “Roads and Maritime Services” or “RMS” changed to “Transport for NSW” or “TfNSW” respectively.	DCS	22.06.20
Ed 2/Rev 10	Annex A	Minor editorial and formatting changes to Table A.1.	SMCSp	03.06.21

## **GUIDE NOTES**

(Not Part of Contract Document)

Specification Q4 is recommended for use on contracts of value between \$0.2m and \$1.0m and uses Minor Physical Works and Services contract terms. Use of Q4 requires the contractor to have, as a minimum, a quality management system that complies with AS/NZS ISO 9001-2008.

Specification Q4 is written such that it is consistent with AS/NZS ISO 9001-2008 and the recommendations contained in HB90.3-2000.

An accompanying document, Specification Guide NQ4, is available for use as a guide on the use of Specification Q4.



# QUALITY MANAGEMENT SYSTEM (TYPE 4)

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IC-QA-Q4

VERSION FOR: DATE:
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## FOREWORD

### TfNSW COPYRIGHT AND USE OF THIS DOCUMENT

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#### When this document forms part of a contract

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### REVISIONS TO PREVIOUS VERSION

This document has been revised from Specification TfNSW Q4 Edition 2 Revision 9.

All revisions to the previous version (other than minor editorial and project specific changes) are indicated by a vertical line in the margin as shown here, except when it is a new edition and the text has been extensively rewritten.

### PROJECT SPECIFIC CHANGES

Any project specific changes are indicated in the following manner:

- (a) Text which is additional to the base document and which is included in the Specification is shown in bold italics e.g. ***Additional Text***.
- (b) Text which has been deleted from the base document and which is not included in the Specification is shown struck out e.g. ~~Deleted Text~~.



# **TfNSW QA SPECIFICATION Q4**

## **QUALITY MANAGEMENT SYSTEM (TYPE 4)**

### **1 GENERAL**

#### **1.1 SCOPE**

The work to be executed under TfNSW Q4 (TfNSW Q) consists of:

- (a) Developing and implementing a partial corporate Quality Management System in accordance with ISO 9001;
- (b) Developing and implementing a PROJECT QUALITY PLAN to cover all Work Under the Contract, whether permanent or temporary both on-site and off-site;
- (c) Operating, maintaining and reviewing the PROJECT QUALITY PLAN and associated quality management system procedures; and
- (d) Keeping Quality Records in accordance with TfNSW Q Clause 4.2.4.

#### **1.2 STRUCTURE OF THE SPECIFICATION**

This Specification includes a series of annexures that detail additional requirements.

##### **1.2.1 Details of Work**

Details of work are shown in Annexure Q/A.

##### **1.2.2 Measurement and Payment**

The method of measurement and payment is detailed in Annexure Q/B.

##### **1.2.3 Schedules of HOLD POINTS and Identified Records**

The schedules in Annexure Q/C list the **HOLD POINTS** that must be observed. Refer to Clause 1.4 for the definition of **HOLD POINTS**.

The Quality Records for the Contract and referenced documents listed in Annexure Q/C must be created, when applicable, and located as specified in Annexure Q/C.

The records listed in Annexure Q/C are **Identified Records** for the purposes of Annexure Q/E.

##### **1.2.4 Planning documents**

The PROJECT QUALITY PLAN must include each of the documents and requirements listed in Annexure Q/D and must be implemented.

In all cases where TfNSW Q refers to manufacturers' recommendations, these must be included in the PROJECT QUALITY PLAN.

### **1.2.5 Record Keeping**

Records for the Contract, including quality, environmental, OHS and other management records must comply with Annexure Q/E.

### **1.2.6 Referenced Documents**

Unless specified otherwise, the applicable issue of a referenced document, other than a TfNSW Specification, is the issue current at the date one week before the closing date for tenders, or where no issue is current at that date, the most recent issue.

Standards, specifications and test methods are referred to in abbreviated form (e.g. AS 2350). For convenience, the full titles are given in Annexure Q/M.

## **1.3 SYSTEM NOT FORMATTED ON AS/NZS ISO 9001:2008**

Where the Quality Management System documents are arranged differently to the format of AS/NZS ISO 9001:2008, include in the PROJECT QUALITY PLAN a matrix of how the Quality Management System addresses all the requirements of TfNSW Q and AS/NZS ISO 9001:2008.

## **1.4 TERMS AND DEFINITIONS**

The definitions appearing in ISO 9000 and in ISO 9001 Clause 3 apply in the interpretation of the words and expressions appearing in the quality assurance provisions of the Contract (except where the context otherwise requires).

“**TfNSW Q**” appearing in the Contract Documents means this Specification.

Additionally, the following words and expressions appearing in the quality assurance provisions of the Contract have the meanings hereby assigned to them, except where the context otherwise requires:

“**Hold Point**”: a point beyond which a work process must not proceed without the Principal's express written authorisation.

“**Inspection records**”: the evidence of conformity specified in ISO 9001 Clauses 7.1 (d) and 8.2.4.

“**Inspection and test forms/ITP forms**”: the forms that accompany the Inspection and Test Plan (ITP) and that are used for recording inspection/test results (eg verification checklists). If the ITP contains the facility to record inspection/test results, the ITP will also be regarded as an “ITP form” (refer TfNSW Q Clause 8.1.1).

“**Project Testing**”: testing, including sampling, carried out on the site, at concrete and asphalt batch plants, on aggregates and materials used for pavements and structures at off site locations and any other testing specified in Annexure Q/A to be Project Testing.

“**Witness Point**”: a point in a work process where the Contractor must give prior notice to the Principal and the option of attendance may be exercised by the Principal.

“**Work Under the Contract**”: the work which the Contractor is or may be required to execute under the Contract and includes all variations, remedial work, Constructional Plant and Temporary Work, design and documentation (TfNSW G2).

**2 (NOT USED)**

**3 (NOT USED)**

**4 QUALITY MANAGEMENT SYSTEM**

**4.1 GENERAL REQUIREMENTS**

Apply the following quality assurance practices to the Work Under the Contract:

- (a) ensure that purchased items conform to specification before incorporating them in the Works;
- (b) plan and control work processes;
- (c) plan and carry out inspection and testing (including identification and traceability) to verify that the work processes are effective and that all finished work complies with the Contract;
- (d) careful selection of subcontractors and confirmation that their work complies with the Contract;
- (e) where the Specifications require plans, procedures, methods and forms to be documented, use these documents in implementing the Quality Management System for the Contract;
- (f) acknowledge and rectify any nonconforming work and improve work processes to prevent recurrence of nonconformities;
- (g) keep orderly records to demonstrate that the Works comply with the Contract; and
- (h) improve procedures and work practices when opportunities are identified to minimise errors, waste and product nonconformities.

**4.2 DOCUMENTATION REQUIREMENTS**

**4.2.1 General**

Develop, implement and maintain a partial corporate Quality Management System in accordance with ISO 9001 and TfNSW Q.

Those requirements in TfNSW Q that are additional to the requirements of ISO 9001 may be addressed within the corporate Quality Management System or in supplementary quality management system documentation applied to the Contract. Where documentation of procedures is specified, it is acceptable to document the procedures either individually or combined with other procedures, depending on how you choose to structure your quality management system.

**4.2.2 Quality Management System Documents**

**4.2.2.1 QUALITY MANUAL**

The development of a QUALITY MANUAL is optional for this Contract. A Quality Manual needs to be maintained, implemented and submitted only if it forms part of the quality management system documentation that addresses the requirements of TfNSW Q.

#### **4.2.2.2 Quality Management System Procedures**

Document, maintain and implement procedures in accordance with ISO 9001 as part of the corporate Quality Management System to:

- (a) manage quality records (refer TfNSW Q Clause 4.2.4);
- (b) plan product realisation and preparation of the PROJECT QUALITY PLAN (refer TfNSW Q Clause 7.1);
- (c) review customer requirements (refer TfNSW Q Clause 7.2);
- (d) control purchasing and subcontracted work to ensure conformity to specification requirements (refer TfNSW Q Clause 7.4);
- (e) plan and implement process controls and monitor their effectiveness (refer TfNSW Q Clause 7.5.1);
- (f) identify and trace products and work (refer TfNSW Q Clause 7.5.3);
- (g) control inspection and testing activities (refer TfNSW Q Clauses 8.1.1, 8.2.4);
- (h) identify, record, notify and control nonconforming products or services (refer TfNSW Q Clause 8.3); and
- (i) analyse nonconformities and implement corrective action (refer TfNSW Q Clause 8.5.2).

Procedures required by this Specification that are additional to the requirements of ISO 9001 may be included in your general corporate quality management system procedures or as supplementary corporate quality management system procedures to be applied on TfNSW contracts. The latter may be incorporated as part of a proforma PROJECT QUALITY PLAN for TfNSW contracts, controlled within your corporate Quality Management System.

The PROJECT QUALITY PLAN or QUALITY MANUAL must describe or reference the applicable quality management system procedures required by this Specification and show their revision status. Quality management system procedures referenced in the PROJECT QUALITY PLAN must be readily accessible to project personnel at their work locations.

#### **4.2.2.3 PROJECT QUALITY PLAN**

Prepare the PROJECT QUALITY PLAN to inform and direct your personnel about the specific quality practices, resources, sequence of activities, controls and checks that you must implement during the Contract. Include or reference in the PROJECT QUALITY PLAN the documents listed in Annexure Q/D plus any additional information nominated in the specifications for inclusion in the PROJECT QUALITY PLAN.

