

TRANSPORT FOR NSW (TfNSW)
SPECIFICATION GUIDE NQ3
GUIDE TO QA SPECIFICATION Q3
QUALITY MANAGEMENT SYSTEM (TYPE 3)

REVISION REGISTER

Ed/Rev Number	Clause Number	Description of Revision	Authorised By	Date
Ed 3/Rev 0		New edition based on RTA Q6	GM, RNIC	29.01.04
Ed 3/Rev 1		Q3 text changed to current version	GM, RNIC	11.06.04
Ed 3/Rev 2	Foreword	Document No. changed to NQ3 New clause added after the Table of contents Q3 text changed to current version	GM, RNIC	09.02.05
Ed 3/Rev 3	E2.5	Additional guidance on listing identified records	GM, RNIC	31.10.05
Ed 3/Rev 4	8.3	Guide notes revised.	GM, RNIC	30.01.06
Ed 3/Rev 5	Guide Notes Global	Heading changed from “Foreword”. Commentary rewritten, notes on Ed 1 deleted. Text from Q3 specification updated due to changes in base document. Minor editorial changes to improve clarity. Document reformatted.	GM, IC (Warren Stalder)	01.09.08
Ed 3/Rev 6	Global 1.3	Updated to incorporate changed text in base specification. Commentary regarding ISO 9001:1994 deleted.	GM, IC	21.05.12
Ed 3/Rev 7	Global	References to “Roads and Maritime Services” or “RMS” changed to “Transport for NSW” or “TfNSW” respectively.	DCS	22.06.20
Ed 1/Rev 9	Global	Minor formatting and editorial changes. Content updated to accord with associated documents.	SMCSp	01.06.21

WITHDRAWN



GUIDE TO QA SPECIFICATION Q3 QUALITY MANAGEMENT SYSTEM (TYPE 3)

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CONTENTS

CLAUSE	PAGE
FOREWORD	III
TfNSW Copyright and Use of this Document	iii
Base Specification	iii
1 GENERAL	1
1.1 Scope	1
1.2 Structure of the Specification	1
1.3 System Not Formatted on AS/NZS ISO 9001:2008	2
1.4 Terms and Definitions	2
2 (NOT USED)	3
3 (NOT USED)	3
4 QUALITY MANAGEMENT SYSTEM	3
4.1 General Requirements	3
4.2 Documentation Requirements	3
5 MANAGEMENT RESPONSIBILITY	8
5.1 Management Commitment	8
5.2 Customer Focus	8
5.3 Quality Policy	8
5.4 Planning	8
5.5 Responsibility, Authority and Communication	8
5.6 Management Review	9
6 RESOURCE MANAGEMENT	9
6.1 Provision of Resources	9
6.2 Human Resources	9
6.3 Infrastructure	9
6.4 Work Environment	10
7 PRODUCT REALISATION	10
7.1 Planning of Product Realisation	10
7.2 Customer-related Processes	10
7.3 Design and Development	10
7.4 Purchasing	11
7.5 Production and Service Provision	13
7.6 Control of Monitoring and Measuring Devices	15
8 MEASUREMENT, ANALYSIS AND IMPROVEMENT	15
8.1 General	15
8.2 Monitoring and Measurement	18
8.3 Control of Nonconforming Product	20
8.4 Analysis of Data	21
8.5 Improvement	22
9 PRINCIPAL'S SURVEILLANCE AND AUDITS	23
9.1 General	23
9.2 Quality Management System, Process Quality and Product Quality Audits and Surveillance	23

9.3	Validation of Principal's Design.....	23
ANNEXURE Q/A – DETAILS OF WORK.....		24
A1	Project Specific Requirements.....	24
A2	Document Submission Requirements.....	24
ANNEXURE Q/B – MEASUREMENT AND PAYMENT.....		25
ANNEXURE Q/C – SCHEDULES OF HOLD POINTS AND IDENTIFIED RECORDS.....		26
C1	Schedule of Hold Points.....	26
C2	Schedule of Quality Records and Identified Records.....	26
ANNEXURE Q/D – PLANNING DOCUMENTS.....		28
ANNEXURE Q/E – RECORD KEEPING AND IDENTIFIED RECORDS.....		30
E1	Record Keeping.....	30
E2	Identified Records.....	33
E3	Example Record Keeping Forms.....	38
ANNEXURE Q/F – SUBCONTRACT REQUIREMENTS.....		45
ANNEXURE Q/G – PRODUCT TRACEABILITY.....		46
ANNEXURES Q/H TO Q/J – (NOT USED).....		46
ANNEXURE Q/K – SURVEY PROCEDURES.....		46
ANNEXURE Q/L – TESTING PROCEDURES.....		47
L1	Identification of Work Lots.....	47
L2	Testing Services.....	48
L3	Statistical Techniques.....	51
ANNEXURE Q/M – REFERENCED DOCUMENTS.....		56
LAST PAGE OF THIS DOCUMENT IS.....		56

FOREWORD

TfNSW COPYRIGHT AND USE OF THIS DOCUMENT

Copyright in this document belongs to the Transport for NSW.

The Guide is not a contract document. It has been prepared to provide readers with guidance on the use of the specification.

The text of the base specification is shown in this Guide in shaded format.

The commentary on the intent of the specification, with guidance as to how it can be interpreted on a construction site, is shown in *italic font* below the specification clause to which it refers.

BASE SPECIFICATION

This document is based on TfNSW QA Specification Q3 Edition 3 Revision 10.

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SPECIFICATION GUIDE NQ3

GUIDE TO QA SPECIFICATION Q3

QUALITY MANAGEMENT SYSTEM (TYPE 3)

1 GENERAL

1.1 SCOPE

The work to be executed under TfNSW Q3 (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) Keeping Quality Records in accordance with TfNSW Q Clause 4.2.4.

The quality assurance provisions of TfNSW contracts are complementary to, and not in substitution for, the technical requirements of the Specifications and Drawings.

A key objective of TfNSW Q3 is to ensure an effective quality management system suitable for medium sized projects is implemented at each project site. This will be demonstrated by a fully developed Project Quality Plan (PQP).

Contractors must maintain records as objective evidence that the Quality Management System and PQP are achieving TfNSW's specified requirements.

Standards Australia developed HB90.3 to provide guidance in the application of the ISO standards for the construction industry. TfNSW Q3 regards the information in HB90.3 as guidelines for establishing a quality management system that will generally be consistent with industry best practice for construction projects.

Some readers of TfNSW Q3 may consider that particular requirements in Q3 are already stated or implied by ISO9001 or are statements of the obvious. They have been included as a result of previous TfNSW experience on QA contracts.

1.2 STRUCTURE OF THE SPECIFICATION

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

TfNSW should customise Clause A1 and Table Q/A.2 for each project.

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 must comply with Annexure Q/B.

1.2.3 Schedules of HOLD POINTS and Identified Records

Annexure Q/C lists the **HOLD POINTS** that must be observed. Refer to Clause 1.4 for the definition of **HOLD POINT**.

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.

Refer also to TfNSW Q3 Clause 4.2.2.3.

1.2.5 Record Keeping

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

Refer also to TfNSW Q3 Clause 4.2.4.

1.2.6 Referenced Documents

Unless otherwise specified 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 (e.g. 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 you 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 you are 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.

Clause 4.1 summarises the key tasks that are needed to manage quality effectively and to give the Principal greater confidence that the Contractor will comply consistently with the Specifications and Drawings.

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 called for, 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.

