TRANSPORT FOR NSW (TfNSW)

SPECIFICATION D&C Q6

QUALITY MANAGEMENT (MAJOR WORKS)

REVISION REGISTER

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Transport for NSW

SPECIFICATION D&C Q6

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CLAUSE **PAGE**

FOREWORD

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BASE SPECIFICATION

This document is based on Specification TfNSW Q6 Edition 2 Revision 0.

TfNSW SPECIFICATION D&C Q6

QUALITY MANAGEMENT (MAJOR WORKS)

1 GENERAL

1.1 SCOPE

This Specification sets out the quality management requirements for Work Under the Contract.

It includes the following:

(a) Quality Management System including QUALITY MANUAL and PROJECT QUALITY PLAN;

(b) supplementary requirements to AS/NZS ISO 9001;

(c) Records Management System and Records Management Plan;

(d) sampling and testing, including Project and Primary Testing;

(e) Principal's surveillance and audits.

1.2 STRUCTURE OF THE SPECIFICATION

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

1.2.1 (Not Used)

1.2.2 (Not Used)

1.2.3 Schedules of HOLD POINTS and Identified Records

The schedule in Annexure Q6/C lists the **HOLD POINTS** that must be observed. Refer to Clause 1.3 for definition of **HOLD POINTS**.

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.

The records listed in Annexure Q6/C are **Identified Records** for the purposes of this Specification.

1.2.4 Planning Documents

The PROJECT QUALITY PLAN must include each of the documents and requirements listed in Annexure Q6/D and must be implemented.

1.2.5 (Not Used)

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 1234). For convenience, the full titles are given in Annexure Q6/M.

1.3 DEFINITIONS AND ACRONYMS

1.3.1 Definitions

The terms "you" and "your" mean "the Contractor" and "the Contractor's" respectively.

The term "TfNSW D&C Q6" appearing in other specifications means this Specification.

The term "product" includes "services", and the term "testing" includes "sampling", except where the context requires otherwise.

The definitions given in AS/NZS ISO 9000 and AS ISO 15489.1 apply in the interpretation of words and expressions in the Contract relating to quality assurance, except where the context requires otherwise.

Additionally, the following words and expressions appearing in the Contract have the meanings assigned to them below, except where the context requires otherwise.

Hold Point	A point beyond which a work process must not proceed without the Principal's written authorisation.
Identified Records	Project Records which are deemed by the Principal to be of assistance or essential for the use, operation and maintenance of the Works, and are usually designated as such in the respective individual TfNSW Specifications.
Inspection and Test Plan	A document which identifies the inspection, testing (verification) and acceptance criteria for each activity.
Lot	A quantity of material or end product, produced under essentially the same conditions, and intended to be of uniform quality and possessing characteristics which are within specified limits (i.e. tolerances). For work output which is areal in nature, such as constructed earthworks or pavements, each Lot must be a continuous portion and essentially homogeneous (except as provided for in Clause 5.4.3).
Project Records	All records, including those of subcontractors and suppliers, which are generated to document the execution of the project, but do not include records which are commercial-in-confidence or relate to confidential staff matters. They include records such as Contract Programs, Quality Records, Identified Records, work health and safety activity records, and environmental protection activity records.
Project Testing	Testing (including sampling) carried out at the Site, at concrete and asphalt batch plants, on aggregates and other granular materials used for construction of pavements and structures, and on products and equipment manufactured to order, all of which have a high risk of nonconformity. Testing of the latter three categories may be carried out at locations away from the Site. It excludes routine production testing in factories of items which are manufactured under controlled conditions.

Quality Records	All records used to provide evidence of conformity with the specified requirements or effective operation of the quality management system, such as records of inspection, sampling and testing (verification).
Witness Point	A point in a work process where the Contractor must give prior notice to the Principal and the option of attendance may be exercised by the Principal.
Work Under the Contract	The work which the Contractor is or may be required to execute under the Contract and includes the Works, all variations, remedial work, Temporary Work, design and design documentation.

1.3.2 Acronyms

ITP	Inspection and Test Plan
ILAC MRA	International Laboratory Accreditation Cooperation's Mutual Recognition Arrangement
JAS-ANZ	Joint Accreditation System of Australia and New Zealand
NATA	National Association of Testing Authorities
PQR	Project Quality Representative
RMP	Records Management Plan

2 QUALITY MANAGEMENT SYSTEM

2.1 GENERAL

You must have in place a quality management system as appropriate to the Prequalification Category level at which you are prequalified, and implement it for the Contract.

Your system must conform to any additional requirements stated in this Specification, and be aligned with and consistent with other contract documents.

2.2 QUALITY MANUAL

2.2.1 General

Establish and maintain a QUALITY MANUAL as documentation for your Quality Management System, using AS/NZS ISO 10013 for guidance.

2.2.2 Document Structure

Where the QUALITY MANUAL is arranged differently to the sequence and structure in AS/NZS ISO 9001, include in the PROJECT QUALITY PLAN a matrix (table) showing how your Quality Management System addresses all the requirements of AS/NZS ISO 9001 and this Specification.

Where this Specification specifies procedures that are additional to the requirements of AS/NZS ISO 9001, you may either include them as part of your corporate quality management system procedures in the QUALITY MANUAL, or as supplementary system procedures for use on TfNSW contracts, in the PROJECT QUALITY PLAN.

2.3 PROJECT QUALITY PLAN

Develop and implement for the Contract a PROJECT QUALITY PLAN to control the work processes necessary for achieving the quality objectives and specified quality requirements, taking into account the conformity requirements, resources required, sequence of activities in the process, controls for and verification of the process, and using AS ISO 10005 and HB90.3 for guidance.

Further requirements for the PROJECT QUALITY PLAN are described in subsequent clauses of this Specification.

2.4 SUBMISSION OF DOCUMENTS

2.4.1 Time for Submission

Submit the QUALITY MANUAL containing the applicable quality management system procedures, PROJECT QUALITY PLAN containing documents for controlling work processes, Inspection and Test Plans (ITPs) and associated forms, and Records Management Plan (refer to Clause 4.2), within 35 days after the Date of Contract, or a longer time period where approved by the Principal.

Do not commence any work activities requiring inspection and testing or process verification, until at least 21 days has elapsed after submission of the complete PROJECT QUALITY PLAN (or if submitted in stages, each part PROJECT QUALITY PLAN), unless agreed to otherwise by the Principal.