Associated technical documents that must be submitted with the PROJECT QUALITY PLAN include:

- (a) Quality Manual and quality management system procedures, if applicable (refer TfNSW Q Clause 4.2.1). Submit only those documents that form part of the Quality Management System applicable to this Contract that are not contained in the PROJECT QUALITY PLAN;
- (b) Documentation required by the specifications or TfNSW Q Clause 7.5.1 to plan and implement controlled conditions; and
- (c) Inspection and test plans and ITP forms that will be used by you to verify that the Works comply with the Contract (refer TfNSW Q Clause 8.1.1).

#### **4.2.2.4 Changes to the Project Quality Plan and Associated Documents**

Immediately implement changes, where applicable, to the PROJECT QUALITY PLAN and corporate Quality Management System if the PROJECT QUALITY PLAN and associated quality management system documents:

- (a) do not adequately address the Specification requirements; or
- (b) are causing nonconformity; or
- (c) have to be revised as a result of an audit; or
- (d) no longer represent current and/or appropriate practice.

Advise the Principal promptly of any revisions to the PROJECT QUALITY PLAN or corporate Quality Management System and submit amended documentation detailing the revisions within 5 working days.

#### **4.2.3 Control of Documents**

Identify each part of the PROJECT QUALITY PLAN and associated quality management system documents with a unique issue number and issue date, and keep a list of who holds copies. When a document has to be changed, ensure that the issue number and issue date is upgraded and that it is re-issued to all listed holders, and that the superseded documents are recalled or endorsed as superseded.

#### **4.2.4 Control of Records**

Document a corporate quality management system procedure to address ISO 9001 Clause 4.2.4.

The quality records must include all those shown in Annexure Q/E.

Implement a records management system in accordance with Clauses E1 and E2 of TfNSW Q. Use ISO 15489.1 and ISO 15489.2 for guidance in developing and implementing the records management system.

Prepare and submit a Records Management Plan (RMP) for the works under the Contract in accordance with Clauses E1 and E2 of TfNSW Q. The RMP must cover the record keeping practices, resources and sequence of activities required to meet all the requirements of TfNSW Q. The RMP must be consistent with the PROJECT QUALITY PLAN and include appropriate cross-referencing to the quality management system and PROJECT QUALITY PLAN.

Describe in the PROJECT QUALITY PLAN where the quality records shown in Annexure Q/E will be located and how they will be stored and maintained so they are readily retrievable, in facilities that provide a suitable environment to minimise deterioration or damage, and to prevent loss of the records.

Make the quality records available to the Principal at all reasonable times. Where requested by the Principal, permit the Principal to make copies of quality records.

Prior to Completion, provide the Principal with any commissioning records and operation and maintenance manuals relevant to the Works.

Provide the Principal with copies of any quality records within 14 days of a request by the Principal.

#### **4.2.5 Submission of Documents to Principal**

Submit documents in accordance with Annexure Q/A Table Q/A.1 and Table Q/A.2.

Within 35 days after the date of acceptance of tender, submit for consideration by the Principal controlled copies of the complete PROJECT QUALITY PLAN with relevant associated quality management system documents. Alternatively, submit the first stage of the PROJECT QUALITY PLAN (where you propose to comply with TfNSW Q Clause 4.2.6). The number of copies required is shown in Annexure Q/A Table Q/A.1.

Alternatively, where the quality management system is accessed electronically on site rather than by reference to hard copies, provide access for the Principal to the extent necessary for the Principal to fulfil the Principal's responsibilities under TfNSW Q.

Submit the RMP to the Principal within 35 days after the date of acceptance of tender or at least 14 days prior to project commencement, whichever is the earlier.

Work requiring controlled conditions or inspection and testing must not commence until 14 days (or 21 days if work involves design) after submission of the PROJECT QUALITY PLAN (for each stage or complete) and associated quality management system documents unless otherwise agreed by the Principal.

When requested by the Principal for the purposes of quality audits, provide additional controlled copies of the QUALITY MANUAL, PROJECT QUALITY PLAN and associated quality management system documents. These documents will be returned to you when they are no longer required by the Principal.

#### **4.2.6 Staged Submission of the Project Quality Plan**

Provided you have submitted a Contract Program in accordance with the Contract, the staged submission of the PROJECT QUALITY PLAN is acceptable subject to the following conditions:

- (a) A written proposal has been submitted to the Principal that includes the following details and documentation:
  - (i) a detailed index describing the full content of each stage of the PROJECT QUALITY PLAN;
  - (ii) the first stage submission of the PROJECT QUALITY PLAN. This stage must include the associated quality management system documents nominated in Annexure Q/D plus work process control documents and inspection/testing documents for those activities that are planned to commence in the first month or greater period of the submitted Contract Program. Work activities involving design and/or requiring controlled conditions or inspection and testing and not covered by documentation submitted in accordance with Clause 4.2.5 must not commence; and
  - (iii) a timetable for submission of each stage of the PROJECT QUALITY PLAN.
- (b) Each stage of the PROJECT QUALITY PLAN must cover all the construction activities for a minimum period of one month when related to the Contract Program.
- (c) Controlled copies of subsequent stages of the PROJECT QUALITY PLAN documentation must be submitted in accordance with Clause 4.2.5 prior to the scheduled start of any work processes covered in that documentation. Work processes covered by the submitted documentation must not commence until 14 days after submission of the documentation unless otherwise agreed by the Principal.
- (d) The complete PROJECT QUALITY PLAN and documented procedures must be submitted before 50% of the contract period has expired or as agreed by the Principal.



## **5 MANAGEMENT RESPONSIBILITY**

### **5.1 MANAGEMENT COMMITMENT**

Your top management is to be actively involved in developing a corporate Quality Management System (to the extent specified in TfNSW Q) that will achieve efficient and effective management of projects in order to consistently produce satisfactory outcomes for customers.

### **5.2 CUSTOMER FOCUS**

Refer TfNSW Q Clause 8.5.

### **5.3 QUALITY POLICY**

Not mandatory.

### **5.4 PLANNING**

Plan a corporate Quality Management System to the extent specified in TfNSW Q.

### **5.5 RESPONSIBILITY, AUTHORITY AND COMMUNICATION**

#### **5.5.1 Responsibility and Authority**

The PROJECT QUALITY PLAN must:

- (a) list the main responsibilities and authorities of personnel primarily responsible for upholding the quality management system provisions of the Contract, including responsibilities for:
  - (i) authorising corporate quality management system procedures;
  - (ii) receiving, in-process and final (or acceptance) inspection and testing (refer TfNSW Q Clause 8.1);
  - (iii) identifying/recording quality problems;
  - (iv) initiating/recommending solutions through designated channels;
  - (v) controlling further processing/delivery/installation of nonconforming product until deficiencies or unsatisfactory conditions have been corrected; and
  - (vi) controlling monitoring and measurement devices.
- (b) nominate the person responsible on site for main construction activities such as construction trials, placing concrete road base, concrete for reinforced structures, placing asphalt, bituminous spray sealing; and
- (c) nominate the persons with the responsibility and authority for planning and implementing training and induction for the project, including establishing competence needed.

#### **5.5.2 Management Representative**

The PROJECT QUALITY PLAN must:

- (a) nominate the Management Representative with corporate responsibility and authority for enacting ISO 9001 Clause 5.5.2 (a) and (b);
- (b) nominate your Project Quality Representative, directly responsible to top management and who has the defined authority and responsibility for ensuring that the requirements of the PROJECT QUALITY PLAN and associated quality management system procedures are implemented and maintained on the project; and
- (c) where the Project Quality Representative is not your designated corporate Management Representative indicate the relationship between the two persons.

The Project Quality Representative must be available for contact by telephone at all times when work is being carried out and be available to attend meetings on site within 24 hours of written or spoken notice by the Principal.

## **5.6 MANAGEMENT REVIEW**

The top management personnel are to review the corporate Quality Management System either annually or before commencing each TfNSW contract to ensure its continuing suitability, adequacy and effectiveness for TfNSW contracts. Implement opportunities for improvement by applying TfNSW Q Clause 4.2.2.4.

# **6 RESOURCE MANAGEMENT**

## **6.1 PROVISION OF RESOURCES**

Comply with ISO 9001 Clause 6.1 to the extent specified in TfNSW Q.

## **6.2 HUMAN RESOURCES**

### **6.2.1 General**

Comply with ISO 9001 Clause 6.2.1 for performing the Work Under the Contract.

### **6.2.2 Competence, Awareness and Training**

Comply with ISO 9001 Clause 6.2.2 (a) and (b) for the Work Under the Contract.

## **6.3 INFRASTRUCTURE**

Comply with ISO 9001 Clause 6.3 for the Work Under the Contract.

## **6.4 WORK ENVIRONMENT**

When planning work process controls in accordance with ISO 9001 Clause 7.5.1, consider whether the work environment could adversely impact on the quality of constructed work. If so, comply with ISO 9001 Clause 6.4.

## **7 PRODUCT REALISATION**

### **7.1 PLANNING OF PRODUCT REALISATION**

Document a corporate quality management system procedure to address ISO 9001 Clause 7.1. Describe the method for preparing Project Quality Plans and associated documents. Include guidelines about how to determine project-specific requirements. Also include a template PROJECT QUALITY PLAN that complies with the Project Quality Plan requirements in TfNSW Q and that will be customised for TfNSW contracts.

### **7.2 CUSTOMER-RELATED PROCESSES**

Document a corporate quality management system procedure to address ISO 9001 Clauses 7.2.1, 7.2.2 and 7.2.3 (c).

### **7.3 DESIGN AND DEVELOPMENT**

Ensure that design is undertaken by a suitably experienced and competent person in the following circumstances, as relevant:

- (a) temporary structures and the checking of permanent structures for construction loadings;
- (b) lifting devices for manufactured items;
- (c) any alternative permanent structure or structural component proposed by you;
- (d) concrete mixes for structures and pavements and asphalt mixes for permanent works;
- (e) traffic management, temporary roadways and detours; and
- (f) permanent works where design is nominated in the Contract.