Contractors must document corporate procedures for selected ISO 9001 clauses nominated in TfNSW Q3, and implement them on each project. It is emphasised that the manner in which the procedures are documented is the Contractor's choice, to suit the structure of their system. The main issue is that the Contractor's quality management system must satisfy TfNSW requirements on TfNSW contracts.

The documented system should be structured to provide effective communication to the various levels of corporate management and site management so that each person can clearly understand their individual responsibilities. Documents should be written in a style that is easy to read and be indexed for ready reference.

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.

A Contractor's Quality Manual, if developed, should establish the general philosophy used by the Contractor for the operation of their quality management system.

Contractors who develop a Quality Manual should identify those management processes that are applicable to the management of all projects, plus management processes that are applied on a specific project. The interaction between these processes should be described (see HB90.3 4.2.2 for guidance).

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) identify, collect, index, access, file, store, maintain and dispose of quality records (refer TfNSW Q Clause 4.2.4);
- (b) identify, record, notify and control nonconforming products or services (refer TfNSW Q Clause 8.3); and
- (c) analyse nonconformities and implement corrective action (refer TfNSW Q Clause 8.5.2).

This is a summary only. See the referenced TfNSW Q3 clauses for details

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.

Contractors who work on TfNSW projects typically provide their services to a range of different clients, all of whom may have their own specific needs. Therefore, TfNSW does not expect a Contractor to document their quality management system specifically to meet TfNSW

requirements. It is acceptable for the Contractor to deal with TfNSW-specific requirements separately if this suits the structure of the Contractor's quality management system.

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 to explain how each work process will be carried out under controlled conditions (refer TfNSW Q Clause 7.5.1); and
- (c) Inspection and test plans and ITP forms that will be used to verify that the Works comply with the Contract (refer TfNSW Q Clause 8.1.1).

The Project Quality Plan (PQP) is specific to the Contract and establishes the methods to be used by the Contractor to achieve the contract requirements. The PQP is the outcome of the Contractor's planning process.

The documents listed in Annexure Q/D are to be considered by the Contractor when preparing the PQP. The PQP may reference any associated quality management system documents that are applicable to the works under the Contract rather than including them as part of the PQP. Any such associated quality management system documents will need to be held by the Contractor at site and must be under document control.

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.

As the PQP is intended to explain how activities under the contract will be controlled, the Contractor must ensure that where any information in the PQP is incomplete or inaccurate or inappropriate, action is taken to modify the PQP to better reflect project requirements.

Where the Contractor does revise the PQP the Contractor must advise the Principal of the nature of the revision and submit amended documentation to detail the change.

It is not necessary to issue amendments to the PQP in a typed format. Handwritten amendments are acceptable. As TfNSW is generally on site, this will help to avoid misunderstandings. What is essential is for the Contractor to demonstrate to the Principal that appropriate action is being taken promptly.

Where the PQP is issued off site, it may be necessary for the handwritten amendments to be formally reissued at a later period.

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.

The Contractor is required to establish a suitable mechanism to control the PQP and associated documents (TfNSW Q3 Clause 4.2.2), e.g. technical instructions, Inspection and Test Plans and ITP forms.

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 copy 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.

ISO 9001 Clause 4.2.4 requires a documented procedure. See guidelines in HB90.3 Clause 4.2.4.

Annexure Q/E has been included to clarify the requirements for records to be maintained by the Contractor to demonstrate the operation of the Quality Management System and the conformity of the activities under the Contract.

TfNSW Q3 requires Contractors to prepare and maintain a Record Management Plan (RMP) outlining their procedures for the systematic control of the creation, handling, processing, filing, storage, retrieval and disposal of Identified Records related to a contract.

The RMP does not need to be lengthy or onerous. It essentially formalises good records management practice and ensures that the Contractor has in place systems of record creation, storage and control which will enable it to deliver the Identified Records at the appropriate stages of the project.

Contractors proposing to hand over records in electronic format to the Principal must consider the longer-term accessibility for their computer hardware/software. Because TfNSW Asset Managers may need to access construction records after 10 years, the Principal may need to discuss this issue with the TfNSW Asset Manager. This issue must be resolved before the Principal agrees to accept records in electronic format in lieu of records in hard copy format.

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. 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 no longer required by the Principal.

Submission of the above documentation is part of communication with the customer (ISO 9001 Clause 7.2.3). The Principal needs to have these documents to confirm the appropriateness of these documents and records. This is integral to the Principal's Authorised Person's ability to provide assurance to the Principal that quality requirements will be met by the Contractor. Table Q/A.1 establishes the time constraints for the submission of documentation.

Copies of the PQP and associated quality management system documents must be issued as controlled copies to the Principal. The number of copies is indicated in Table Q/A.1. These documents will be treated by the Principal as confidential.

Provision of additional copies of the relevant quality management system documentation is to assist TfNSW auditors in their review of the documentation and to conduct a desktop audit prior to attendance for the site audit. TfNSW auditors are bound by the rules of the Quality Society of Australasia to treat all material received as confidential and are required to return the material when the audit process is completed, which should coincide with the issue of the audit report.

The Contractor is obliged to provide copies of (or electronic access to) all quality management system documentation referenced or appended to the PQP. By allowing TfNSW auditors to fully assess this documentation prior to an audit, the time spent on site and hence the disruption to the activities of the Contractor's staff should be minimised.

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.

TfNSW expects Contractors to use their management systems to develop corporate business controls to facilitate effective management in all phases of TfNSW contracts. See guidelines in HB 90.3 Clause 5.1.

5.2 CUSTOMER FOCUS

Refer TfNSW Q Clause 8.5.

5.3 QUALITY POLICY

Not mandatory.

See guidelines in HB90.3 Clause 5.3 and ISO9004 Clause 5.3, if a quality policy is prepared.

5.4 PLANNING

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

5.5 RESPONSIBILITY, AUTHORITY AND COMMUNICATION

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 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;
- (c) where the Project Quality Representative is not your designated corporate Management Representative indicate the relationship between them; and
- (c) 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) verifying implementation of solutions;
 - (vi) controlling further processing/delivery/installation of nonconforming product until deficiencies or unsatisfactory conditions have been corrected.

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

QA responsibilities may be assigned by the Contractor to various project personnel. The PQP should clearly define the roles of the Contractor's site management personnel.

ISO 9001 Clause 5.5.2 requires Contractors to designate a member of their senior management as Management Representative to be responsible for ensuring that their corporate Quality Management System is being properly implemented.

The Contractor must also nominate a Project Quality Representative to ensure that the PQP is properly implemented for the project. This person should be actively involved in the project and be on site regularly. The Project Quality Representative need not be the corporate Management Representative, but would have to keep the corporate Management Representative informed about effectiveness of PQP implementation and any quality management system deficiencies.

5.6 MANAGEMENT REVIEW

Not mandatory.

6 RESOURCE MANAGEMENT

6.1 PROVISION OF RESOURCES

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

Contractors have a contractual obligation to provide adequate personnel, infrastructure, information management and financial resources to operate the quality management system at corporate level and project level and to meet customer requirements. Contractors do not have to document how they will fulfil this obligation, apart from allocation of responsibilities in Clause 5.5. See guidelines in HB90.3 Clause 6.1.

TfNSW may raise concerns if a Contractor's personnel are unable to effectively fulfil their QA functions because of other commitments or if other resources appear to be inadequate to finish the Works by the date for contract completion.

6.2 HUMAN RESOURCES

6.2.1 General

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

See guidelines in HB90.3 Clause 6.2.

6.2.2 Competence, Awareness and Training

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

Contractors must keep records to demonstrate that their personnel are suitably skilled and competent.