2.4.2 Stage Submission of PROJECT QUALITY PLAN

You may submit the PROJECT QUALITY PLAN in stages, provided that you first submit the following:

(a) Contract Program;

(b) written proposal to the Principal for submission of the PROJECT QUALITY PLAN in stages;

(c) detailed index describing the full content of each stage submission of the PROJECT QUALITY PLAN;

(d) first stage submission of the PROJECT QUALITY PLAN, together with the QUALITY MANUAL;

(e) time schedule for submission of the remaining parts of the PROJECT QUALITY PLAN.

The first stage submission under item (d) above must include the work process control documents, and ITPs for those activities that are planned to commence during the initial months of the submitted Contract Program.

Each stage submission of the PROJECT QUALITY PLAN must cover all the design and/or construction activities for the time period covered by that stage.

The complete PROJECT QUALITY PLAN must be submitted before 50% of the contract period has elapsed, unless agreed to otherwise by the Principal.

2.5 NUMBER OF COPIES

2.5.1 Paper Medium

Where the documents are in paper medium, submit one controlled copy of the QUALITY MANUAL, two controlled copies of the complete PROJECT QUALITY PLAN (or if submitted in stages, two controlled copies of each part PROJECT QUALITY PLAN) and two controlled copies of your Records Management Plan.

Provide additional controlled copies of the QUALITY MANUAL, PROJECT QUALITY PLAN, Records Management Plan and other associated quality management documents, upon request by the Principal for the purpose of carrying out quality audits (refer to Clause 6.2).

These additional copies will be returned to you when they are no longer required by the Principal.

2.5.2 Electronic Medium

Where the documents are in electronic medium, you need to submit only one controlled copy of the documents specified in Clause 2.5.1.

Where your quality management documentation is stored remotely at locations away from the Site, and accessed at the Site electronically through your organisation's intranet, provide the Principal with access to the documentation, to the extent that is necessary for the Principal to fulfil its quality management responsibilities under the Contract.

2.6 CHANGES TO QUALITY MANAGEMENT DOCUMENTATION

Advise the Principal promptly of any intended updates or changes to the QUALITY MANUAL, PROJECT QUALITY PLAN or Records Management Plan, and submit the amended document(s) within five working days of the change.

3 SUPPLEMENTARY REQUIREMENTS

3.1 PROJECT ROLES, RESPONSIBILITIES AND AUTHORITIES

3.1.1 Project Quality Representative

Nominate in the PROJECT QUALITY PLAN your Project Quality Representative (PQR), directly responsible to top management, with defined authority and responsibility for ensuring that the requirements of your Quality Management System and PROJECT QUALITY PLAN are implemented and maintained on the Contract, including the authority to stop work over quality related issues.

Your PQR must have the appropriate qualifications, knowledge and experience and be acceptable to the Principal, and have adequate time available to discharge the responsibilities effectively.

Station your PQR at the Site. Your PQR must be contactable at all times when work is being carried out, and be available to attend meetings with the Principal at 24 hours notice.

3.1.2 Other Key Personnel

State in the PROJECT QUALITY PLAN the responsibilities and authorities of other key personnel who will be responsible for implementing the quality management system requirements of the Contract.

Nominate in the PROJECT QUALITY PLAN the person(s) fulfilling the roles specified in the various specifications applicable to the Contract, such as Piling Supervisor, Responsible Welding Coordinator and Welding Supervisor, Paving Supervisor (for concrete pavements), Concrete Supervisor (for concrete structures), etc.

Nominate also in the PROJECT QUALITY PLAN the person(s) responsible for supervision of other major construction activities in the Contract, such as earthworks, asphalt paving, etc.

3.2 MONITORING AND MEASURING RESOURCES

3.2.1 General

Include in the PROJECT QUALITY PLAN a list of monitoring, measuring and testing devices (other than laboratory testing equipment) used to ensure or verify conformity of the Works.

Highlight those monitoring, measuring and testing devices in the list that are maintained and calibrated by your suppliers and subcontractors.

For monitoring, measuring and testing devices used at the Site, including those of subcontractors, ensure that they are maintained and calibrated, and kept in good working order.

3.2.2 Measurement Traceability

Include (where applicable) in the PROJECT QUALITY PLAN calibration and maintenance schedules for monitoring, measuring and testing devices.

Keep documented information of the calibration status of the equipment, either in the form of a current calibration certificate, or a register showing the calibration status of the equipment.

Verify through surveillance and audit the control of monitoring and measuring equipment operated by suppliers or subcontractors (refer also to Clause 3.7) for production purposes, such as that used in a concrete or asphalt batching plant.

For laboratory testing equipment (refer also to Clause 5), NATA accreditation will be deemed to satisfy the requirements of measurement traceability in AS/NZS ISO 9001.

3.3 COMPETENCE AND AWARENESS

3.3.1 Quality Management Induction and Training

Provide induction and training to your site personnel (including those of your subcontractors) instructing how your Quality Management System and associated procedures will be implemented on the Contract.

Include in the PROJECT QUALITY PLAN an induction and training plan describing the competence required, the personnel to be trained, and the frequency of the training.

Where requested by the Principal, make the induction and training available to the Principal’s staff.

Keep the induction and training records as part of your Project Records.

3.3.2 Concreting Training

Comply with the requirements in the respective specifications for Bridgeworks Concreting Grey Card and Concrete Paving Crew Grey Card training, where such specifications are applicable to the Contract.

3.4 COMMUNICATION AND DOCUMENTED INFORMATION

3.4.1 General

Provide your personnel and those of your subcontractors, working at the Site with ready access to the QUALITY MANUAL, PROJECT QUALITY PLAN, contract specifications, contract drawings, referenced standards and Test Methods.

Provide the testing laboratory (refer to Clause 5.2) with all relevant information, including the relevant specifications and ITPs.

3.4.2 Control of Documented Information

Comply with Clause 4 for management of records.

If not included as part of the quality management system procedures in the QUALITY MANUAL (refer to Clause 2), include in the PROJECT QUALITY PLAN a procedure for version control of documented information, including those from the Principal or external design service provider (refer to Clause 3.6.2).

Include also a procedure for the controlled distribution of documented information, including to your suppliers and subcontractors.

3.5 OPERATIONAL PLANNING AND CONTROL

3.5.1 General

When planning and documenting your work processes, include (where appropriate) the following:

(a) sequence of activities in the work process;

(b) work methods, materials and equipment to be used;

(c) competency and skills of personnel, including any required qualifications;

(d) any necessary infrastructure and environment for the work process;

(e) specified acceptance criteria, such as product characteristics or workmanship standards, and tolerances.