Control the design process in accordance with TfNSW Q Clause 7.4.

Notwithstanding TfNSW Q Clause 4.2 and Annexure Q/A, the submission of your Documents must comply with the General Conditions of Contract (refer to Clause 40 of GC21).

### **7.4 PURCHASING**

#### **7.4.1 Purchasing Process**

Document a corporate quality management system procedure to address ISO 9001 Clause 7.4. Include a method to systematically plan and implement surveillance and inspection of subcontractors' work.

Document in the PROJECT QUALITY PLAN how the subcontract requirements identified in Annexure Q/F will be included in sub contracts whenever they apply.

Where a supplier or subcontractor is to carry out work or provide services that require process validation (refer TfNSW Q Clause 7.5.2), evaluate the supplier or subcontractor on their capability to perform process validation. Document the method and results of this evaluation in the PROJECT QUALITY PLAN.

### **7.4.2 Purchasing Information**

Address the requirements of ISO 9001 Clause 7.4.2 and include the subcontract requirements identified in Annexure Q/F in subcontracts whenever they apply.

The quality management system requirements detailed in TfNSW Q apply to all subcontracted products and services procured as part of the Work Under the Contract. This includes work process control documents and inspection/testing documents required by TfNSW Q Clauses 7.5.1 and 8.1.1. Include these documents in the PROJECT QUALITY PLAN. When planning surveillance of subcontractors, review the documents submitted by each subcontractor to ensure that all process control and inspection/testing requirements from the Specifications are adequately addressed.

Where any subcontractor is required to have TfNSW Prequalification or Registration, the subcontractor must use its quality management system that must conform to the quality management system requirements of the specified TfNSW Prequalification or Registration Category.

When a copy of a Subcontract is provided in accordance with the General Conditions of Contract, include associated reference data (except price) and the applicable subcontract requirements listed in Annexure Q/F. When requested by the Principal, also submit the evaluation of the subcontractor's ability to meet subcontract requirements.

### **7.4.3 Verification of Purchased Product**

Comply with TfNSW Q Clause 8.1(a) when receiving products from suppliers.

Include in the PROJECT QUALITY PLAN the subcontractors' PROJECT QUALITY PLAN or process control documentation used to control processes and to verify purchased product.

Plan the extent of surveillance to be exercised for each subcontractor including management of information and records generated by subcontractors. When planning this surveillance, review the documents submitted by each subcontractor to ensure that all process control and inspection/testing requirements from the Specifications are adequately addressed. The surveillance process must include how nominated HOLD POINTS will be released and other activities to verify that the subcontractor's output complies with the Principal's quality requirements.

Include in the PROJECT QUALITY PLAN the methods of surveillance that will be implemented for subcontracted work, in accordance with ISO 9001 Clause 7.4.3.

### **7.4.4 Use of Purchased Products**

Ensure that purchased products are compatible with the other products and works and are handled, stored, combined with other products, installed and used in accordance with the manufacturer's recommendations.

## **7.5 PRODUCTION AND SERVICE PROVISION**

### **7.5.1 Control of Production and Service Provision**

Document a corporate quality management system procedure to address ISO 9001 Clause 7.5.1. Apply the procedure to plan, document, implement and monitor the controlled conditions for each work process. Consider the following (as appropriate) when planning work process controls:

- (a) sequence of operations;
- (b) types of equipment required, capability, maintenance, calibration;

- (c) any special working environment aspects;
- (d) competency and skills of personnel;
- (e) work methods and materials to be used;
- (f) product characteristics, tolerances and workmanship standards to be met;
- (g) inspection, test and control points;
- (h) how the process will be monitored to ensure its continuing suitability;
- (i) records to be kept as evidence that the work process controls remain effective; and
- (j) defining responsibility for implementing and monitoring work process controls and rectifying any deficiencies.

Include the work process control documents in the PROJECT QUALITY PLAN (refer TfNSW Q Clause 4.2.2.3).

Treat and carry out survey as a separate application of work process control in accordance with TfNSW G71.

### **7.5.2 Validation of Processes for Production and Service Provision**

Identify in the PROJECT QUALITY PLAN any work processes (including subcontracted work) where the resulting output cannot be verified by subsequent monitoring and measurement. In such cases, control of the work processes must be documented and implemented in accordance with ISO 9001 Clause 7.5.2.

### **7.5.3 Identification and Traceability**

Document in the PROJECT QUALITY PLAN how identification and traceability will be dealt with in accordance with ISO 9001 Clause 7.5.3.

Subdivide Work Under the Contract into Lots or discrete work areas and control work in accordance with Annexure Q/L. Document in the PROJECT QUALITY PLAN the method(s) for subdividing the work into Lots or discrete work areas and for allocating Lot numbers (refer TfNSW Q Annexure Q/L Clause L1) to uniquely identify each Lot.

The Principal has the right to reject a Lot that is visually non-homogeneous and/or non-representative.

Identify all samples and test results with the field locations and Lot number, as applicable, to which they relate.

Maintain a register that identifies every Work Lot established for the Contract.

Describe in the PROJECT QUALITY PLAN how traceability of the materials specified in TfNSW Q Annexure Q/G will be maintained.

### **7.5.4 Customer Property**

Take responsibility for safekeeping any materials or equipment supplied by the Principal for Work Under the Contract.

### **7.5.5 Preservation of Product**

Employ methods of transport, identification, handling, packaging and storage on Site to prevent damage, deterioration or inappropriate use of materials and products used in the Works.

## **7.6 CONTROL OF MONITORING AND MEASURING DEVICES**

Ensure that measuring and test equipment used to set out, construct or check the Work Under the Contract is maintained in calibration and good working order.

# **8 MEASUREMENT, ANALYSIS AND IMPROVEMENT**

## **8.1 GENERAL**

In demonstrating conformity of the product to specified requirements, carry out inspection and testing:

- (a) before any supplied product is used in the Works (receiving inspection and testing);
- (b) progressively during construction of the Works (in-process inspection and testing); and
- (c) as a final check that all inspection and testing necessary to demonstrate conformity of the Works to specified requirements has been carried out (final or acceptance inspection and testing).

### **8.1.1 Inspection and Test Planning**

Document a corporate quality management system procedure to address ISO 9001 Clause 8.1a and TfNSW Q Clause 8.1. Prepare template Inspection and Test Plans (ITPs) and ITP forms.

Document ITPs and ITP forms for all inspection and testing required by the Specifications. Include these documents in the PROJECT QUALITY PLAN (refer TfNSW Q Clause 4.2.2.3).

The ITPs and/or ITP forms must indicate:

- (a) who performs the receiving, in-process and final inspections or testing and at what stage of the work;
- (b) how the inspection or test is to be carried out and recorded (e.g. as a documented testing procedure or by reference to a Standard test method);
- (c) the acceptance criteria and frequency of inspection and testing. The detail for the acceptance criteria and frequency of inspection and testing and must replicate the nominated requirements of the Specifications. Reference to a specification clause alone is unacceptable;
- (d) who reviews inspection/test results, evaluates whether work conforms, determines what to do next if work does not pass a required inspection or test and closes out Work Lots;
- (e) when statistical analysis of test results is required (refer TfNSW Q Clause 8.2.4);
- (f) when nonconformity control is addressed (refer TfNSW Q Clause 8.2.4.2) including closing out Work Lots (refer TfNSW Q Clause 8.2.4.3);
- (g) who performs final review of all inspection/test results to confirm that all inspections and tests have been carried out to completely verify conformity for each Lot;
- (h) the time limits for testing, time constraints for submission, and Hold and Witness Points that are nominated in the Specifications; and

- (i) the requirements of TfNSW Q Clause 7.5.3 for Identification and Traceability and the sampling methods as required by TfNSW Q Clause L1.

### **8.1.2 Frequency of Testing**

The frequency of testing must be appropriate to verify conformity and must not be less than that stated in the Specifications. Nominate appropriate frequencies even where no minimum frequency of inspection or testing is stated in the relevant Specification.

Include in the management review of the PROJECT QUALITY PLAN a review of the appropriateness of the frequency of testing nominated in the Inspection and Test Plan(s). Take into account the frequency of nonconformity detected, including nonconformities remedied by simple reworking.

The Principal may conditionally agree to your proposal to reduce the specified minimum frequency of testing by up to 50% or as defined in the relevant Specification. The proposal must be supported by a statistical analysis verifying consistent process capability and product characteristics.

The specified minimum frequency of testing must be restored when a nonconformity is detected and until the Principal agrees to a new proposal to reduce the specified minimum frequency. The Principal may vary or restore the specified minimum frequency of testing, either selectively or permanently, at any time.

### **8.1.3 Inspection and Test Status**

Describe in the PROJECT QUALITY PLAN, the method to be used for identifying and controlling the inspection and test status of all product and Work Under the Contract, including product and work which is incorporated in the Works prior to being verified as conforming.

If inspection/test records (such as a Lot register) do not clearly show the inspection and test status of each Lot or work area, Lots must be physically marked in the field to show whether they conform.

## **8.2 MONITORING AND MEASUREMENT**

### **8.2.1 Customer Satisfaction**

Refer to TfNSW Q Clause 8.5.2.

### **8.2.2 Internal Audit**

Not mandatory.

### **8.2.3 Monitoring and Measurement of Processes**

Review each work process control and the associated documents and inspections and tests while that work process is in progress to monitor whether the planned controls are effective in achieving product conformity.