6.3 INFRASTRUCTURE

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

Contractors have a contractual obligation to provide adequate facilities, equipment and support services to complete the specific work under the Contract. While TfNSW does not require Contractors to document how they will comply with ISO9001 Clause 6.3, this contractual obligation is auditable.

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.

Guidance is provided in ISO 9004 Clause 6.4 and HB90.3 Clause 6.4.

7 PRODUCT REALISATION

7.1 PLANNING OF PRODUCT REALISATION

Document a Project Quality Plan that complies with the PROJECT QUALITY PLAN requirements in TfNSW Q.

7.2 CUSTOMER-RELATED PROCESSES

Comply with ISO 9001 Clauses 7.2.1, 7.2.2 and 7.2.3(c) for this Contract.

See guidance in HB90.3 Clause 7.2.

Contractors have a contractual obligation to fully inform themselves about the requirement for a project at tender stage. This should include satisfying themselves that the tender documents are complete and cover the scope of work, and that their resources will be available if awarded the contract. They should seek clarification from TfNSW about any uncertainties or apparent discrepancies in the tender documents.

Contractors should ensure that appropriate records of contract review (ISO 9001 Clause 7.2.2) are available during the conduct of a quality management system audit by TfNSW.

ISO 9001 Clause 7.2.1 also applies when identifying inputs to prepare PQPs (see TfNSW Q3 Clause 4.2.2.3).

7.3 DESIGN AND DEVELOPMENT

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

temporary structures and the checking of permanent structures for construction loadings;

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 control, 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 Conditions of Contract.

TfNSW has specified design control for those processes that are critical to the safety or performance of the works or from experience have a record of poor performance.

Contractors must identify necessary design tasks when preparing PQPs and apply a systematic approach to planning design work.

The Contractor should identify the tasks involved, the responsibilities for the activities, interface requirements, input/output and the design review/verification/validation process. These requirements should be stated in a Design Plan (as a subsidiary document in the PQP).

The Design Plan should detail the scope of each design package and where input for a design package relies on output from another, plus milestones where reviews are needed. The Design Plan should demonstrate how the overall design process has been planned and should facilitate control by the Contractor over the progress of the design packages (similar to a construction program for scheduling of construction activities). Design could involve input from several disciplines. The Contractor will have a strong input in relation to constructability of the design. The Design Plan should also identify any design validation checks that may be appropriate under operational conditions.

This clause also applies to the project-specific design of concrete and asphalt mixes. The Design Plan should describe how the supplier will verify and validate its mix design.

The Principal may review the Design Plan to confirm that the Contractor has identified and addressed key requirements for design activities on the project.

If the Contractor proposes to subcontract design work, the Contractor's brief to engage the design subcontractor should be documented as purchasing data (see TfNSW Q3 Annexure Q/F). Selection of design subcontractors should be as per ISO 9001 Clause 7.4.1. If a design subcontractor has a suitable Design Plan, this can be incorporated as part of the Contractor's Design Plan. The Contractor is required to determine the extent of surveillance the Contractor needs to undertake (ISO 9001 Clause 7.4.3) in relation to design subcontractors. Surveillance can be performed through design review/co-ordination meetings. If the subcontractor is not operating a quality management system, the Contractor is also required to resolve with the design subcontractor appropriate procedures for design verification.

Design output should draw attention to any constraints on the method of construction (eg. construction sequence, stability during erection). The design output should indicate whether any further checks are needed during construction to provide full confidence in the design (eg. pile load test).

7.4 PURCHASING

ISO 9001 Clause 7.4.1 requires contractors to have good control over their subcontractors and suppliers, including:

- evaluate and select subcontractors and suppliers on their ability to meet QA requirements*
- formalise subcontracts and purchase orders with written purchasing data that spells out the QA requirements for the subcontractor or supplier (see Table Q/D.2 in TfNSW Q3 Annexure Q/D)*
- carry out an appropriate level of inspection (or surveillance) of each subcontractor's work and records to confirm that the subcontractor is performing in accordance with the Drawings and Specification*

7.4.1 Purchasing Process

Evaluate subcontractors and suppliers, keep records of these evaluations and control purchasing and subcontracting for the Contract in accordance with ISO 9001 Clause 7.4.1.

See guidance in HB90.3 Clause 7.4.1.

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

This may be achieved by nominating in the PQP who is responsible for checking that Annexure Q/F requirements are included in subcontract documents.

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.

See guidelines in HB90.3 Clause 7.4.2. These requirements allow TfNSW to complete the evaluation of subcontractors as required by TfNSW's quality obligations.

The Principal has the right to review the purchasing data (except price) to ensure that they address the project specific requirements of the head contract. Price has been excluded, as this is confidential and not required to be disclosed to the Principal.

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.

See guidelines in HB90.3 Clause 7.4.3. TfNSW wants Contractors to verify work by their subcontractors before handing such work over to TfNSW. This involves planning the type of surveillance checks to be undertaken by the Contractor while subcontracted work is in progress.

Surveillance should cover all inspection functions and interfaces with the subcontractor, including release of HOLD POINTS, submission of information or results to the Principal etc, to provide the Contractor with confidence that each subcontractor is complying with the Specifications and Drawings.

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.

This is a contractual obligation. It does not have to be documented but it is auditable. Products should generally only be used as recommended by the manufacturer. Noncompliance can affect the warranty on the product and the performance of the product and works. Where there is no alternative conforming product, the Contractor should seek advice from the manufacturer before requesting a change from the Principal.

7.5 PRODUCTION AND SERVICE PROVISION

7.5.1 Control of Production and Service Provision

Prepare work process control documents that describe how to implement and monitor the controlled conditions for work processes covered by the Specifications. 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).

See guidelines in HB90.3 Clause 7.5.1. TfNSW expects Contractors to carry out construction activities under controlled conditions to ensure that TfNSW Specifications are followed and that work passes all inspections and tests.

The Contractor is required to identify relevant work processes for all Specifications.

See guidelines in HB90.3 Clause 7.5.1. Written process controls are usually developed by listing the sequence of tasks needed to complete each construction process. This may be presented as a process flow chart or included in the Inspection and Test Plan. The amount of detail needed will depend on how much skill and experience the Contractor's work crews have. Additional guidance for workers

can be documented as method statements or work instructions. Note that some TfNSW Specifications (e.g. B80 for concreting) nominate particular information to be included in the Contractor's (or subcontractor's) documented process controls.

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 to indicate operator qualifications, equipment controls, method for validating process parameters and records to be kept.

Use these process validation controls to validate applicable work processes in accordance with ISO 9001 Clause 7.5.2.

ISO 9001 Clause 7.5.2 requires Contractors to validate those work processes where the resulting output cannot be adequately verified by subsequent inspection and testing. TfNSW specifications previously used the term "special processes" to designate such work. These work processes may require pre-qualification of process method, equipment and personnel and/or continuous monitoring to ensure that the work is completed within the control parameters as outlined by the process control procedure. See guidance in HB90.3 Clause 7.5.2.

Where this type of work process is to be carried out by subcontractors, the Contractor must confirm that the subcontractor has in place suitable process controls. This is particularly relevant for manufacturing activities associated with bridge construction.

Other examples include: welding; the compaction or non-segregation of concrete or possibly its strength in structures where coring is not practical both in terms of frequency or being able to do it (for example in a bored pile); the position and cover of reinforcing steel after concrete has been placed and compacted, and; the temperature of bitumen.

7.5.3 Identification and Traceability

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.

TfNSW Asset Managers often refer back to construction records when deciding about future maintenance. Accordingly, TfNSW relies heavily on Contractors providing effective identification and traceability within their construction records.