3.5.2 Planning Documents in Other Specifications

Include in the PROJECT QUALITY PLAN the Planning Documents listed in Annexure D of other specifications which are applicable to the Contract.

3.6 (NOT USED)

3.7 CONTROL OF EXTERNALLY PROVIDED PROCESSES, PRODUCTS AND SERVICES

3.7.1 General

Include (where applicable) in the PROJECT QUALITY PLAN details of the following:

(a) major items of product(s) or service(s) that are to be externally provided; i.e. by supplier(s) and subcontractor(s);

(b) procurement schedule, showing the timing of the procurement process, with due allowance for any lead time required for approval by the Principal;

(c) method of evaluation of the supplier's or subcontractor's ability to provide products and services which will conform to the specified requirements.

Where requested by the Principal, submit details of your evaluation of the supplier or subcontractor's ability to meet the specified requirements.

Where a supplier or subcontractor's output requires process validation (refer to Clause 3.8.1), include details of your evaluation of the supplier or subcontractor's capability to perform the process validation.

3.7.2 Prequalified or Registered Subcontractors

Where a part of the Works can only be undertaken by a subcontractor with Prequalification or Registration at a particular Category or specialist Category, the subcontractor must implement its quality management system on which they are prequalified or registered, for the subcontracted part of the work, unless approved otherwise by the Principal.

3.7.3 Type and Extent of Control

Include in the PROJECT QUALITY PLAN details of the type and extent of control you will exercise over your supplier(s) and subcontractor(s) to ensure the provision of conforming products and services.

Include also details for surveillance of your subcontractors to monitor their performance and verify that their quality management system is being implemented, and that all specified inspection and testing of the subcontractor's work is being carried out, and the subcontractor's output complies with the Principal's quality requirements.

3.8 CONTROL OF PRODUCTION AND SERVICE PROVISION

3.8.1 General

When documenting the controls for your work processes, include (where appropriate) the following:

(a) product characteristics or workmanship standards, and tolerances, to be met;

(b) competency and skills requirements for personnel, including any required qualifications;

(c) method(s) of monitoring the work process, and showing the relevant inspection and test points;

(d) method(s) of controlling the work process to prevent human error;

(e) method(s) for identifying and controlling the inspection and test status of product or work, including that which is incorporated into the Works prior to it being verified as conforming (refer to Clause 3.11.2);

(f) method of arranging for release of HOLD POINTS by the Principal (including that for work carried out by subcontractors);

(g) responsibilities for implementing and monitoring work process controls and rectifying any deficiencies;

(h) records to be kept as evidence that the work process controls are effective.

You may incorporate into the PROJECT QUALITY PLAN your subcontractor(s) Quality Plans or process control documentation to control work processes for the subcontracted part of the work.

Identify and list in the PROJECT QUALITY PLAN any work processes (including that of subcontracted work) where the resulting outputs cannot be verified by subsequent monitoring and measurement, and the method of validation of these processes.

3.8.2 Inspection and Test Plans

Include in the PROJECT QUALITY PLAN the Inspection and Test Plans (ITPs), and associated forms, for use in verifying that the Works conform to the specified requirements.

The ITPs, or associated forms, must show (where applicable):

(a) the frequency of inspection and testing, which must not be less than the stated requirements in the specifications, including the stage(s) in the process at which inspection and testing is required. Where a minimum frequency is not stated, nominate an appropriate frequency;

(b) the steps by which inspection or testing is to be carried out and recorded (e.g. either in a documented testing procedure or by reference to a standard test method), and the acceptance criteria;

(c) the HOLD POINTS and WITNESS POINTS nominated in the specifications, and the time constraints for submission to the Principal for their release;

(d) the circumstances under which statistical analysis of test results is required;

(e) the person(s) or role(s) who will perform the inspection or testing;

(f) the person(s) or role(s) who will review the inspection or test results, assess whether the work performed is conforming, and determine the next step(s) if the work is nonconforming;

(g) the person(s) or role(s) who will verify that all specified inspection and testing have been carried out to determine the conformity status of each Lot;

(h) the person(s) or role(s) who will close out the Lots.

3.8.3 Frequency of Testing

For work output which is areal in nature such as constructed earthworks or pavements, frequency of sampling and testing, including determination of sampling locations, must comply with Annexure Q6/L. For other cases such as loose granular material in stockpiles, or individual discrete components, or any other type of work output which is not areal in nature, frequency of sampling and testing will be stated in the respective specifications.

As part of your management review (refer to Clause 3.14), review the appropriateness of the frequency of testing nominated in the ITPs, taking into account the frequency of nonconformity detected, including nonconformities remedied by simple reworking.

You may propose to the Principal a reduced minimum frequency of testing, by up to 50% unless limited otherwise in the relevant specification. Any such proposal must be supported by a statistical analysis verifying consistent process capability and product characteristics.

The Principal may vary or restore the specified minimum frequency of testing, either provisionally or permanently, at any time.

3.9 IDENTIFICATION AND TRACEABILITY

Include in the PROJECT QUALITY PLAN methods of identification and traceability for various types of work. Comply with Annexure Q6/J on traceability of the products shown in Table Q6/J.1.

Divide the work into Lots for the purpose of identification. Lot definitions for work output which is areal in nature such as constructed earthworks or pavements, must comply with Clause 5.4.

Maintain a register that identifies every Lot established for the Contract (refer also to Clause 5.4.6).

3.10 PROPERTY BELONGING TO PRINCIPAL

Include (where applicable) in the PROJECT QUALITY PLAN procedure(s) for care of property belonging to the Principal while it is under your control, such as Principal supplied materials or equipment, and items to be retained by the Principal during demolition of existing structures.

3.11 CLOSE OUT OF LOTS AND RELEASE OF PRODUCTS

3.11.1 General

Close out conforming Lots within 45 days, or a longer time period where approved by the Principal.

Do not close out Lots or release any product or incorporate the product into the Works until you have verified that the Lot is conforming and incorporated the associated inspection or test reports into your records, except as permitted under Clauses 3.11.2, 3.12.2 and 3.12.4.

3.11.2 Covering Up Before Verification of Conformity

Where the specified conformity testing may require 48 hours or more to complete and where approved by the Principal, you may cover up the Lots before they are verified to be conforming (subject to any other requirement in the respective specification) if you can demonstrate that, based on past work, it is highly unlikely that the work will be nonconforming.

Include in the PROJECT QUALITY PLAN a procedure describing how the Lot to be covered up will be identified and traced, and subsequently verified for conformity, and what action will be taken if full conformity is not achieved. Nominate in the procedure the person or role responsible under the procedure.