### **8.2.4 Monitoring and Measurement of Product**

Implement the Inspection and Test Plans for the project, as established in TfNSW Q Clause 8.1.1.

Where acceptance characteristics are described in the Specifications in terms of characteristic values, apply statistical techniques to analyse test results in accordance with Annexure Q/L Clause L3 (refer TfNSW Q Clause 8.1.1(e)).

Document and maintain a method to confirm that all products or work Lots requiring inspection and/or testing are so inspected and/or tested (refer TfNSW Q Clause 7.5.3) at the required testing frequency. Include this method in the PROJECT QUALITY PLAN or ITP documentation.

Arrange sampling and testing to be performed in accordance with Annexure Q/L.

#### **8.2.4.1 Hold Points**

Describe in the PROJECT QUALITY PLAN the method of arranging for the release of HOLD POINTS by the Principal.

Do not proceed beyond a HOLD POINT until the Principal has released that HOLD POINT. Make suitable arrangements to notify the Principal when a HOLD POINT will be reached.

#### **8.2.4.2 Inspection and Test Records**

The inspection, test and verification records for each Lot or work area (refer TfNSW Q Clause 7.5.3) must:

- (a) clearly show or reference the actual results obtained for any inspection and/or test and demonstrate conformity with the specified requirements;
- (b) be progressively maintained as results are achieved; and
- (c) indicate that control of nonconformity is addressed.

Make inspection, test and verification records available for evaluation by the Principal. Inspection and test records which are to be held on Site (refer Annexure Q/A) must be stored in a room reasonably accessible to the Principal with facilities for the inspection of the records. Access must not be limited by your other management activities.

#### **8.2.4.3 Close-out of Work Lots and Release of Products**

Work Lots must not be closed out nor product released, dispatched, used or installed until you have fully verified their conformity and incorporated the required inspection and/or test results/reports, including the documentation referred to in TfNSW Q Clause L2.2, into your records.

Work Lots and products must not be covered up until their conformity has been fully verified, except as permitted below in this Clause.

The Principal recognises that some specified compliance testing might take over 48 hours to complete. In such circumstances, Work Lots/products may be covered up before the Lot is closed-out, subject to the following conditions:

- (a) you document an effective traceability/closure method in the PROJECT QUALITY PLAN that nominates the person or position responsible and describes how work or product that may need to be covered up will be identified, traced, recorded and promptly verified and what action will be taken if full conformity is not achieved;
- (b) you apply the traceability method on each occasion that a Work Lot or product is covered up under such circumstances;
- (c) any specified verification survey has demonstrated conformity before covering up the work;
- (d) you demonstrate on the basis of past work that it is highly unlikely that the work will fail to pass the specified compliance testing; and



- (e) you apply the closure method and only close out the Work Lot after verifying that the work or product has passed the specified compliance testing.

Where product or work fails to pass any inspection and/or test, the Work Lot must not be closed out until the nonconformity has been rectified and closed out in accordance with TfNSW Q Clause 8.3.

### **8.3 CONTROL OF NONCONFORMING PRODUCT**

Document a corporate quality management system procedure to address ISO 9001 Clause 8.3. Prepare a standard form for use as a Nonconformity Report.

Describe in the PROJECT QUALITY PLAN how the additional requirements of TfNSW Q Clause 8.3 will be implemented for the Contract.

Identify and control all products or services that fail to pass any inspection or test in accordance with the defined acceptance criteria. Where conformity may be achieved by simple reworking or repair (that is, without reference to the Principal), record the required action in a format to suit your continual improvement procedures (refer TfNSW Q Clause 8.5).

Where conformity cannot be achieved by simply reworking with the original process, notify the Principal of the nonconformity and record it on an appropriate register. Products that may be or are accepted with specified or predetermined deductions are nonconformities.

Submit a Nonconformity Report within 2 working days of detection of the nonconformity indicating the proposed rectification method, the calculations of any specified deductions, and when the rectification is to be undertaken.

If surveillance or an audit by the Principal indicates a nonconforming product that has not been addressed by a Nonconformity Report, the Principal will issue a 'Nonconforming Product Notification'. This nonconforming product must be dealt with in the same manner as if you had identified it.

For any nonconforming product, do not proceed with the rectification work, or cover up or further build on it until the proposed rectification method has been accepted by the Principal or a concession for its use has been given by the Principal. In evaluating the proposed rectification method or the request for a concession, the Principal may require additional supporting information, such as engineering calculations or the opinion of a recognized technical expert in the field under consideration.

Acceptance of the proposed rectification method will be at the discretion of the Principal. The costs of the rectification work and any associated delays will be borne by you.

#### **HOLD POINT**

Process Held:	Implementation of rectification work.
Submission Details:	Proposed rectification method for nonconforming product, and additional supporting documentation where required by the Principal.
Release of Hold Point:	The Principal will consider the submitted documents and may inspect the nonconforming work prior to authorising the release of the Hold Point.

## **8.4 ANALYSIS OF DATA**

Not mandatory.

## **8.5 IMPROVEMENT**

### **8.5.1 Continual Improvement**

Implement continual improvement in accordance with Clauses 4.2.2.4 and 8.5.2.

### **8.5.2 Corrective Action**

Document a corporate quality management system procedure to address ISO 9001 Clause 8.5.2.

Establish and maintain a Corrective Action Register to record a summary of corrective actions or list those records that demonstrate corrective actions.

If surveillance or an audit by the Principal indicates that the Quality Management System does not comply with the provisions of the Contract or that a condition adverse to quality exists, the Principal may issue a Corrective Action Request.

Rectify any nonconformity or condition adverse to quality notified by the Principal. Take corrective/preventive action to prevent recurrence of the nonconformity or remove the condition adverse to quality and return the completed Corrective Action Request, all within 7 days after the Corrective Action Request is given to you.

Address the Corrective Action Request in accordance with your arrangements for handling customer complaints as required by ISO 9001 Clause 7.2.3(c).

<b>HOLD POINT</b>	(Where required by the Principal)
Process Held:	The Process referred to in the Corrective Action Request.
Submission Details:	Details of the corrective action.
Release of Hold Point:	The Principal will consider the submitted documents prior to authorising the release of the Hold Point.

Enter details of the developed corrective action onto the Nonconformity Report or Corrective Action records, as appropriate.

### **8.5.3 Preventive Action**

Not mandatory.

## **9 PRINCIPAL'S SURVEILLANCE AND AUDITS**

### **9.1 GENERAL**

All testing by the Principal associated with surveillance and audits will be conducted by a laboratory with NATA accreditation for the test methods specified. The results of such testing will be recorded on NATA endorsed test reports. If NATA has not accredited a laboratory for a test, the test must be carried out at a laboratory approved by the Principal.

### **9.2 QUALITY MANAGEMENT SYSTEM, PROCESS QUALITY AND PRODUCT QUALITY AUDITS AND SURVEILLANCE.**

Quality management system audits by the Principal may be conducted on a scheduled basis on all aspects of the Quality Management System and will be performed in accordance with recognised audit procedures.

The Principal will give at least 5 days notice that a quality management system audit is to be conducted.

Surveillance, process quality audits and product quality audits by the Principal may be conducted at any time.

If surveillance or an audit indicates a significant nonconformity of a product or service, the Principal is entitled to conduct a quality management system audit at 24 hours notice to you.

Make suitable facilities available at the site to accommodate an audit team of three persons. The costs of providing such facilities will be borne by you.

### **9.3 VALIDATION OF PRINCIPAL'S DESIGN**

Provide records, access to the works and assistance for surveillance and audits conducted by the Principal to allow the Principal to carry out validation of Principal supplied designs.

The Principal will give you at least 5 days notice in writing of when an audit by the Principal for design validation will be carried out. The notice will nominate the design to be validated, the names of persons authorised to conduct the audit for design validation and the inspections and tests to be carried out by the auditors.

## ANNEXURE Q/A – DETAILS OF WORK

### A1 PROJECT SPECIFIC REQUIREMENTS

Clause	Description	Requirement
Annexure Q/C Clause C2	Site records more than 35 days old must be stored on Site:	Yes / No

<b>Project Testing</b> also applies to the following tests: (Annexure Q/L Clause L2.2.1)	
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### A2 DOCUMENT SUBMISSION REQUIREMENTS

Documents and records must be submitted in accordance with this matrix. Refer to the Specifications for full details of submission requirements.

**Table Q/A.1 – Document and Record Submission Matrix**

Document	Number of Copies to be Submitted					
	During tender review	First Stage	Other Stages	During contract		
	Sample on request (1)	14 days prior to use (2, 3)	14 days prior to use (3)	For review on request	On Completion	During audits (4)
Quality Manual if available; otherwise applicable quality management system procedures	1 <sup>(5, 6)</sup>	1 <sup>(5, 6)</sup>	1	–	–	1
PROJECT QUALITY PLAN	–	2	–	–	–	1
Process control procedures	1	2	2	–	–	1
Inspection and test plans and record forms	1	2	2	–	–	1
Records Management Plan	–	1	–	–	–	–
Quality records	–	–	–	(7)	(7)	(7)
Index of quality records	–	–	–	–	(8)	–

**Notes:**

- (1) Refer Table Q/A.2.
- (2) Also required within 35 days of acceptance of tender.
- (3) Also required 21 days prior to use if work involves design.
- (4) Copies will be returned on request.
- (5) The Principal may, on request from you, accept controlled copies of Quality Manual and/or applicable quality management system procedures that were submitted to Principal for a previously completed contract.
- (6) Where these documents contain additional information that is relevant for Work under the Contract but not already contained in the PROJECT QUALITY PLAN.