Contractors must use a well-defined Lot numbering system so that every construction quality record can be traced back to the precise location on the site (see TfNSW Q3 Annexure Q/L).

In Annexure Q/L, the Contractor is required to ensure that each “Lot” is homogeneous. If the Principal observes a Lot that is visually non-homogeneous, the Principal is entitled to reject that Lot.

When determining the size or bounds of a Lot, for Lots that are subject to statistical assessment (see TfNSW Q3 Annexure Q/L Clause L3), the costs of additional testing associated with smaller Lots should be balanced against the costs of reworking and delays from the possible rejection of large Lots.

7.5.4 Customer Property

Take responsibility for safekeeping any materials or equipment supplied by the Principal for work under the Contract.

TfNSW sometimes supplies materials for the Contractor to incorporate in the Works (e.g. filling, seed, bridge nameplates). The Contractor should inspect the property supplied by the Principal in the same way as materials purchased by the Contractor (see TfNSW Q3 Clause 8.1.1a).

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.

In addition to normal handling and storage issues, Contractors should consider what measures might be needed to prevent deterioration of products prior to incorporation, during incorporation and after incorporation in the Works. Damage or deterioration could result from adverse weather conditions (e.g. heat, cold, rain). Some typical examples are curing of concrete; not placing asphalt when rain is imminent; protection of pavement layers from wetting up. Preservation control measures may be included in work process control documentation (see TfNSW Q3 Clause 7.5.1).

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.

Monitoring and measuring devices were previously referred to by TfNSW as inspection, measuring and test equipment (IMTE).

The Contractor is required to check that monitoring and measuring devices being used by the Contractor’s personnel and also by subcontractors are reliable and producing accurate results. Particular applications are surveying equipment and laboratory testing equipment.

Where equipment is internally calibrated, TfNSW expects Contractors to have documented calibration procedures. Contractors must keep calibration records to demonstrate that all equipment is in current calibration.

8 MEASUREMENT, ANALYSIS AND IMPROVEMENT

8.1 GENERAL

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

- (a) before 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).

Comply with ISO 9001 Clauses 8.1(a) and 7.5.1(e). Document in the PROJECT QUALITY PLAN a procedure that describes how to carry out, and who is responsible for, receiving, in-process and final inspection and testing and for closing out work Lots. Describe how to keep records of inspection and testing results.

8.1.1 Inspection and Test Planning

Document Inspection and Test Plans (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.

Inspection and Test Plans (ITPs) serve two main purposes:

- a) they identify the in-process checks needed to confirm that the Contractor's process controls are effective, and*
- b) they list the compliance testing needed to verify that incoming materials and completed work have passed specified acceptance criteria.*

The PQP must include ITPs, inspection/test procedures and record forms for all work processes required under the Contract. See guidelines in HB90.3 Clause 8.2.4.

In parallel with the drafting of the ITPs, the Contractor needs to draft forms for the recording of the inspections and tests completed. These generally take the form of ITP forms.

As ITPs and ITP forms are used by field staff who do not always have access to the Specifications and Drawings, TfNSW wants the ITPs to state the conformity criteria. Therefore, reference to the specification clauses without including the details is unacceptable. Instead, Contractors must be able to demonstrate that they have reviewed the Specifications, identified the relevant inspections and tests (and their frequency), nominate how these tests are to be carried out, and state the compliance requirements in the ITP or associated documents.

For example, when pouring concrete, checking the slump is a receiving inspection that must be identified on the ITP. The ITP itself or ITP form must show the required slump range for the nominated concrete mix and the concrete slump test method.

The ITPs must also nominate any additional constraints on the process, such as time limits or Hold Points.

The ITPs and ITP forms must be submitted to the Principal prior to the activity commencing (see TfNSW Q3 Clause 4.2.6). This enables the Principal to review the ITPs against the inspection/testing requirements in the Specifications.

The terms Hold Point and Witness Point are defined in TfNSW Q3 Clause 1.4. See also TfNSW Q3 Clause 8.2.4.2.

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.

The frequencies of testing nominated in the Specifications or referenced documents are generally minimum frequencies. The Contractor should determine the appropriate frequencies required for the contract. This will be a function of the material, equipment, training of personnel and the level of supervision provided for each work process.

The Contractor's frequency of testing must be nominated in the ITP or ITP forms (see TfNSW Q3 Clause 8.1.1). The Principal may review these documents to confirm that a suitable frequency of testing has been nominated.

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.

This clause recognises the potential for modifying the frequency of testing through the management review process.

The intention is that if there are a large number of nonconformities detected through the testing process, a higher testing regime may be warranted (especially in-process testing) or a more stringent process control mechanism implemented to better control the process outcomes.

The Principal may conditionally agree to a 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.

If the nominated frequency of testing does not reveal any nonconformities, there may be scope for a reduced testing regime as lack of nonconformities implies that the process is under effective control.

Consideration may also be given to situations where a Contractor conducts additional tests (such as concrete strengths at 3 days so as to allow stripping of formwork) which may, through an appropriate statistical analysis, indicate that testing at the nominated times may not always be required to the extent identified by the specification.

In these situations, the Contractor can propose to vary the testing frequencies for the Contract. Such proposals must be supported by appropriate statistical analysis to verify that the process is under control, and are at the discretion of the Principal.

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.

When reviewing a Contractor's proposal to reduce the minimum frequency of testing for a particular item of work, the Principal should consider the following factors:

(a) *Whether the subject work:*

- (i) *uses the same materials, processes, work methods, equipment and has the same environmental conditions;*
 - (ii) *has had the previous 5 Lots tested, and all 5 Lots conforms to the requirements without reworking or remedial work needed after testing;*
 - (iii) *is carried out as a generally uninterrupted process;*
 - (iv) *is not specifically prohibited by the Specification to a reduction in the specified minimum frequency of testing.*
- (b) *The Project Quality Plan is changed to show how testing at the reduced frequency can be carried out in a random and unbiased manner, while maintaining statistical validity.*
- (c) *The whole of the quality management system is consistently maintained, including carrying out inspections, testing, and addressing nonconformities and corrective actions without delay.*
- (d) *The register of nonconformities for the subject work includes nonconformities that may be corrected by simple repair or reworking.*

Given the cost of testing, contractors can, by applying effective control of work processes, minimise expenditure on testing and remove some time constraints on their contract.

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.

Inspection and test status indicates what inspection and testing has been carried out on each Lot (e.g. whether the Lot is awaiting testing, or has passed all its tests, or has failed any of its tests).

TfNSW does not want work to be covered up before it has passed all specified inspections and tests.

The Contractor must establish how the inspection status of work will be identified. Under TfNSW Q3, the Contractor's system is to be documented in the PQP. If no system is identified, the Contractor must physically identify the inspection status in the field.

The intention is to encourage the Contractor to nominate an effective system that is relevant to the Works Under the Contract, and communicate this system to field personnel and the Principal.

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.

See guidance in HB90.3 Clause 8.2.2, if internal auditing is to be performed.

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.

TfNSW wants Contractors to establish a control mechanism to ensure that no work is covered up until it has been fully tested. This could be incorporated as a review during the Lot close-out procedure (see TfNSW Q3 Clause 8.2.4.4)

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.

Work process HOLD POINTS are identified in the Specifications or may be imposed by the Principal in certain circumstances. They allow the Principal to review and/or witness any work process, inspection or test being undertaken. Contractors must employ a method for releasing Hold Points that is acceptable to the Principal, and include this protocol in the PQP.

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.