Apply the procedure on each occasion when such circumstances occur.

Where the conformity requirements of the Lot also include levels and other measurements done by survey, carry out the survey first and verify its conformity with respect to the survey requirements before covering up the Lot.

Close out the Lot only after verifying that the Lot is conforming. Where the Lot which has been covered up is subsequently shown to be nonconforming, do not close out the Lot until the nonconformity has been rectified and closed out in accordance with Clause 3.12.

3.12 CONTROL OF NONCONFORMING OUTPUTS

3.12.1 General

Identify and control any product or service that does not conform to the specified requirements.

Where conformity can be achieved by simply reworking the product using the original work process, you do not need to notify the Principal, but use it as an opportunity for continual improvement.

3.12.2 Nonconformity Report

Where conformity cannot be achieved by simply reworking the product using the original work process, notify the Principal of the nonconformity by means of a Nonconformity Report and record it in an appropriate register.

The Nonconformity Report must include details of the following:

(a) particulars of the nonconformity;

(b) root cause of the nonconformity, as identified by a root cause analysis (refer also to Clause 3.15.2);

(c) proposed disposition for the nonconformity (refer also to Clause 3.12.4);

(d) proposed corrective action on the root cause of the nonconformity (refer also to Clause 3.15.2).

Submit the Nonconformity Report within two working days of detection of the nonconformity, providing details of the proposed rectification method and the time(s) when the rectification will be undertaken.

Where the specifications allow nonconforming products to be accepted by the Principal with the application of a specified predetermined deduction, include with the Nonconformity Report calculations of the deduction amount.

3.12.3 Nonconforming Product Notification

If surveillance or an audit by the Principal detects a nonconforming product that has not been addressed by a Nonconformity Report, the Principal will issue to you a Nonconforming Product Notification.

Deal with the nonconforming product identified in the Nonconforming Product Notification in the same manner as if you have identified it yourself.

3.12.4 Disposition of Nonconforming Product

Do not proceed with any rectification work until the proposed rectification method has been accepted by the Principal.

Acceptance of the proposed rectification method will be at the sole discretion of the Principal. In evaluating the proposed rectification method (or request for a concession for acceptance of the nonconforming product), the Principal may require additional supporting documentation, such as engineering calculations or the opinion of a recognised technical expert in the field under consideration.

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

Do not cover up or further build on the nonconforming product until the rectified product has been accepted by the Principal, or a concession for its acceptance has been given by the Principal.

The costs of the rectification work and any associated delays will be borne by you.

3.13 INTERNAL AUDIT

3.13.1 Audit Schedule

Include in the PROJECT QUALITY PLAN an internal audit schedule for the Contract covering the following types of audit:

(a) audits on the operation of your Quality Management System, to evaluate its effectiveness as applied to the Contract;

(b) audits of work process control, to evaluate how effectively work process controls are implemented in practice;

(c) product or service audits, to assess conformity of the product or service.

Such audits should also extend to your subcontractors and suppliers engaged on the Contract, including concrete precasters, steel fabricators, concrete suppliers and quarries.

3.13.2 Adjustment to Audit Schedule

Adjust your internal audit schedule when:

(a) results of previous audits indicate the need for a higher (or lower) audit frequency;

(b) significant changes are made to functional areas of your organisation;

(c) safety or other regulatory requirements are in jeopardy, or anticipated to be in jeopardy, due to deficiencies in your Quality Management System;

(d) necessary to verify that the required corrective action has been taken;

(e) changes are made to your Contract Program.

3.14 MANAGEMENT REVIEW

If the initial contract period exceeds 12 months, carry out a review of the PROJECT QUALITY PLAN to confirm its continuing suitability, adequacy and effectiveness at least once during the course of the Contract.

Include in the PROJECT QUALITY PLAN your proposed timing for such reviews.

Notify the Principal of the outcome of the review.

3.15 CORRECTIVE ACTION

3.15.1 Corrective Action Request By Principal

If surveillance or an audit by the Principal (refer to Clause 6) indicates that the implementation of your Quality Management System is nonconforming, or that a condition adverse to quality exists, the Principal may issue a Corrective Action Request and may apply a Hold Point on the relevant process.

3.15.2 Required Action By Contractor

Rectify any nonconformity or condition adverse to quality which you have identified yourself, or have been notified by the Principal in a Corrective Action Request.

Through root cause analysis, identify the root cause of the nonconformity.

Implement corrective action on the root cause to prevent recurrence of the nonconformity or remove the condition adverse to quality, within seven days of it being identified by you or notified by the Principal.

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

Record details of corrective actions taken in a register.

4 RECORDS MANAGEMENT

4.1 RECORDS MANAGEMENT SYSTEM

4.1.1 General

Establish and maintain a Records Management System for the creation, capture, storage, retrieval and use of records, based on the concepts and principles of AS ISO 15489.1 and conforming to AS/NZS ISO 9001.

Your Records Management System must also satisfy the requirements of the *State Records Act 1998 (NSW)*.

The Records Management System must comply with the characteristics of records systems detailed in AS ISO 15489.1.

4.1.2 Record Keeping Policy

Include a record keeping policy as part of your Records Management System.

The record keeping policy must detail the record keeping objective(s), and communicated to the relevant personnel, including personnel engaged by subcontractors (refer also to Clause 3.4).

4.2 RECORDS MANAGEMENT PLAN

4.2.1 General

Develop and implement for the Contract a Records Management Plan (RMP) for management of Project Records, including Quality Records and Identified Records.

The RMP must be consistent with the PROJECT QUALITY PLAN and include appropriate cross referencing to the PROJECT QUALITY PLAN.

Include in the RMP procedures for the creation, registration, filing, indexing, storage, movement, maintenance, retrieval and disposal of Project Records, and their control.

Include in the RMP a list of all Identified Records under the Contract (refer to Clause 4.4.1), and a procedure for the submission and delivery of Identified Records to the Principal.

State in the RMP the location where the Project Records will be stored, and their method of storage (refer to Clause 4.3.2).

4.2.2 Index of Project Records

Provide an index of Project Records in the RMP that is consistent with the Records Management System.

Keep the index current throughout the duration of the Contract and provide a copy of the updated index to the Principal whenever the index is revised.

At Completion, provide a copy of the updated index to the Principal.

4.2.3 Record Keeping Responsible Person

Nominate in the RMP a full-time member of your site management team who will be responsible for record keeping matters, and be the contact person for the Principal on matters relating to Project Records including provision of access to, or copies of, such records.