- (7) Copy must be provided for Principal's records as specified or as directed.
- (8) Prior to Completion (refer Clause E1.4.1).

**Table Q/A.2 - Documented Procedures to be Submitted After Closing of Tenders:**

The following documents must be submitted after the closing of Tenders within 5 working days of request, in accordance with the Request for Tenders:

<b>Process and Location</b>	<b>Activities to be documented</b>

**ANNEXURE Q/B – MEASUREMENT AND PAYMENT**

The costs of testing by the Principal associated with audits or design validation will be borne by the Principal. The costs for all other activities associated with the planning, establishment, implementation and maintenance of the Quality Management System for this Contract including the costs of all investigation, testing, rectification and recording, as detailed in this Specification, must be included in the rates or prices generally in the Contract, except for any tests paid by the Principal as Primary Testing.

## ANNEXURE Q/C – SCHEDULES OF HOLD POINTS AND IDENTIFIED RECORDS

### C1 SCHEDULE OF HOLD POINTS

Clause	Description
8.3	Implementation of rectification work
8.5.2	The Process referred to in the Corrective Action Request

Note: The imposition of a Hold Point is at the direction of the Principal.

### C2 SCHEDULE OF QUALITY RECORDS AND IDENTIFIED RECORDS

The Quality Records and reference documents must include the following. Until the time of Completion, the originals or copies must be at the following locations, unless otherwise agreed by the Principal. These records must be made available to the Principal.

Records located with the Principal (indicated by “R” in the table) are Identified Records for the purposes of TfNSW Q Annexure Q/E.

Site records more than 35 days old (if permitted in TfNSW Q Annexure Q/A) may be stored off site, but must be available on site within 24 hours of notice given by the Principal.

Clause	System Requirement	Required Record or Reference	Location
4.2.2	Quality Management System documents	PROJECT QUALITY PLAN, Quality Manual and quality management system procedures when applicable	S & R
4.2.3	Control of documents	List of who holds issued documents	S
		Register of current document issue/revisions	S
7.2.2	Review of requirements	Minutes of tender/contract reviews	M
7.3	Design and development	Design records	D & P
7.4	Purchasing	Evaluation of subcontractors and suppliers	P & S
		Surveillance, audit of subcontractors	S
		Subcontractor supplied documentation	P & S
		Certificate of testing by suppliers	S
7.5.1	Control of production and service provision	Procedures describing how to control work processes	P & R
		Records demonstrating effectiveness of work process controls	S
		Records of process validation when applicable	S
7.5.3	Identification and traceability	Product batch/traceability records	S
		Lot Identification Register	S

<b>Clause</b>	<b>System Requirement</b>	<b>Required Record or Reference</b>	<b>Location</b>
7.6	Control of monitoring and measuring devices	Calibration certificates	P
8.1.1	Inspection and test planning	Inspection and test plans	S & R
8.2.4.2	Inspection and test records	Records/checklists of inspection and testing Conformity reports for each completed Lot	P S
8.3	Control of nonconforming product	Nonconformity reports Principal's Nonconforming Product Notifications Nonconformity Register	S & R S & R P
8.5.2	Corrective action	Corrective action reports and Register Principal's Corrective Action Requests	S S & R

Legend of Document Location: D = Office of designer; R = Principal; S = Site; M = Office of Management Representative with executive responsibility; P = Principal place where the document is used.

## ANNEXURE Q/D – PLANNING DOCUMENTS

The PROJECT QUALITY PLAN and its references must, as a minimum, include the following, when applicable.

**Table Q/D.1 - PROJECT QUALITY PLAN**

<b>Clause</b>	<b>Required Planning Document or Reference</b>
1.3	Matrix explaining the quality management system if it is not based on AS/NZS ISO 9001:2008
4.2.2.2	TfNSW specific procedures when they are not incorporated into the corporate system procedures
4.2.2.2	Description of applicable corporate quality management system procedures.
4.2.4	Description of how quality records will be stored and maintained
5.5.1	List of main responsibilities and authorities of personnel primarily responsible for quality assurance activities on this Contract
7.4.1	Describe how Annexure Q/F requirements will be included in subcontracts (when applicable)
7.4.1	Document method and results of subcontractor evaluation for work processes that require process validation (when applicable)
7.4.2	Subcontractor's PROJECT QUALITY PLAN or process control documentation for each subcontract
7.4.3	Method of surveillance for subcontracted work
7.5.1	Work process control documents
7.5.2	Identification of work processes where the resulting output cannot be verified by subsequent monitoring and measurement
7.5.3	Dealing with identification and traceability
7.5.3	Method of maintaining traceability for materials listed on Annexure Q/G
7.5.3	Methods for subdividing the work into Lots and allocating Lot numbers
8.1.1	Inspection and Test Plans, ITP Record Forms for all inspection and testing required by the Specifications
8.1.3	Method for identifying and controlling inspection and test status
8.2.4	Method for verifying that all inspection and/or testing is carried out at the required testing frequency
8.2.4.1	Method for release of Hold Points
8.2.4.3	Traceability/closure method for close-out of Work Lots
8.3	Additional requirements of TfNSW Q Clause 8.3
	Any other documents or information required by the specifications to be included in the PROJECT QUALITY PLAN

NOTE: Where the above documents are liable to change, they may be referenced in the PROJECT QUALITY PLAN and attached as an annexure to expedite their revision.



## ANNEXURE Q/E – RECORD KEEPING AND IDENTIFIED RECORDS

Refer to TfNSW Q Clauses 1.2.5 and 4.2.4.

### E1 RECORD KEEPING

#### E1.1 General

The work to be executed under Clauses E1 and E2 of TfNSW Q consists of:

- (a) Development and implementation of a RECORDS MANAGEMENT PLAN (RMP);
- (b) Operation, maintenance and review of the RMP during the work under the Contract and thereafter as required by TfNSW Q; and
- (c) Secure storage of project records and delivery of Identified Records.

#### E1.2 Record Keeping Definitions

The terms and definitions in ISO 15489.1 apply to TfNSW Q. In addition, the following definitions are applicable:

**Project Record.** Any record generated to document the execution of the project but does not include records which are commercial in confidence or relate to staff confidential matters.

**Quality Record.** A record used to demonstrate conformity to specified requirements and effective operation under the AS/NZS ISO 9001 or required by TfNSW Q.

**Identified Record.** Any project record that is named as an Identified Record in the Contract.

#### E1.3 Contractor's Records Management Plan (RMP)

##### E1.3.1 Scope of RMP

Include procedures for the following in the RMP:

- (a) the systematic control of the creation, registration, indexing, filing, maintenance, storage, movement, retrieval and disposal of project records related to the Contract;
- (b) providing to the Principal the information required under the Contract;
- (c) submission and delivery of Identified Records as specified;
- (d) disaster recovery plan in accordance with Clause E1.3.5; and
- (e) providing a list of Identified Records relevant to the Contract which must be progressively handed over to TfNSW.

Include an index of project records in the RMP that is consistent with the records management system. Keep the index up-to-date during the period of the Contract and provide the index to the Principal whenever the index is revised.

Include a list of Identified Records relevant to the Contract in the RMP.

Revise the RMP and implement more appropriate record keeping practices if the original record keeping practices prove not to be fully effective. Apply Clause 4.2.3 of TfNSW Q whenever the RMP is revised.

When requested by the Principal for the purposes of audit, provide up to three additional controlled copies of the RMP and relevant documented procedures. These documents will be returned when no longer required by the Principal.

### **E1.3.2 Record Keeping Policy**

Establish a record keeping policy as part of the RMP. The record keeping policy must define the record keeping objectives of the project and be relevant to the works required by the Contract. Introduce the policy to all appropriate personnel working on the project (including appropriate personnel in Subcontractors' workforces) as part of the induction process (refer to Clause 6.2.2 of TfNSW Q).

### **E1.3.3 Project Management**

Nominate in the RMP a full time member of your site management team to be the authorised contact person for communications with the Principal on record keeping matters. Detail their responsibilities in the RMP, include filing, indexing, storage, movement, retrieval and disposal of records. This person must be fully conversant with the RMP, the record keeping system and progress with hand-over of Identified Records and must promptly provide access to or copies of records to the Principal as required.

### **E1.3.4 Monitoring and Compliance**

If the period of the Contract exceeds six months, the RMP must state the requirements for review of the RMP which must be carried out by a senior officer of your management. Confirm the continuing suitability and effectiveness of the RMP for the Work Under the Contract.

Undertake compliance audits of the RMP at intervals of not more than six months, preferably in conjunction with quality management system audits.

### **E1.3.5 Disaster Recovery Plan**

The records management system must address disaster preparedness to ensure that risks are identified and mitigated.

Records that are particularly critical for business continuity may require additional methods of protection and duplication to ensure accessibility in the event of a disaster.

Develop a disaster recovery plan that defines an organized and prioritized response to the disaster, planning for the continuance of regular business operations during the disaster and making appropriate plans for recovery after the disaster.

Integrity must be demonstrably maintained during and after recovery from disaster.

In the development of a disaster recovery plan, you may refer to Appendix B of AS 4390.6-1996 (superseded).

## **E1.4 Project Records: Basic Record Keeping Requirements**

### **E1.4.1 General**

Project records include the following:

- (a) Quality Records as shown in Clause C2 of TfNSW Q;
- (b) Records of Environmental activities in accordance with TfNSW G36, Clause 3.11;
- (c) Records related to Work Health and Safety activities in accordance with TfNSW G22;
- (d) Contract Programs, as specified in the General Conditions of Contract;
- (e) Identified Records that are a sub-set of the project records – see Clause E2 of TfNSW Q.