TfNSW wants Contractors to maintain comprehensive Lot records. These records must include inspection/test results, or can alternatively reference test report numbers. ISO9001 8.2.4 requires *evidence* of conformity. TfNSW wants the Lot records to clearly show if each Lot tested has passed or failed.

Records must include the outcomes of all receiving, in-process and final inspections and tests, as listed in TfNSW Q3 Clause 8.1.

The Lot records or ITP forms must show the actual test results; “ticking off” test activities is unacceptable. TfNSW will permit some discretion; eg, recording all the aggregate test results

for asphalt and concrete tests on an ITP Form could be onerous. “Ticking off” may be acceptable for inspection activities not associated with conformity testing.

Contractors are responsible for establishing suitable methods for collation and filing of these records and making them accessible to the Principal. See also TfNSW Q3 Clause L2.1.6.

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 Lot close-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.

TfNSW wants Contractors to place high importance on implementing a rigorous Lot close-out process that ensures all inspection/testing results are acceptable and all traceability requirements are in place.

The clause addresses the situation where the required inspection and testing has not been carried out or completed.

The concession for Lots to be covered over before they have been closed out was previously known as “positive recall”.

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.

A nonconforming product must not be covered up nor be further built in unless a rectification method has been accepted by the Principal and implemented by you.

HOLD POINT

(Where required by the Principal)

Process Held.

Covering up of rectified work.

Submission Details.

Notification and verification rectified work conforms to accepted rectification method and specifications.

Release of Hold Point.

The Principal will consider the submitted documents and may inspect the rectified work prior to authorising the release of the Hold Point.

ISO 9001 Clause 8.3 requires a documented procedure. See guidelines in HB90.3 Clause 8.3.

TfNSW wants Contractors to use nonconformity reports to keep track of how substantial product nonconformities are controlled and rectified.

However, for minor defects that can be simply rectified TfNSW will accept a simple recording system such as keeping a defects list or notation in a site diary. The Contractor must have a reliable mechanism for closing out these records when the defect has been satisfactorily rectified.

The Contractor’s recording system must be accessible for review by the Contractor (and Principal) to identify any trends that may require the application of corrective action.

In the case where the Principal issues a “Nonconforming Product Notification” to the Contractor, it must be formally reviewed in line with the Contractor’s nonconformity control procedure. If a Contractor does not use their own quality management system to control and eliminate nonconformities identified in their site activities, this is a warning sign that the Contractor’s quality management system is defective. It is emphasised that a Nonconforming Product Notification must not only address the particular nonconformity, but it must also address the problem of a Contractor’s defective quality management system which did not detect the nonconformity.

Attention is also drawn to the TfNSW’s Engineering Contracts Manual which provides advice for the Principal regarding the issue of Corrective Action Requests.

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.

Continual improvement forms part of the NSW Government's agenda of reform for the construction industry.

If a Contractor's quality management system is not providing effective control of work under the Contract, TfNSW will request the Contractor to take corrective action in accordance with Q3 Clause 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).

HOLD POINT

(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.

ISO 9001 Clause 8.5.2 requires a documented procedure. See guidelines in HB90.3 Clause 8.5.2.

TfNSW wants Contractors to use the corrective action mechanism as a key means to implement continual improvement (see TfNSW Q3 Clause 8.5.1).

TfNSW's Engineering Contracts Manual provides advice for the Principal regarding the issue of Corrective Action Requests. With reference to comments about HB90.3 in NQ3 Clause 1.1, if a Contractor could have avoided a nonconformity by implementing a recommendation of HB90.3 as relevant to TfNSW Q3, the Principal may issue a Corrective Action Request.

8.5.3 Preventive Action

Not mandatory.

While not auditable, Contractors are encouraged to use the preventive action mechanism to avoid potential nonconformities. See guidelines in HB90.3 Clause 8.5.3.

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.

When planning surveillance/audit testing, the Principal should consider the basis the Contractor used to determine test frequencies for the project. However, the Principal may adopt a different frequency if the purpose of the Principal's tests is different. Refer to Section 4 of the Engineering Contracts Manual.

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 cost of providing such facilities is to 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.

Section 9.3 is included to allow for the possibility that the Principal may need to carry out design validation (ISO9001 Clause 7.3.6) as part of its own design development process.

The Principal should schedule design validation activities to minimise possible disruption to the Contractor.

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

Project Testing also applies to the following tests:
(Annexure Q/L Clause L2.2.1)

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 ^(5, 6)	1 ^(5, 6)	1 ⁽⁶⁾	–	–	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:

Process and Location	Activities to be documented

TfNSW may nominate some work processes at tender stage for tenderers to submit work process documentation (refer to TfNSW Q3 Clause 7.5.1). If so, this information will be considered as part of TfNSW's tender assessment. TfNSW would normally request this information only to compare each tenderer's approach for atypical work processes or to allow some work on site to commence promptly after award of a contract.

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	Covering up of rectified 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 Register of current document issue/revisions	S 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 Surveillance, audit of subcontractors Subcontractor supplied documentation Certificate of testing by suppliers	P & S S P & S S
7.5.1	Control of production and service provision	Procedures describing how to control work processes Records demonstrating effectiveness of work process controls Records of process validation when applicable	P & R S S
7.5.3	Identification and traceability	Product batch/traceability records Lot Identification Register	S S
7.6	Control of monitoring and measuring devices	Calibration certificates	P

Clause	System Requirement	Required Record or Reference	Location
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.

TfNSW wants Contractors to develop an effective record management system for keeping the above records.

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

Clause	Required Planning Document or Reference
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	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	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	Procedure describing how to carry out and who is responsible for receiving, in-process and final inspection and testing and for closing out work Lots, plus how to keep records of inspection and test results
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.

Table Q/D.1 provides a checklist of key items to be addressed in the Contractor's PQP and for the Principal's review of the PQP. If a Contractor considers that any items are not relevant for a specific project, this should be indicated in the PQP.

WITHDRAWN

ANNEXURE Q/E – RECORD KEEPING AND IDENTIFIED RECORDS

Refer to TfNSW Q Clauses 1.2.5 and 4.2.4.

Clauses E1 and E2 in TfNSW Q3 are suitable for most contracts. However, the TfNSW Project Manager should check the wording for each contract to ensure appropriateness, in accordance with clause 2.4.3 of the Engineering Contracts Manual and, if necessary, project specific changes made.

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 9000 series 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 organised and prioritised 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 given to 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 should 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 must be delivered to the Principal in hard copy on paper size A3 or A4 in good quality file housing/covering except that work-as-executed drawings must be on paper size A2. The paper must be premium bond paper of minimum weight 80 grams per square metre. The colour must be white unless the record is normally maintained in some other colour for ease of identification when that colour may be supplied.

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 the TfNSW's electronic records management system.

E2.3 Filing and Indexing

File Identified Records as required to be prepared by 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 by the Contractor

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.

Record Keeping and Identified Records

TfNSW Q3 Clauses E1 and E2 are designed to meet the requirements of the State Records Act, 1998, which came into operation in October, 1998. The Act establishes requirements for public authorities (such as TfNSW) to make and keep full and accurate records of their activities.

TfNSW Q3 sets out the requirement for construction contractors to keep certain records (and to provide them to TfNSW when required), including the details to enable TfNSW to meet its obligations as a public authority and at law, to assist in the management of its assets and to address future issues that may arise as a consequence of the project.

The Principal's Authorised Person should note the requirements for "Completion" in Clause 83 of the General Conditions of Contract. For the purpose of this clause, Identified Records are records that are essential for the operation, use and maintenance of the works; i.e. records required for the ongoing management of the asset after completion of the contract.