Detail in the RMP the responsibilities of this person, including filing, indexing, storage, movement, maintenance, retrieval and disposal of records. This person must be fully conversant with the RMP and be responsible for the progressive handover of Identified Records to the Principal.

4.2.4 Disaster Recovery Plan

If not included as part of the Records Management System procedures, include a disaster recovery plan for the Contract providing an organised and prioritised response to a disaster, including measures for the continuance of regular business operations during the disaster and recovery after the disaster.

Provide methods of protection for records that are critical for business continuity, or alternatively, provide backup duplication of the records to ensure their availability in the event of a disaster.

Ensure that the integrity of the data is maintained during and after recovery from disaster.

4.2.5 Review and Audit

If the initial contract period exceeds 12 months, state in the RMP the requirements for review of the RMP, to confirm the continuing suitability and effectiveness of the RMP. The review must be carried out by a senior officer of your management team.

Revise the RMP and implement more appropriate record keeping procedures if the original record keeping practices is found to be not fully effective.

Undertake internal compliance audits of the RMP at intervals of not more than 12 months, preferably in conjunction with your internal quality management system audits (refer to Clause 3.13.1).

4.3 PROJECT RECORDS

4.3.1 General

Project Records may be created in either paper or electronic media, unless otherwise specified in the Contract or agreed with the Principal.

(a) Paper medium

Make the Project Records which are stored at the Site accessible to the Principal at all reasonable times. Upon request by the Principal, provide copies of the requested records to the Principal or permit the Principal to make copies of such records.

For records which are not stored at the Site, provide the requested copies within 24 hours (prior to Completion), or within 14 days (after Completion).

(b) Electronic medium

Provide the Principal with unrestricted access to Project Records which are stored electronically.

4.3.2 Storage Location

Store the Project Records on media and in a storage environment that prevents loss or destruction.

(a) Paper medium

Prior to Completion, store the Project Records at the principal place where the records are used (which will generally be at the Site), unless otherwise specified in the Contract or agreed with the Principal.

Store sampling and testing records at the Site in a room which is readily accessible to the Principal and with facilities for inspection of the records. If the room forms part of the laboratory premises, do not limit access for the Principal due to the laboratory's other activities.

After Completion, store the Project Records 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. Do not change the storage location without the concurrence of the Principal.

(b) Electronic medium

You may store records at a remote location, provided that the Principal has access to the records in accordance with Clause 4.3.1 (b).

4.3.3 Handover to Principal

Maintain a register showing which records have been handed over to the Principal or sent to other parties, including the date and method of handover or dispatch.

In the event that that the Contract is terminated, all Project Records then in your possession become the property of the Principal forthwith and must be handed over to the Principal.

4.3.4 Retention and Disposal

Retain all Project Records for a minimum period of five years after the Date of Completion.

(a) Paper medium

Even if the Principal has possession of copies of the Project Records, retain the originals of those records or, where originals are not held by you, good quality copies of the records, for the retention period specified in the paragraph immediately above.

After the expiration of the retention period, you may dispose of the records, but only by pulping, shredding or burning them in industrial facilities. Do not dispose of the Project Records by dumping them.

(b) Electronic medium

Where Project Records are in electronic medium, keep a copy of the records for the specified retention period stated above.

4.4 IDENTIFIED RECORDS

4.4.1 General

Compile a list of all Identified Records stated in Annexure C2 of all specifications which are applicable to the Contract, and include the list in the RMP.

The Principal may direct that other records be added to the list, or records already on the list be deleted from the list. Deal with such added records as Identified Records from the time of receipt of the Principal's direction.

4.4.2 Filing and Indexing

Give each Identified Record a unique identifying number and file them in chronological order and grouped under the relevant TfNSW Specification with which they are associated. Include an index for easier searching.

Alternatively, you may submit for the Principal's approval a different method of filing and indexing the Identified Records, which will still comply with the requirements of the Contract and forms part of your standard record keeping system.

4.4.3 Delivery of Identified Records

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.

Include any commissioning records and Operation and Maintenance Manuals relevant to the Works even if they are not listed in the Contract specifications as Identified Records.

Completion will not be granted until all Identified Records have been delivered.

4.4.4 Media of Records Delivered

(a) Paper medium

Where the Identified Records delivered to the Principal is in paper medium, the paper used must be premium bond paper of minimum weight 80 g/m^2, of A4 or A3 size, and in white colour, unless some other colour is necessary for identification purposes, in which case that particular colour may be used.

Do not use thermal paper for the records.

(b) Electronic medium

Where the Identified Records are provided in electronic medium, they must be compatible with the Principal's electronic records management system, and must be in the format specified in the Contract specifications, or any other format accepted by the Principal.

5 SAMPLING AND TESTING

5.1 TESTING LABORATORIES

5.1.1 NATA Accreditation

All testing carried out within Australia for Work Under the Contract must be carried out by laboratories which have been accredited by the National Association of Testing Authorities (NATA), unless approved otherwise by the Principal.

Where the testing is to be carried outside of Australia and the proposed laboratory is not accredited by NATA, the laboratory must be accredited by another accreditation body accepted into the International Laboratory Accreditation Cooperation's Mutual Recognition Arrangement (ILAC MRA), and be approved by the Principal.

Tests must be carried out in accordance with the specified test method and the accreditation conditions, with the results reported in a format acceptable to the Principal.

Upon request by the Principal, provide copies of audit reports, whether by NATA or another accreditation body under the ILAC MRA, carried out on those tests which are applicable to the Contract.

5.1.2 Laboratory Impartiality

Laboratories carrying out the testing must ensure impartiality in accordance with AS ISO/IEC 17025.

Where the laboratory is part of an organisation providing other products or services (whether directly or indirectly) to the Principal, the organisation must be so structured as to prevent any adverse influence from other departments within the organisation on the laboratory to ensure impartiality.

5.1.3 Competency of Sampling and Testing Personnel

Laboratories carrying out the testing must ensure that the person authorised to perform the sampling or testing, including selection of locations for taking samples, is suitably trained and has the necessary competence to perform the sampling or testing, and is appropriately supervised and monitored.

Ensure that the person performing the sampling understands the requirements for independent random and unbiased sampling.

5.1.4 Test Reports By Laboratories

Test results must be reported on NATA endorsed documentation, or where the approved laboratory is located outside of Australia, on documentation endorsed by the accreditation body under the ILAC MRA in accordance with Clause 5.1.1, unless agreed to otherwise by the Principal.