The project records must be:

- (i) sufficiently comprehensive to demonstrate compliance with contract Specifications. This includes subcontractor and supplier records, where relevant;
- (ii) accurate, legible and fully completed;
- (iii) kept in order, particularly in the case of multi-page records;
- (iv) filed in such a way that individual records can be readily retrieved;
- (v) filed promptly after they are generated or received;
- (vi) securely maintained to prevent unauthorised access, alteration, removal, deterioration, damage or loss;
- (vii) kept track of where authorised removal or transfer of records within the company is permitted; and
- (viii) entered on a register which shows what records are handed over to the Principal or sent to other parties, including the date and method of hand-over/dispatch.

Make all project records available to the Principal at all reasonable times. When requested by the Principal, permit the Principal to copy such records.

By Completion, provide the up-to-date index of all project records to the Principal. Following the provision of that index, provide copies of any project records within 14 days of a request by the Principal.

### **E1.4.2 Form of Records**

Keep records as paper files or in electronic form in accordance with Clause 9 of ISO 15489.1 and Clause 4 of ISO 15489.2 unless otherwise provided in the Contract or agreed with the Principal.

Store records on media that ensure their useability, reliability, authenticity and preservation in accordance with the Contract. The media and formats used for making records must be in accordance with Clause 9 of ISO 15489.1.

### **E1.4.3 Storage**

Store and maintain project records or copies thereof such that they are readily retrievable, in facilities that provide a suitable environment to minimise deterioration or damage, and to prevent loss.

Store project records:

- (a) Prior to Completion, at the location or locations specified in the Contract or, failing such specified location, at the principal place where the respective records are used or such other place as may be agreed with the Principal.
- (b) After Completion, at a location within the TfNSW Region in which the Work Under the Contract was carried out or at a location within the Sydney metropolitan area, as agreed with the Principal. Inform the Principal of the street address of the location. The location must not be changed without the approval of the Principal.

#### **E1.4.4 Retention Period**

Keep all project records for a minimum period of five years after Completion. This requirement continues to apply even though the records or copies of the records may have been given to the Principal and the Principal may have taken copies of the records.

#### **E1.4.5 Disposal of Records**

The records must be pulped, shredded or burned in industrial facilities when disposing of records after the expiration of the retention period. Dumping of project records is not permitted.

## **E2 IDENTIFIED RECORDS**

### **E2.1 General**

Deliver Identified Records to the Principal in accordance with Clauses E1 and E2 of TfNSW Q.

Each TfNSW Specification includes as an Annexure a list of Identified Records applicable to that Specification. Compile a list of all Identified Records for all TfNSW Specifications included in the Contract and include the list in the RMP.

The Principal may direct, as a variation, that records be added to or deleted from the list. Deal with those records as Identified Records as from the time of receipt of the Principal's direction.

For the purposes of the definition of Completion in the General Conditions of Contract, Identified Records which are then in existence, or must be in existence to comply with the provisions of the Contract, are deemed to be essential for the operation, use and maintenance of the Works.

### **E2.2 Form of Identified Records**

Unless otherwise provided in the Contract or agreed with the Principal, all Identified Records, except for work-as-executed drawings, must be delivered to the Principal in hard copy on paper size A3 or A4 in good quality file housing/covering.

The submission of work-as-executed drawings must comply with Specification TfNSW G2-C41 Clause 41.

The paper must be premium bond paper of minimum weight 80 grams per square metre. The colour of the paper used must be white unless the record is normally maintained in some other colour for ease of identification in which case that particular colour may be used.

The use of thermal paper is not acceptable.

With the agreement of the Principal, Identified Records may be provided in electronic form if it can be demonstrated that:

- (a) the records have been properly captured into an electronic record keeping system and the records remain accessible, authentic, reliable and useable through any kind of system change during the period of Work Under the Contract and for the entire retention period; and
- (b) the records are compatible with TfNSW' electronic records management system.

### **E2.3 Filing and Indexing**

File Identified Records as required to be prepared under the relevant TfNSW Specification. They must be uniquely numbered and filed in chronological order under the heading of the relevant TfNSW Specification by which they were created. Include an index for quick reference. Alternatively, you may submit for the Principal's approval an alternative means of filing and indexing which provides the information required by this Clause E2.3 and forms part of your standard record keeping system.

### **E2.4 Delivery**

Deliver Identified Records to the Principal progressively during the course of the Contract at the times specified in the Contract or, if not so specified, at such times or within such periods as may be agreed with the Principal.

The Principal may withhold agreement of Completion until such time as all the Identified Records have been delivered. Make arrangements with the Principal for the delivery of any outstanding Identified Records.

In the event that the Principal elects to exercise the power conferred on him by the General Conditions of Contract to terminate the Contract due to your default or insolvency or in the event that you, as a company, is being wound up voluntarily by its members for the purpose of reconstruction or amalgamation, all project records, including Identified Records, then in your possession become the property of the Principal forthwith and must be handed over to the Principal.

### **E2.5 Records to be Kept**

Notwithstanding that project records and Identified Records have been delivered to the Principal or the Principal has taken copies of project records or Identified Records, retain the originals of those records or, where originals are not held by you, good quality copies of the records, for the period specified in Clause E1.4.4 of TfNSW Q.

Where electronic records are provided, keep a copy of those records in accordance with the provisions of TfNSW Q.

**ANNEXURE Q/F – SUBCONTRACT REQUIREMENTS**

Subcontracts for products and services provided to the Principal (refer to TfNSW Q Clause 7.4.2) must include the following requirements, as applicable.

<b>Subcontract Requirements</b>	
(i)	Quality management system requirements which must be addressed by the subcontractor's quality management system;
(ii)	Method to be used for identifying purchased products (where required by Specifications);
(iii)	Verification requirements to be carried out by the subcontractor;
(iv)	Points in the subcontractor's Inspection and Test Plan(s) where you will verify conformity to contract requirements;
(v)	Hold Points and Witness Points to be observed by the subcontractor;
(vi)	Requirements for Principal's approval of the disposition of nonconformities;
(vii)	Requirements for the submission, retention and disposal of documentation, quality records and Identified Records;
(viii)	Identification and traceability requirements for work Lots and product, as specified in TfNSW Q Clause 7.5.3;
(ix)	Any specific requirements with regard to process control activities;
(x)	Requirements for the submission of inspection and test plans, procedures and record forms as specified by the Contract;
(xi)	Requirements for calibration of subcontractor's measuring and test equipment;
(xii)	For subcontract surveying services, requirements to comply with TfNSW G71;
(xiii)	For subcontract sampling/testing services, requirements to comply with Annexure Q/L.;
(xiv)	Right of the Principal to monitor, audit, inspect, test and sample subcontractor's management systems and plans, products, designs and activities and to inspect and copy records and report on the subcontractor's performance;
(xv)	Security of payment clauses of the General Conditions of Contract where the subcontract exceeds \$25,000; and
(xvi)	Requirements for warranties in the name of the Principal.

## ANNEXURE Q/G – PRODUCT TRACEABILITY

Refer to TfNSW Q Clause 7.5.3 – Apply traceability to the following products:

Specification	Product	Requirement
	Concrete batches used in bridge components, cast-in-place box culverts and retaining walls.	The trace must start at the batch plant and finish at the location where the material is incorporated in the Works. Records must be kept of the batch quantities and time, testing details and location of placement.
	Concrete batches used in road pavement sub-base and base.	The trace must start at the batch plant and finish at the location where the material is incorporated in the Works. Records must be kept of the batch quantities and time, testing details and location of placement.
	Stabilised material used in road pavement.	The trace must start at the batch plant and finish at the location where the material is incorporated in the Works. Records must be kept of the batch quantities and time, testing details and location of placement.
	Asphalt used in wearing courses, intermediate courses and drainage layers.	The trace must start at the batch plant and finish at the location where the material is incorporated in the Works. Records must be kept of the batch quantities and time, testing details and location of placement.
	Steel plate in bridge girders and bridge columns.	The trace must start at the steelworks and finish at the location of the plate in the girder or column. Records must be kept of the steel heat number, testing details and location of the plate in the girder or column.

## ANNEXURES Q/H TO Q/J – (NOT USED)

## ANNEXURE Q/K – SURVEY PROCEDURES

Refer to TfNSW Q Clause 7.5.1. Carry out survey in accordance with TfNSW G71.

## ANNEXURE Q/L – TESTING PROCEDURES

This Annexure provides details on the content of sampling and testing procedures to be included in the PROJECT QUALITY PLAN, when applicable.

### L1 IDENTIFICATION OF WORK LOTS

Refer to TfNSW Q Clause 7.5.3.

Work Under the Contract must be subdivided into Lots or discrete work areas. A Lot must consist of a continuous portion of homogeneous and/or representative material or end product produced under essentially constant conditions. Discrete portions of a Lot that are visually non-homogeneous and/or

non-representative must be excluded from the Lot and must be either treated as separate Lots or reworked to achieve conformity to the Specification.

The size of a Lot must not exceed one day's output except that this period may be extended by agreement with the Principal where full conformity cannot be achieved in one day.

Describe in the PROJECT QUALITY PLAN how the Lot is to be identified in the field.

Determine the bounds of each Lot before sampling. Set the bounds of each Lot so that each Lot is represented by a single tested sample, except where statistical methods (which require several tested samples to represent a Lot) are used. Each acceptance criterion may have different Lot boundaries. Demonstrate the relationship of the boundaries of all adjacent Lots to confirm that the Lots represent the total work.