The Contract allows the Principal to withhold agreement of Completion until such time as all Identified Records have been delivered. Refer to Clause E2 of TfNSW Q3.

The following guidance is provided for the information only of the Contractor and Principal as an indication of the content of a Record Management Plan (RMP) that a Contractor may develop for a small TfNSW contract. The Contractor must develop its own RMP, ensuring that it complies with the Contract.

Record management procedures may be included in the Contractor's quality management system procedures or Quality Plan or may alternatively be established as a separate document. This Commentary offers guidance on some of the key issues to be addressed.

General

The Contractor's RMP should create an index of all records generated for the contract and keep track of those records which are nominated in the various Specifications as "Identified Records". The RMP should also set out the company's records management practices and procedures for record creation; storage and control. The aim is to ensure delivery of identified records at the appropriate stages of the contract.

The record index is generally used to show how the various records are filed. This allows records to be registered at the time they are filed and to be tracked until their disposal. Record indexes may be set up on paper or electronically. Three sample forms are attached which show one way to set out a record index, including both one-off records and Lot records.

There are two main types of record keeping systems, as described below. TfNSW Q3 does not prescribe what type or what combinations the Contractor has to use.

- *Systems based on paper files. Paper records (hard copy) are attached to relevant files (e.g. lever arch folders) as soon as possible after the records have been created or received. A filing system should be established to file the project records in an orderly fashion so they can be readily retrieved if needed at a later date.*
- *Electronic record keeping systems. Electronic documents and other records are saved as electronic files. A systematic way of naming electronic files should be established to facilitate retrieval of electronic files if needed at a later date. Where a large number of electronic files will be generated, it may be appropriate to set up a computer database with electronic file management software, to provide effective control and searching capability.*

Creation of Records (Clauses E1.4.1 and E2.4.2)

Records of all phases of the project, and in particular those noted as Identified Records should be created using permanent inks on good quality paper. Any records generated on thermal paper should be photocopied onto plain paper before the thermal copy fades.

Electronic records can be generated in various ways such as: electronic measurements (e.g. from surveyor's EDM), computer generated calculations, handwritten data transcribed onto electronic report forms/spreadsheets or computer database, Word documents, and email documents.

If paper copies are made and filed, information saved on computers need not be controlled as electronic records. If electronic files could be transferred to other hardware and software platforms, it is important to choose formats that will allow the electronic files to be accessed in the future. Because it is easy to make changes to an electronic file, consideration should be given to restricting access (e.g. passwords), or to read-only access.

Registration, indexing, filing and retrieval of records

It is good practice to manage all project records via a central record index. The record index provides the entry point for searching and retrieval of records and will record the location of all records.

Possible Procedures (Dependent on Local Practices and Tools):

- *The index could take the form of a manual card index or records could be listed progressively onto a form*
- *The index could take the form of an electronic Word document or Excel spreadsheet. The "Find" function in Word/Excel can be used to search for relevant record type, Lot no, etc. (according to indexing applied by the company).*
- *File all project records in chronological order according to Lot no.*

- *Registration of project records could include the following index terms:*
 - *Project code;*
 - *Type of “identified record” (“identified records” only);*
 - *Lot no.;*
 - *Date;*
 - *Storage location;*
 - *Whether it has it been handed over (“identified records” only).*

It may be appropriate to have a separate record index at the company’s long-term storage premises to list records from all projects being held there.

Storage, Protection and Retention of Records

Record storage facilities should be located to minimise the risk of flooding, fire or theft. Attention should be given to the security of premises in which records are stored, particularly where premises could be left unattended.

All project records should be stored in a clean dry environment, free of excessive dust and pests, and with appropriate fire prevention devices.

Possible Procedures (Dependent on Local Practices and Tools):

- *Fit records storage areas with smoke alarms and appropriate fire extinguishers.*
- *Staff should be trained to use fire extinguishers. Extinguishers to be checked at three monthly intervals.*
- *No food or drinks to be consumed in the records storage area.*
- *Fumigate records storage areas periodically against insects and vermin*
- *As a precaution against computer malfunction or theft, electronically stored project records should be backed up daily and a security backup sent off-site weekly.*

Movement of Records

All movements of records should be tracked via the company’s record management system to ensure that they can be readily located if needed at a later date.

Possible Procedures (Dependent on Local Practices and Tools):

- *When records are “borrowed” from the records storage area, the borrower’s name should be marked on the central record index (or Word document/Excel spreadsheet). The borrower is responsible for returning the record to the correct storage location and checking off the record index.*
- *For large projects, the record controller should conduct regular (e.g. weekly) checks of the project site to confirm locations of all project records.*
- *When a record is transferred from the records storage area (e.g. from site to long-term storage), the new location and person responsible for the transfer should be shown on the record index.*

TfNSW Access to Information Required under the Contract

The Principal is entitled to have access to any project record on request.

Delivery of Identified Records

Progressive handover of Identified Records will minimise the number of requests by the Principal’s staff to view project records and will also minimise loss in the event of any disaster.

Clause E1.3.1 (e) requires the RMP to include a procedure for providing a list of Identified Records relevant to the Contract which must be progressively handed over to TfNSW. Providing a list of Identified Records in the Records Management Plan helps to ensure that the need to manage and provide Identified Records is not overlooked on a project.

The list can also serve as a checklist to monitor progress of handover of records and provide evidence to ensure that all Identified Records have been delivered. The way that the checklist would operate on a project would depend on the methods adopted in the Contractor's quality management system; for instance, a method that is paper-based would operate differently to an electronically-based method.

Refer to the example list of Identified Records in Clause E3 that is made up from a sample of TfNSW specifications that may be included in a TfNSW roadworks project. In practice, the list of Identified Records contained in the Records Management Plan must include all the specifications in the particular TfNSW contract.

Possible Procedures (Dependent on Local Practices and Tools):

- *Identified Records due for handover will be delivered to the Principal at the beginning of each month. Records will be boxed prior to delivery in good quality boxes suitable for records storage.*
- *A list will be prepared detailing the contents of all boxes to a level appropriate to ensure retrieval of specific records. The list of records to be transferred will be faxed to the Principal prior to dispatch of the records so that the Principal can arrange suitable storage.*
- *Electronic Identified Records will be copied to appropriate media for transport to TfNSW via secure courier.*
- *Electronic Identified Records will be emailed to the Principal/uploaded to the TfNSW secure project web-site weekly.*

Disaster Recovery

When setting up a site office, consider how to minimise risks to project records in the event of disasters such as theft, flooding, fire, electricity failure, etc.

Example List of Identified Records to be Included in the Records Management Plan

The following list of Identified Records is made up from a sample of TfNSW specifications that may be included in a TfNSW roadworks project. In practice, the list of Identified Records contained in the Records Management Plan must include all the specifications in the particular contract.