Where a test is not accredited by NATA, state this on the test report.

The test report for each Lot (or sub-Lot) must identify the work or materials tested with the relevant Lot number (refer to Clause 5.4.6), and reference the associated ITP. Where several samples were taken from a Lot to calculate characteristic values, show in the report the test results for each individual sample tested. Show in the test report the applicable specification requirements for acceptance.

The test report must include a declaration, by an approved signatory (as defined in NATA document "NATA Rules") of the testing laboratory, that:

(a) sampling was carried out in accordance with the specified sampling method(s) and, where applicable, with Annexure Q6/L;

(b) testing was carried out in accordance with the specified testing method(s) and any other specified requirements;

(c) statistical analysis, where applicable, was carried out in accordance with Annexure Q6/L2;

(d) no samples have been abandoned or left untested, or alternatively, provide details of any samples that have been abandoned or left untested for any reason.

The declarations must be in wording that is acceptable to the Principal.

Where the sampling was performed by personnel other than from the laboratory carrying out the testing (refer to Clause 5.2.2), the declaration under item (a) above will be by the person who carried out the sampling, and the declaration under item (b) above must also reference the sampler's declaration.

5.1.5 Laboratory Performance Reporting

The Principal may forward to NATA copies of certificates, and past test, surveillance, audit and other performance reports on any NATA accredited laboratory contracted to carry out sampling and testing of any Work Under the Contract.

5.2 PROJECT TESTING

5.2.1 General

Project Testing includes all sampling and testing carried out at the Site, at concrete and asphalt batch plants, on aggregates and other granular materials used for construction of pavements and structures, and on products and equipment manufactured to order. Testing of the latter three categories may be carried out at locations away from the Site.

Project Testing excludes routine production testing in factories of items which are manufactured under controlled conditions.

The records generated from inspection and testing of each Lot are Project Records, and must comply with Clause 4.

5.2.2 Contracting Out of Testing By Laboratory

Where your Project Testing laboratory at the Site need to contract out some of the testing, then prior to those tests commencing, submit for the Principal's approval a list of the tests to be contracted out, the proposed laboratory for carrying out those tests, their experience in carrying out those tests, and their measures for ensuring the integrity of the sampling and testing.

The laboratory carrying out the testing must be the same as that which initially carried out the sampling for the particular test, unless otherwise approved by the Principal.

Where some of the sampling or testing need to be carried out by personnel other than from the Project Testing laboratory at the Site, then prior to those tests commencing, submit for the Principal's approval a list of the tests concerned, the name(s) of the personnel performing the sampling or testing, their experience, and measures for ensuring the integrity of the sampling or testing.

5.2.3 Review of Inspection and Test Plans

Engage the Project Testing laboratory carrying out testing at the Site, to independently review your ITPs (and/or those of your subcontractors) to confirm that:

(a) all tests required to demonstrate conformity have been identified;

(b) frequency of sampling and testing, test methods to be used, and acceptance criteria, all conform to the Specifications.

The ITPs reviewed will be limited to ITPs containing those sampling and/or testing which the laboratory has been contracted to perform.

Resolve any detected discrepancies with the Project Testing laboratory, and amend the ITPs where applicable.

Submit, together with the PROJECT QUALITY PLAN (or with each stage submission of the PROJECT QUALITY PLAN), a certification that the relevant ITPs included in the PROJECT QUALITY PLAN, has been reviewed by the Project Testing laboratory and any discrepancies detected have been resolved.

5.2.4 Laboratory Contact Person

Nominate a member of the Project Testing laboratory team at the Site 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, relevant specified test methods, tests which have been carried out by the laboratory and associated testing records, and must promptly provide, when requested by the Principal, information on testing matters and access to, or copies of, testing records including worksheets.

5.2.5 Submission of Test Results

Submit test results to the Principal as evidence of conformity within the time stated in the respective specification. Where no time limit is stated, submit the results upon completion of the testing.

Where so requested by the Principal, the laboratory must independently forward to the Principal test reports such as that containing preliminary test results, concurrently with their submission to you.

5.3 (NOT USED)

5.4 LOT DEFINITION AND SAMPLING LOCATIONS

5.4.1 General

Clause 5.4 generally applies only to work output which is areal in nature such as constructed earthworks or pavements.

For other cases such as loose granular materials in stockpiles, or individual discrete components, or any other type of work output which is not areal in nature, the Lot definition will be stated in the respective specifications.

5.4.2 Procedure

Divide the constructed work into Lots of discrete work areas, consisting of a continuous portion (except as provided in Clause 5.4.3 (a) below) of work areas that are essentially homogeneous. (In the case of earthworks, refer to Specification TfNSW D&C R44 for a description of what constitutes "essentially homogenous".) The material within a Lot must be representative of the entire Lot, and has been produced under essentially constant conditions.

Exclude from the Lot those portions which are non-homogeneous and/or otherwise considered to be non-representative, which will be either treated as separate Lots, or reworked to achieve conformity. The Principal may reject a Lot that is non-homogeneous and/or otherwise considered to be non-representative.

The size of a Lot must not exceed one shift's output, except that the one shift period may be extended by agreement with the Principal where the process cannot be completed in one shift.

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

Lots must not comprise more than one layer except as provided in Clause 5.4.3 (b) below, or specifically permitted by the relevant specification.

5.4.3 Exceptions

Where you can provide assurance that the constructed work is essentially homogeneous and has been carried out within the same shift under essentially constant conditions, and where approved by the Principal, the following apply:

(a) where the specified relative compaction is less than 100.0%, separate non-contiguous areas of work, up to a total area of 1,000 m^2, may be considered as one Lot.

(b) where the specified relative compaction is below 98.0%, a Lot may comprise more than one layer, but subject to the following limitations:

Sum total area of layers (m^2)	**≤ 100**	**> 100, ≤ 500**	**> 500, ≤ 1000**
Maximum number of layers (1)	5	3	2
Minimum number of tests (2)	1	2	3

Notes:

(1) Total thickness of the Lot (comprising multiple layers) must not exceed 600 mm.

(2) Where more than one test is required, the tests must be evenly distributed throughout the layers and areas of the Lot.

The lower layers within the Lot may be covered over before the samples taken are tested.

5.4.4 Lot Boundaries

Determine the boundaries of each Lot before sampling. Set the boundaries of each Lot so that each Lot is represented by a single tested sample, except where characteristic values (which require several tested samples to represent a Lot) are required.

Different acceptance criterion may have different Lot boundaries.

Demonstrate that the total of the Lots represents fully all of the work done, and no part of the work has been left out.