Give each Lot a unique Lot number. Use this Lot number as an identifier on all quality records. The Lot numbering system must be compatible with any activity numbering system used for your Contract Program. Record the Lot number on an appropriate register that indicates the three-dimensional location of the Lot. Include in the PROJECT QUALITY PLAN details of the Lot numbering system and the place where the Lot register is kept. Record chainages of start and finish, lateral location and layer location. When the Lot number does not indicate the location of the Lot, agree the method for identification of the Lot with the Principal.

## **L2 TESTING SERVICES**

### **L2.1 General**

#### **L2.1.1 National Association of Testing Authorities (NATA) Accreditation**

Apply the requirements of Clause L2 to all laboratories verifying conformity of materials and work used for the Contract. Ensure that all suppliers and subcontractors required to use or supply tested materials or work are informed of and implement the requirements of Clause L2 and testing requirements in the relevant specifications.

If NATA has not accredited a laboratory for a test, the test must be carried out by a laboratory accredited for the test by an organisation mutually recognised by NATA and approved by the Principal. The test must be carried out and results endorsed in accordance with accreditation conditions or by a laboratory approved by the Principal with results reported in a format also acceptable to the Principal.

#### **L2.1.2 Laboratory Independence**

You and the laboratories used for the testing must ensure objectivity and impartiality in sampling, testing and reporting of results. The laboratories must act independently of you, any of your subcontractors and the Principal in conducting the sampling and testing.

Independence, for the purposes of this clause, means “management and personnel are free from any undue internal and external commercial, financial and other pressures and influences that may adversely affect quality of their work” (refer AS/ISO/IEC 17025 Clause 4.1.5(b)).

#### **L2.1.3 Sampling Personnel**

Sampling, including selection of locations, must be conducted by personnel either accredited by NATA for that sampling procedure or who are from a NATA accredited laboratory or approved by the Principal and who have been assessed as proficient for that sampling procedure and must be supervised by an officer having NATA signatory approval for that process.



#### **L2.1.4 Test Certificates**

Test results for each Lot must be reported in NATA endorsed documentation.

### **L2.2 Project Testing**

#### **L2.2.1 Project Laboratories**

In addition to Clause L2.1, Clause L2.2 applies for all samples and tests carried out on the Site, at concrete and asphalt batch plants, on aggregates and materials used for pavements and structures at off site locations and any other testing specified in Annexure Q/A to be Project Testing.

Engage one or more Project Testing laboratories that hold NATA accreditation at your own cost.

As a condition of appointment by you (refer TfNSW Q Clause 7.4), laboratories, material suppliers or subcontractors who have NATA accreditation must provide to you and the Principal, on request, copies of NATA audits, relevant to the type of tests carried out for the Contract.

The Principal may forward to NATA copies of test records, certificates, reports of surveillance, performance and audits of any laboratory used for sampling and testing the conformity of materials and work.

The same Project Testing laboratory responsible for testing the sample must undertake the sampling, unless otherwise approved by the Principal.

Should you propose sampling and/or testing by personnel other than from the laboratory, prior to sampling and/or testing commencing, submit a proposal for the Principal's approval showing the sampling and/or testing to be performed, by whom, their experience and the measures to ensure the integrity of the sampling and testing. Ensure that the sampler has NATA accreditation for the specified sampling methods (where applicable) and understands the requirements for independent random and unbiased sampling. If NATA accreditation does not apply for any sampling or testing method, you must ensure that the sampler and/or tester is suitably trained and competent.

Should a Project Testing laboratory need to subcontract testing then, prior to sampling and testing commencing, submit a proposal for the Principal's approval showing the tests to be performed, by whom, their experience and the measures to ensure the integrity of the sampling and testing.

#### **L2.2.2 Inspection and Test Plans**

Provide the Project Testing laboratory with all information, including relevant parts of the Contract, Specifications, Inspection and Test Plans, and ensure that laboratory performs sampling and testing in accordance with the Contract.

Project Testing laboratories that provide on-site testing services must independently review your Inspection and Test Plans (and/or your subcontractors) to confirm that:

- (a) all conformity tests are identified, and
- (b) sampling and test methods, acceptance criteria and frequency of testing conform to the Contract and Specifications.

Any discrepancies must be resolved between you and the Project Testing laboratory and amended Inspection and Test Plans issued, where appropriate. The Project Testing laboratory must supply to the Principal, for each staged submission of ITP's (submitted in accordance with TfNSW Q Clause 4.2.5), prior to commencement of any sampling and testing, a written report describing the outcome of this review.

#### **L2.2.3 Selection of Sampling Locations**

You must define the Lots for sampling and the Project Testing laboratory must select the sampling locations in accordance with the Contract and Specifications. Sampling must not be restricted to locations dimensioned or otherwise defined for setting out the Works in the Drawings or Specification, but must be undertaken in a random or unbiased manner at any location within the Works.

#### **L2.2.4 Test Certificates and Declarations**

The test report for each Lot (or sub-Lot) must include the following details:

- (a) identification of work and materials with the relevant Lot number;
- (b) where sampling is performed by personnel other than from the laboratory undertaking the testing,
  - (i) declaration from the sampler that the sampling was carried out in accordance with Annexure Q/L and the specified sampling methods. Detail all samples taken as part of the Lot.
  - (ii) declaration (in a format acceptable to the Principal) by an officer having NATA signatory approval for the testing performed, that the test results, and statistical analysis where applicable, conform with the specified criteria. This declaration must reference your Inspection and Test Plan and the sampler's declaration.
- (c) where sampling is performed by personnel from the laboratory undertaking the testing, declaration (in a format agreed by the Principal) by an officer having NATA signatory approval for the sampling and testing performed, that the sampling was carried out in accordance with Annexure Q/L and the specified sampling methods, test results, and statistical analysis (where applicable), conform with the Inspection and Test Plan. This declaration must reference and indicate the issue number or date of the Inspection and Test Plan.
- (d) Declaration that no samples have been abandoned or untested, or details of any samples that have been abandoned or untested for any reason.

#### **L2.2.5 Availability of Sampling and Testing Records**

Sampling and testing records shown in Annexure Q/C2 to be held on site must be stored in a room readily accessible to the Principal with facilities for inspection of the records. Access must not be limited by the laboratory's other management activities.

The laboratory, on request, must independently provide to the Principal, concurrently with submission to you, the test certificates and declarations in Clause L2.2.4, including preliminary results forwarded to you.

The Principal must be given physical access to sites and personnel in conjunction with or through you. Nominate a member of the Project Testing laboratory team to be the authorised contact person for communications with the Principal in sampling and testing matters. This person must be fully conversant with the relevant parts of the specifications, specified test methods, the test carried out and testing records and must promptly provide, when requested,

information on testing and access to, or copies of, testing records including worksheets to the Principal.

### L2.3 Protection of Sampled Work

Samples removed from the Work Under the Contract must be replaced, unless otherwise specified, with similar material placed and finished in accordance with the relevant specification requirements, within 7 days of sampling and prior to the use, deterioration, contamination or covering up of the sampled work.

## L3 STATISTICAL TECHNIQUES

Use statistical techniques in accordance with the following sub-Clauses where required in the Specifications. By agreement with the Principal, areas that are not generally rectangular may be notionally rearranged to suit the method of determining sampling locations in TfNSW Q Clause L3.1.

### L3.1 Sampling and Testing

The number of samples per Lot (n) must be not less than:

Specified Relative Compaction (%)	Minimum Testing Frequency for Lot Area of:				
	> 5000 m <sup>2</sup>	1000 - 5000 m <sup>2</sup>	500 - 1000 m <sup>2</sup>	50-500 m <sup>2</sup>	≤ 50 m <sup>2</sup>
≤ 90.0	1 per 3000 m <sup>2</sup>	1 per 2000 m <sup>2</sup> (min. 2)	1	1	1
> 90.0 ≤ 95.0	1 per 2000 m <sup>2</sup>	1 per 1000 m <sup>2</sup> (min. 3)	1 per 250 m <sup>2</sup> (min. 3)	2	1
> 95.0 ≤ 98.0	1 per 2000 m <sup>2</sup> (min. 6)	5	4	3	1
> 98.0 ≤ 100.0	1 per 2000 m <sup>2</sup> (min. 6)	5	4	3	1
> 100.0	1 per 1000 m <sup>2</sup> (min. 10)	1 per 500 m <sup>2</sup> (min. 5)	4	3	1

#### NOTES:

1. Where the sampler/tester can assure that the work is homogeneous and has been carried out within the same day under homogeneous conditions, and:
  - (a) where the minimum specified compaction is below 100.0%, work in separate areas, up to a total area of 1000 m<sup>2</sup>, may be considered as one Lot; or
  - (b) where the minimum specified compaction is below 98.0%, layers may be covered before testing and may be considered as one Lot, subject to the following:
 

Sum Total Area of layers:	< 100 m <sup>2</sup>	101-500 m <sup>2</sup>	501-1000 m <sup>2</sup>
Maximum number of layers:	5	3	2
Maximum thickness of Lot:	600 mm	600 mm	600 mm
Minimum number of Tests:	1	2	3

The tests must be evenly distributed throughout the layers and areas of the Lot.

2. Lots less than 2 m wide must not be longer than 150 m.

- 3. Except as stated in 1(b) above or specifically allowed by the relevant specification, the Lot will only be one layer.