<i>Clause</i>	<i>Description of the Identified Record</i>
<i>TfNSW G10 – Traffic Management</i>	
2.8	<i>Risk issues identified in Traffic Management Risk Assessment Workshop</i>
3.2.3	<i>Records of times when temporary speed zoning signs are in place</i>
4.2	<i>Road safety audit report and associated documentation</i>
4.4.2	<i>Inspection reports on traffic control measures, prior to opening of temporary roadways and detours</i>
4.5	<i>Road safety audit report of traffic control measures implementation</i>
4.7	<i>Inspection reports of traffic control measures in place</i>
<i>TfNSW G22 – Work Health and Safety (Construction Work)</i>	
2.3.2	<i>Designer’s Safety Report</i>
8.1	<i>Project WHS records</i>
8.1	<i>Health monitoring records</i>
<i>TfNSW G36 – Environmental Protection</i>	
2	<i>Alternative environmental control measures</i>
3	<i>Contractor’s Environmental Management Plan (CEMP), Sub-Plans, procedures and EWMS</i>
3.2.2	<i>Approvals, licences and permits</i>
3.5	<i>Records of environmental induction training</i>
3.6	<i>Extended working hours and associated advice to Principal and relevant authorities</i>
3.7.3	<i>Reports on complaints about any environmental issue and actions</i>
3.8	<i>Records of emergency responses</i>
3.9	<i>Records of environmental management performance monitoring and measurement</i>
3.9	<i>Environmental audit reports</i>
3.10	<i>Records of corrective and preventative measures to address nonconformities of environmental obligations</i>
3.11	<i>CEMS and CEMP compliance records</i>
3.12	<i>Records of review of effectiveness and proper implementation of CEMP</i>
4.3	<i>Records of spill prevention measures and responses</i>
4.7	<i>Building Condition Inspection Reports</i>
4.11	<i>Waste Management Register</i>
4.11	<i>“s.143 Notices” for transporting and depositing of waste</i>
4.12	<i>Pesticide Records Sheets</i>
4.14	<i>Environmental incident and investigation reports</i>

Clause	Description of the Identified Record
4.15.2	<i>Pre-construction land condition assessment reports</i>
4.15.3	<i>Post-construction land condition assessment reports</i>
TfNSW G38 – Soil and Water Management	
3.1.2	<i>Register of inspection and maintenance measures</i>
3.4	<i>Dewatering records</i>
3.5	<i>Approval notices to locate stockpiles on private land</i>
3.8	<i>Approvals and licences to extract water</i>
TfNSW Q6 – Quality Management System (Type 6)	
4.2.2	<i>QUALITY MANUAL, quality policy and PROJECT QUALITY PLAN, Quality Management System procedures when applicable</i>
4.2.3	<i>List of who holds issued documents Register of current document issue/revisions</i>
4.2.4	<i>Index of all quality records (prior to Completion)</i>
5.6	<i>Records of management reviews for the project</i>
6.2.2	<i>Personnel qualifications/skills records Induction and training records</i>
6.4	<i>Records of work environment controls, where applicable</i>
7.2.2	<i>Minutes of tender/contract reviews</i>
7.3	<i>Design plan, inputs/outputs, changes, verification/review/ validation records</i>
7.4	<i>Evaluation of subcontractors and suppliers Surveillance, audit of subcontractors Subcontractor supplied documentation Certificate of testing by suppliers</i>
7.5.1	<i>Procedures describing how to control work processes Records demonstrating effectiveness of work process controls Records of process validation when applicable</i>
7.5.3	<i>Product batch/traceability records Lot Identification Register</i>
7.5.4	<i>Contractor's verification records/reports</i>
7.5.5	<i>Delivery dockets Product preservation control/inspection records</i>
7.6	<i>Register of equipment Calibration frequency and certificates</i>
8.1.1	<i>Inspection and test plans</i>
8.2.1	<i>Customer satisfaction records and actions taken to improve customer satisfaction</i>
8.2.2	<i>Audit reports</i>
8.2.4.2	<i>Records/checklists of inspection and testing Conformity reports for each completed Lot</i>

<i>Clause</i>	<i>Description of the Identified Record</i>
8.3	<i>Nonconformity reports and rectification details Principal's Nonconforming Product Notifications Nonconformity Register</i>
8.4	<i>Records of analysis of data generated during the Contract</i>
8.5.2	<i>Corrective action reports and Register Principal's Corrective Action Requests</i>
8.5.3	<i>Preventive action reports and Register</i>
<i>TfNSW R11 – Stormwater Drainage</i>	
2.4.1	<i>Product drawings and methods for manufacture, testing and installation of precast drainage structures other than pipes and box culverts</i>
2.6	<i>Certificate of conformity, stating that the supplied manufactured product conform to the requirements of this Specification</i>
5.2	<i>Report on CCTV inspections of drainage structures</i>
<i>TfNSW R16 – Precast Reinforced Concrete Box Culverts</i>	
2	<i>Design output and certification of compliance</i>
3	<i>Testing and calculation records and certification of compliance</i>
6	<i>Certificate which states that the items conform to the Specification and all nonconformities have been rectified</i>
<i>TfNSW R44 - Earthworks</i>	
1.5	<i>Earthworks Plan.</i>
2.5	<i>Records of spoil disposal, including their locations, relevant consents and planning and environmental approvals, placement Lot records, and records of contaminated material transport and disposal.</i>
2.7.3	<i>Records of contractor arranged borrow areas, including their locations, relevant consents and planning and environmental approvals, and placement Lot records.</i>
2.8.2	<i>Details of source, location, quantities and type of imported Selected Material.</i>
4.6.1	<i>Details of blasting design and measures to limit noise and ensure that vibration from blasting does not adversely affect nearby structures.</i>
4.6.2	<i>Blasting records.</i>
7.6	<i>Deflection testing results of each Lot of formation.</i>
<i>TfNSW R75 – Insitu Pavement Stabilisation Using Slow Setting Binders</i>	
2.3	<i>Certification of stockpiles</i>
3.1.3	<i>Verification records of blended binder proportions</i>
4.2.3	<i>Approved Contractor nominated mix design details</i>
4.3	<i>Supplementary Information and test results</i>
4.4	<i>Variation to approved Contractor nominated or Principal nominated mix design</i>
5.5.2	<i>Details of Alternative Construction Method</i>
5.5.3	<i>Completed Table R75/E.2 and calculations</i>

Clause	Description of the Identified Record
5.6	<i>Target moisture content envelope</i>
5.8.1	<i>Locations and types of joints, treatment of overlaps and irregular shaped Lots, locations of unsupported edges and details of rolling pattern</i>
5.11.1	<i>Conformity documentation for trial section of pavement</i>
7.2	<i>UCS sampling locations and test results</i>
7.5	<i>Thickness of bound pavement course</i>
7.10	<i>Certificate of conformity</i>
TfNSW R116 – Heavy Duty Dense Graded Asphalt	
2.1.4 (a)	<i>RAP Management Plan</i>
2.1.6	<i>Documentary evidence of binder conformity for asphalt used in the Works</i>
2.3.3	<i>Nominated mix design details</i>
2.4.3, 2.4.5	<i>Asphalt manufacturing process parameters including process temperatures</i>
3.2.4	<i>Daily record of average tackcoat application rate in each Lot</i>
3.3.1	<i>Surface temperature and weather conditions at time of paving</i>
3.5	<i>Asphalt temperature at time of initial compaction</i>
3.8	<i>Verification checklist and all listed test reports of trial section for each combination of materials, mix proportions, equipment, rate of paving and methods for placement, compaction and finishing</i>
TfNSW B80 – Concrete Work for Bridges	
3.9	<i>Submission of nominated mixes</i>
3.9.4	<i>Variations from nominated mixes</i>
7.5.1	<i>Certificate of Conformity in respect of formwork, reinforcement, embedments and other relevant details or precast concrete members cast at off site locations</i>
8.2.3	<i>Certificate of Conformity of curing compound</i>

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.

Subcontract Requirements	
(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 construction 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.

See comments under Clauses 7.5.3 and 8.2.4.4. Note TfNSW's definition of a "Lot". The Contractor has an obligation to confirm that a Lot is visually homogeneous before the Lot undergoes conformity testing.