5.4.5 Selection of Sampling Locations

The Project Testing (or Primary Testing if applicable) laboratory must select the sampling locations in accordance with the method specified in Clause L2 of Annexure Q6/L.

For re-testing of nonconforming work which has been reworked, you may maintain the original Lot boundaries but the Project Testing laboratory must select new sampling locations in accordance with the method specified in Clause L2 of Annexure Q6/L.

5.4.6 Lot Identification

Give each Lot a unique Lot number, which will act as a quality records identifier.

When the Lot number does not indicate the location of the Lot, agree on the method for identification of the Lot with the Principal.

Record the Lot number on a register, and include the three-dimensional location of the Lot, comprising its start and finish chainages, lateral location boundaries, and layer location.

The Lot numbering system must be compatible with any activity numbering system used in your Contract Program.

Include in the PROJECT QUALITY PLAN details of the Lot numbering system, and the place where the Lot register will be kept.

5.5 REINSTATEMENT AFTER SAMPLING

Reinstate any part of the Works from which samples have been taken, with similar material and placed and finished in accordance with the relevant specification requirements, within seven days of sampling, and prior to the use, deterioration, contamination or covering up of the affected Works.

6 PRINCIPAL'S SURVEILLANCE AND AUDITS

6.1 GENERAL

6.1.1 Principal's Surveillance

The Principal will carry out surveillance of the Work Under the Contract.

The Principal may elect to witness a test being carried out as part of its surveillance activities, regardless of the accreditation status of your testing laboratory (refer to Clause 5.1.1).

6.1.2 Parallel Testing by Principal

The Principal may carry parallel testing of the Work Under the Contract.

All such testing will be undertaken by a laboratory with NATA accreditation for the test methods specified. If no laboratory has a particular test accredited by NATA, the test will be carried out at a laboratory considered to be suitable by the Principal.

6.1.3 Access for Principal

Provide the Principal with access to the Site and to your premises and arrange for equivalent access to premises of your subcontractors, suppliers and consultants, for the purposes of surveillance, audit, inspection, testing, certification and recording of information.

6.1.4 Additional Testing by Contractor

The Principal may order testing which are additional to those specified to be carried out, and can include additional number of tests, and special or non-specified tests.

Payment will not be made for the costs of the additional testing, where such testing is required:

(a) to verify conformity of work which is covered up or made inaccessible without the Principal's prior approval where such approval is required; or

(b) as a consequence of a failure by you to comply with a requirement of the Contract.

6.2 SYSTEM, PROCESS AND PRODUCT AUDITS

The Principal will conduct quality management system audits on a scheduled basis, on all aspects of your Quality Management System. The Principal will give you at least five days notice of the intended date of the audit.

If surveillance, or process or product quality audit, indicates significant nonconformity of a product or service, the Principal may conduct a quality management system audit, giving you only 24 hours notice.

The Principal may conduct process and product quality audits at any time.

All audits will be performed in accordance with AS/NZS ISO 19011.

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

6.3 (NOT USED)

ANNEXURE Q6/A – (NOT USED)

ANNEXURE Q6/B – (NOT USED)

ANNEXURE Q6/C – SCHEDULES OF HOLD POINTS AND IDENTIFIED RECORDS

C1 SCHEDULE OF HOLD POINTS

Clause	Description
3.12.4	Submission of proposed rectification method for nonconforming product, and additional supporting documentation where required by Principal
3.15.2	Submission of details of proposed corrective action

C2 SCHEDULE OF IDENTIFIED RECORDS

The records listed below are the Identified Records of this Specification for the purposes of Clause 1.2.3.

Clause	Description of Document
3.12.2	Nonconformity Reports and associated register
3.12.3	Register of Nonconforming Product Notification by Principal
3.15.1	Register of Corrective Action Request by Principal
3.15.2	Register of corrective actions taken
4.2.2	Updated index of Project Records
4.4	List of Identified Records stated in Annexure C2 of all specifications which are applicable to the Contract, and delivery status of these Identified Records

ANNEXURE Q6/D – PLANNING DOCUMENTS

D1 PROJECT QUALITY PLAN

The PROJECT QUALITY PLAN must include the documents listed in Table Q6/D.1, where applicable.

Table Q6/D.1 – PROJECT QUALITY PLAN

Clause	Description of Document
2.2.2	Matrix (table) showing alignment of QUALITY MANUAL with AS/NZS ISO 9001 (if arranged differently)
3.1.1	Details of Project Quality Representative
3.1.2	Details of other key personnel responsible for implementing quality management system requirements in Contract
3.2.1	List of measuring and testing equipment for use in Work Under the Contract
3.2.2	Calibration and maintenance schedules for monitoring, measuring and testing devices
3.3.1	Induction and training plan
3.4.2	Procedure for version control of documented information (if not included in QUALITY MANUAL) Procedure for the controlled distribution of documented information
3.5.2	Planning Documents listed in Annexure D of other specifications which are applicable to Contract
3.7.1	List of major items of product(s) or service(s) to be externally provided Procurement schedule Method of evaluation of the supplier or subcontractor's ability to provide conforming products and services
3.7.3	Details of the type and extent of control over supplier(s) and subcontractor(s), including surveillance of subcontractor(s)
3.8.1	List of processes where output cannot be verified by subsequent monitoring and measurement, and method of validation of these processes
3.8.2	Inspection and Test Plans and associated forms
3.9	Methods of identification and traceability, including for those products listed in Annexure Q6/J
3.10	Procedures for care of property belonging to Principal while it is under control of Contractor
3.11.2	Procedure describing how the Lot to be covered up before verification of conformity will be identified and traced, and subsequently verified for conformity, and what action will be taken if full conformity is not achieved
3.13.1	Internal audit schedule
5.4.6	Lot numbering system, and place where Lot register will be kept

D2 RECORDS MANAGEMENT PLAN

The Records Management Plan must include the documents listed in Table Q6/D.2, where applicable.

Table Q6/D.2 – Records Management Plan

Clause	Description of Document
4.2.1	Procedures for creation, registration, filing, indexing, storage, movement, maintenance, retrieval and disposal of Project Records, and their control
4.2.1, 4.4.1	List of Identified Records under the Contract, and procedure for submission and delivery of Identified Records
4.2.2	Index of Project Records
4.2.3	Name and responsibilities of person responsible for record keeping
4.2.4	Disaster recovery plan Methods of protection for critical records

ANNEXURES Q6/E TO Q6/I – (NOT USED)

ANNEXURE Q6/J – PRODUCT TRACEABILITY

Refer to Clause 3.9.