Sampling locations must be determined by the sampling personnel in a random or unbiased manner (refer TfNSW Q Clause L2.2.3) as follows, unless directed otherwise by the Principal:

- (a) Representing the Lot as a rectangle, subdivide the Lot lengthwise into equal-area sub-Lots in accordance with the number of samples selected (n);
- (b) Establish six equally spaced grid lines within the Lot, as illustrated in Figure Q/L.1;
- (c) Where the width of Lot is between 0.5 m and 2.5 m, the number of grid lines may be reduced such that the distance between adjacent grid lines (equally spaced) does not exceed 400 mm;
- (d) Where the Lot is less than 500 mm wide, the offset locations must be randomly selected;
- (e) Determine the order of sampling of the six lines by selecting a six digit number from Table Q/L.1. A starting point on the table (e.g. 1st number, block 6D (= 415236)) will be advised by the Principal prior to the commencement of testing. The numbers are to be used sequentially down the Table until further notice from the Principal, starting at the point advised by the Principal, and selecting a new number for each Lot tested;
- (f) Where there are less than 6 grid lines in the Lot, delete from the random number selected from Table Q/L.1, the numerals that exceed the number of gridlines in the Lot (e.g. in the above example, where there are only 4 grid lines, the sequence is 4123);
- (g) If for any reason the starting point has not been advised then it must be the first number in the block determined, by the following method, from the date on which sampling is first undertaken:

Select column:	A	B	C	D
For:	January	February	March	April
For:	May	June	July	August
For:	September	October	November	December

Day: select a row on the basis of: 1st, 11th, 21st, 31st = Row 1;  
2nd, 12th, 22nd = Row 2; etc.

- (h) For each block in Table Q/L.1, use the Fraction R at the right of the relevant random number. Length coordinate for sample location in sub-Lot 1 =  $RL/n$ ;
- (i) Record the Lot number on Table Q/L.1 to the right of the applicable random number and indicate the date of the sampling on the Table;
- (j) For the sample location in the next sub-Lot:  
Add  $L/n$  to the previous length coordinate.  
Go to the next line as indicated by the six-digit number  
(e.g. if the number is 415236 the first line tested is 4, followed by 1, 5, 2, 3 and 6 and the sample locations are as shown in Figure Q/L.1);
- (k) If the Lot requires more than six sampling locations, repeat the sequence using the same Grid Line Sequence and Fraction R to provide as many additional locations as are required.

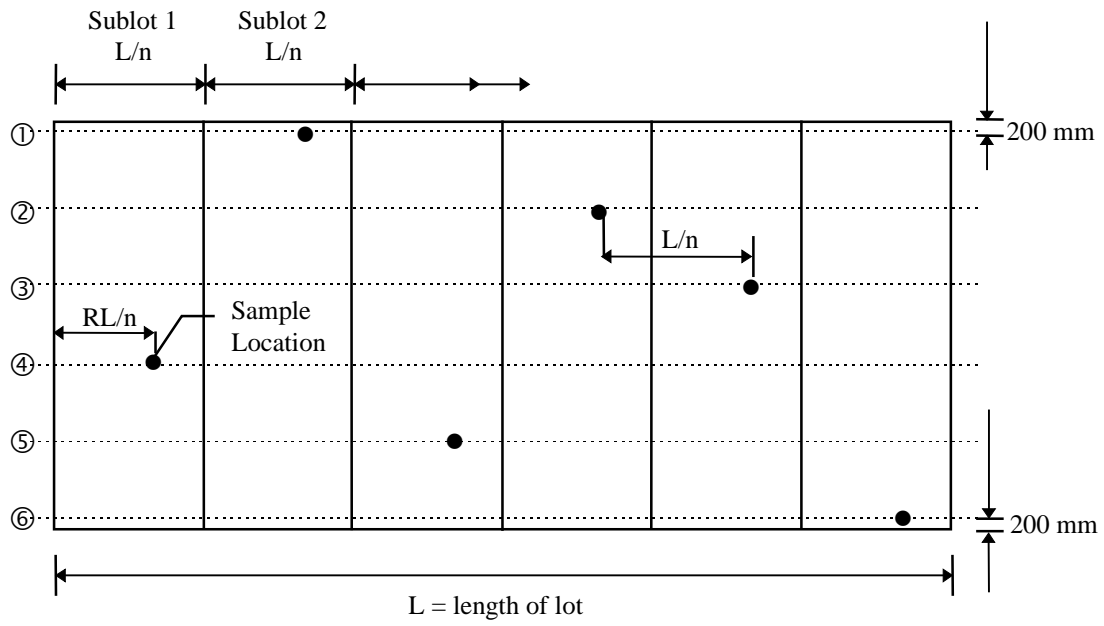


Figure Q/L.1 Sampling Locations for a Rectangular Lot

Table Q/L.1 — Random Grid Line Sequences (and Random Fraction R)

	A			B			C			D		
	Sequence	R	Lot No.	Sequence	R	Lot No.	Sequence	R	Lot No.	Sequence	R	Lot No.
1	531426	.91		245136	.01		532461	.25		425316	.17	
	634125	.15		641532	.46		431652	.95		613254	.38	
	165243	.96		265413	.29		124563	.76		352641	.32	
	452613	.61		236541	.49		324651	.84		546123	.30	
2	612345	.14		625413	.76		514236	.68		364251	.07	
	246135	.72		145632	.76		643215	.45		621534	.85	
	316245	.86		516342	.21		546312	.50		156243	.03	
	253416	.01		615243	.04		526413	.29		514326	.63	
3	342615	.95		162543	.70		263541	.69		145236	.63	
	352146	.85		624315	.43		435612	.01		412536	.97	
	245613	.38		526314	.02		356412	.23		614253	.01	
	451623	.08		631245	.13		163425	.07		652143	.11	
4	135624	.49		213465	.97		356142	.29		163254	.77	
	621354	.45		536214	.36		325461	.88		342165	.37	
	613425	.34		425136	.78		125463	.91		564231	.45	
	456321	.35		514623	.75		436251	.61		326451	.67	
5	245631	.44		214563	.43		124356	.45		325164	.83	
	516234	.52		425631	.23		536412	.64		246153	.08	
	462513	.83		645213	.86		653124	.32		516423	.94	
	532146	.83		531624	.19		453612	.93		125643	.54	
6	264531	.16		654132	.64		153462	.19		415236	.16	
	321456	.07		352416	.64		526431	.42		524163	.54	
	426135	.52		436125	.63		125436	.40		641352	.04	
	154632	.64		625341	.20		613452	.36		251436	.17	
7	512463	.13		362451	.16		125346	.12		136542	.09	
	264315	.85		251634	.99		431265	.10		132546	.18	
	453216	.15		136254	.72		425361	.79		145326	.74	
	532164	.12		523641	.85		614352	.02		245361	.76	
8	631524	.33		634521	.23		632154	.48		264351	.72	
	532614	.01		153264	.35		452316	.16		465312	.57	
	253641	.28		152634	.53		153642	.22		635412	.01	
	261453	.75		624135	.08		423561	.87		312645	.76	
9	235461	.68		532164	.63		652431	.90		516432	.88	
	654321	.19		415362	.05		613542	.64		461523	.31	
	614523	.13		316524	.48		463521	.66		236415	.92	
	361524	.51		432165	.54		621435	.39		346512	.43	
10	152643	.04		365142	.29		146253	.97		241365	.09	
	625314	.43		315624	.90		162354	.96		452631	.42	
	346251	.54		142356	.60		461352	.62		241356	.45	
	513246	.70		513624	.74		163542	.61		352614	.97	

**L3.2 Method for Statistical Calculation for Conformity of Lots**

When acceptance criteria specify a maximum and/or minimum characteristic value of attribute ( $Q$ ),  $Q_U$  and/or  $Q_L$  must be used to determine  $Q$ .

The calculation of the characteristic value of attribute ( $Q$ ) for the Lot must be as follows:

- (a) Sample Size = 1

$$Q_U = Q_L = \text{Test result}$$

- (b) Sample Size = 2

$$Q_U = \text{highest test result}$$

$$Q_L = \text{lowest test result}$$

- (c) Sample Size > 2

$$Q_U = \bar{x} + ks$$

$$Q_L = \bar{x} - ks$$

where  $\bar{x}$  = arithmetic mean of attribute test results for all sub-Lots

$s$  = standard deviation of sub-Lot attribute test results

$$= \sqrt{\frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n-1}}$$

$k$  = acceptance constant from Table Q/L.2 (based on 10% producer's risk)

**Table Q/L.2 – Acceptance Constant  $k$**

Sample Size	3	4	5	6	7	8	9	10 - 14	15 - 19	20 +
$k$	0.52	0.62	0.67	0.72	0.75	0.78	0.81	0.83	0.90	0.95

A Lot achieves conformity if:

$Q_U \leq$  the specified upper limit for characteristic value of the attribute; and

$Q_L \geq$  the specified lower limit for characteristic value of the attribute.

If:  $Q_U$  is more than the specified upper limit for characteristic value; or

$Q_L$  is less than the specified upper/lower limit for characteristic value,

and reworking is subsequently undertaken, the complete Lot must be resampled and retested to verify conformity.

## **ANNEXURE Q/M – REFERENCED DOCUMENTS**

Refer to TfNSW Q Clause 1.2.6.

### **TfNSW Specifications**

TfNSW G2	General Requirements
TfNSW G22	Work Health and Safety (Construction Work)
TfNSW G36	Environmental Protection
TfNSW G71	Construction Surveys

### **Australian Standards and Handbooks**

AS 4390.6	AS 4390:1996, Records management Part 6: Storage (superseded)
ISO 9000	AS/NZS ISO 9000:2006, Quality management systems - Fundamentals and vocabulary
ISO 9001	AS/NZS ISO 9001:2008, Quality management systems - Requirements
ISO 15489.1	AS ISO 15489.1:2002, Records Management Part 1: General
ISO 15489.2	AS ISO 15489.2:2002, Records Management Part 2: Guidelines
ISO/IEC 17025	General requirements for the competence of testing and calibration laboratories
HB90.3	HB90.3:2000, The Construction Industry Guide to ISO 9001:2000