The Contractor's POP must clearly explain the methodology or numbering system that will be used to identify Lots. This must be compatible with the Contractor's construction program. Where the Contract Drawings call up discrete work areas (e.g. Culvert 1-2, Pit 6), it is acceptable to use the same terminology to identify these areas as Lots. For continuous layers (e.g. earthworks, pavement, asphalt), the Lot numbering system must describe the three dimensional location of each Lot. For work areas such as embankment fills that comprise multiple layers, it is acceptable to treat the embankment as a Lot and each layer as a sub-Lot provided the three dimensional location of each sub-Lot is established.

The Contractor must establish a Lot Register to keep track of all Lots. It is acceptable to incorporate diagrams or wall charts as part of the Lot Register.

The format to be used is up to the Contractor, however the Principal must be able to locate an item of work, either from the actual Lot number or from the Lot Register.

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 a proposed laboratory for a test has not been accredited by NATA, the laboratory must be accredited for the test by another 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 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.

Project testing is specified for works that have a higher risk of nonconformity than manufactured items with proven controls. Monitoring of these processes and addressing nonconformities will be improved if the NATA signatory is in the laboratory carrying out the tests. There is opportunity in Annexure Q/A to extend Project Testing to other works that have similar risks.

Project Testing laboratories may be required by TfNSW G1 to be a TfNSW Registered Laboratory.

The independent role of Project Testing laboratories includes the following:

- (i) independent verification of the Contractor's (or subcontractor's) Inspection and Test Plans (refer TfNSW Q3 Clause L2.2.2);*
- (ii) select random sampling locations (refer TfNSW Q3 Clause L2.2.3);*
- (ii) sample and test, as specified. Ensure that all Lots are tested at the specified frequency;*
- (iv) record the Contractor's (or subcontractor's) Lot numbering on all sampling and test reports (refer TfNSW Q3 Clause L1);*
- (v) carry out statistical analysis of test results for Lots, where required (refer TfNSW Q3 Clause L3);*
- (vi) independently provide test certificates and declarations to the Principal concurrently with the submission to the Contractor (refer Clause L2.2.4).*

In submitting a proposal to use samplers other than from the laboratory, the Contractor should explain how the sampler will maintain an independent role from the Contractor (or subcontractors).

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 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, prior to commencement of any sampling and testing, a written report describing the outcome of this review.

This Clause is applicable for testing of work performed at the site. It does not apply to testing for suppliers (e.g. asphalt production). See also TfNSW Q3 Clause 8.1.2 for comments about frequency of testing.

Personnel from the Project Testing laboratory who carry out this independent review should be suitably experienced in the understanding of TfNSW specifications.

L2.2.3 Selection of Sampling Locations

Define Lots and the Project Testing laboratory must select 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.

When retesting work after nonconformity rectification, it is not acceptable to only retest at locations adjacent to previous samples nor to incorporate previously favourable results. The full sampling, testing, test frequency and statistical technique procedures must be repeated. However it is acceptable to propose new boundaries of homogeneous Lots, providing the full extent of the previous nonconforming Lot is retested.

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.

With reference to TfNSW Q3 Clause 8.2.4.3, the above documents must be completed for each Lot before the Contractor can close out the Lot or release a product for dispatch or installation.

The declaration referred to in (b)(ii) and (c) above, or a referenced attachment, should show the Lot number, list the test results and clearly indicate any nonconforming result. Preferably, the acceptance criteria (available from the Contractor's inspection and test plans that have been previously confirmed by the laboratory) should also be shown.

Suppliers of imported materials may apply to the Principal, through the Contractor, for approval of testing and test certificates carried out by a laboratory accredited by an organisation mutually recognised by NATA. Details of the mutual recognition scheme can be obtained from NATA. Principal's staff should consult with TfNSW Pavements and Scientific Services Branch before accepting this option.

Item (d) has been included to ensure that where a nonconforming sample has been identified, it is not abandoned or left unreported. This is to ensure that the random and unbiased sampling regime is maintained for the project, and remove the possibility of nonconforming results being ignored.

L2.2.5 Availability of Sampling and Testing Records

Sampling and testing records shown in Annexure Q/F 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 L2.1, 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.

The Principal is entitled to witness all on-site and off-site sampling or testing activities and to inspect sampling/testing records. Arrangements to do so will be made in liaison with the Contractor.

The intention of this Clause is to give the Principal ready access to records and avoid disrupting the confidential activities of the Contractor. A specially dedicated room is not required, only a room that the Contractor can give unrestricted access during working hours. Laboratories probably do not have such confidentiality issues so their normal records storage could be appropriate.

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.

The Contractor is responsible for proper restoration of all sampling sites.

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 ²	1000 - 5000 m ²	500 - 1000 m ²	50-500 m ²	≤ 50 m ²
≤ 90.0	1 per 3000 m ²	1 per 2000 m ² (min. 2)	1	1	1
> 90.0 ≤ 95.0	1 per 2000 m ²	1 per 1000 m ² (min. 3)	1 per 250 m ² (min. 3)	2	1
> 95.0 ≤ 98.0	1 per 2000 m ² (min. 6)	5	4	3	1
> 98.0 ≤ 100.0	1 per 2000 m ² (min. 6)	5	4	3	1
> 100.0	1 per 1000 m ² (min. 10)	1 per 500 m ² (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 m², 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 ²	101-500 m ²	501-1000 m ²
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, 3, 2 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.

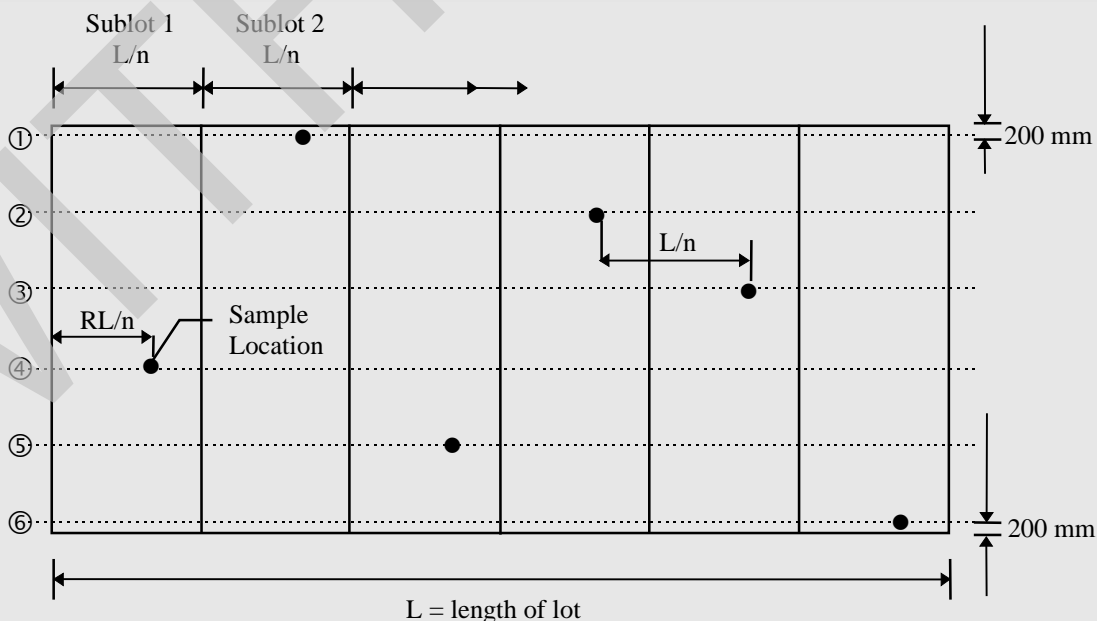


Figure Q/L.1 Sampling Locations for a Rectangular Lot

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), 3 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