Apply traceability in accordance with Table Q6/J.1, for those products which are applicable to the Contract.

Table Q6/J.1 – Product Traceability

Product	Requirement
Precast concrete pipe, box culvert and other concrete units	Tracing must start at manufacturer's moulds and end when installed.
Concrete batches used in bridge components, cast-in-place box culverts and retaining walls	Tracing must start at batch plant and finish at location where material is incorporated in the Works. Records must be kept of batch quantities and time, testing details and location of placement.
Concrete batches used in road pavement subbase and base	
Plant mixed stabilised material used in road pavement	
Asphalt used in pavement courses	
Steel plate in bridge girders and bridge columns	Tracing must start at steelworks and finish at location of plate in girder or column. Records must be kept of steel heat number, testing details and location of plate in girder or column.
Structural bolts used in fatigue prone situations	Tracing must start at the manufacturer's premises and end at its location in the structure.

ANNEXURE Q6/K – (NOT USED)

ANNEXURE Q6/L – SAMPLING FREQUENCY, SAMPLING LOCATIONS AND CHARACTERISTIC VALUES

Refer to Clause 5.4.

This Clause generally applies only to constructed earthworks or pavements which are areal in nature.

L1 NUMBER OF SAMPLES PER LOT

The number of samples per Lot (n) must be not less than specified in Table Q6/L.1.

Table Q6/L.1 – Minimum Number of Samples Per Lot

Specified Relative Compaction (%)	Minimum Number of Samples [(1)]				
	Lot Area (m^2)				
	≤ 50	> 50, ≤ 500	> 500, ≤ 1,000	> 1,000, ≤ 5,000	> 5,000
≤ 90.0	1	1	1	1 per 2,000 m^2 (minimum 2)	1 per 3,000 m^2
> 90.0, ≤ 95.0	1	2	1 per 250 m^2 (minimum 3)	1 per 1,000 m^2 (minimum 3)	1 per 2,000 m^2
> 95.0, ≤ 98.0	1	3	4	5	1 per 2,000 m^2 (minimum 6)
> 98.0, ≤ 100.0	1	3	4	5	1 per 2,000 m^2 (minimum 6)
> 100.0	1	3	4	1 per 500 m^2 (minimum 5)	1 per 1,000 m^2 (minimum 10)

Note:

(1) Where the Lot comprises more than one layer (refer to Clause 5.4.3 (b)), the minimum number of samples must also conform to Clause 5.4.3 (b). Where there is a conflict between the two values, the greater of the two will apply.

L2 METHOD FOR DETERMINATION OF SAMPLING LOCATIONS

Determine the sampling locations in accordance with the following method, which aims to obtain samples in a semi-random manner, unless directed to obtain samples at specific locations by the Principal.

(a) Representing the Lot as a rectangle, subdivide the Lot lengthwise into sub-Lots of equal area, of equal number to the number of samples to be taken (n).

Where the area representing the Lot is not generally rectangular in shape, by agreement with the Principal, the boundaries of the Lot may be rearranged marginally to avoid triangular areas.

Where the resulting Lot is still non-rectangular, the sub-Lot boundaries, and the grid lines, may "fan out" such that they are of equal distance from each other at the boundary edges, in order to suit the method of determining sampling locations as described below.

(b) Establish six equally spaced grid lines within the Lot, as shown in Figure Q6/L.1.

Where the number of samples to be taken is less than six, as determined in accordance with Table Q6/L.1, and the width of the Lot is greater than 2.4 m, keep the number of grid lines at six.

Where the width of the Lot is between 1.2 m and 2.4 m, reduce the number of grid lines such that the distance between adjacent (equally spaced) grid lines is not less than 400 mm.

Where the width of the Lot is less than 1.2 m, the offset locations will be randomly selected.

(c) Determine the order of sampling of the six lines using a six digit number set from Table Q6/L.2. Each number set contains one of each of the numerals from "1" to "6", arranged in a random manner.

(d) The Principal will nominate the starting six digit number set in Table Q6/L.2 prior to the commencement of sampling.

If, for any reason, the Principal did not nominate the starting number set, determine the starting number set as follows:

Using the date on which sampling is to be first undertaken, select the number set from Table Q6/L.2 as follows:

(i) Column

If month is:	January, May, September	February, June, October	March, July, November	April, August, December
select column:	A	B	C	D

(ii) Horizontal Row Group

If day of month is 1st, 11th, 21st, 31st, select horizontal row group (of 4 rows) which is marked "1"; if day of month is 2nd, 12th, 22nd, select horizontal row group (of 4 rows) which is marked "2"; and so on.

(iii) Selected Number Set

From the block of 4 number sets identified by the column letter and horizontal row group number as above, select the first number set within the block.

Example:

If date on which sampling is to be first undertaken is 19 May, then the column letter is "A", and the horizontal row group is "9". The number set selected is the first number set within the block, which is "235461".

(e) Where there are less than 6 grid lines in the Lot (arising from the case where the width of the Lot is between 1.2 m and 2.4 m, refer to item (b) above), delete from the number set selected those numerals that exceed the number of grid lines in the Lot. For example, if there are only 4 grid lines, then delete the numerals "5" and "6" from the number set.

Where there are less than 6 samples to be taken but the number of grid lines is kept at 6 (refer to item (b) above), delete from the number set selected the last few digits corresponding to the shortfall between 6 and the number of samples to be taken. For example, if the number set is "235461" and only 4 samples are to be taken, delete the last two digits from the number set selected; i.e. "6" and "1".

(f) Select the grid line on which the sample in the first sub-Lot will lie, which will correspond to the first numeral in the number set selected. For example, if the first numeral is "2", then the sample will lie on grid line "2".

(g) Obtain the corresponding R value, which is shown to the right of the selected number set in Table Q6/L.2. Using this R value, obtain the offset distance (from the starting edge boundary of the Lot as shown in Figure Q6/L.1) for the sampling location in sub-Lot 1 as RL/n.

(h) For the next sub-Lot, select the grid line on which the sample will lie, which will correspond to the next numeral in the number set selected.

(i) Obtain the offset distance for the sampling location in sub-Lot 2 by adding L/n to the offset distance for the sampling location in sub-Lot 1.

(In so doing, the sampling location in sub-Lot 2 will be at an offset distance of RL/n from the common boundary between sub-Lot 1 and sub-Lot 2.)

(j) Repeat the process for the remaining sub-Lots.

(k) If the Lot requires more than six sampling locations, repeat the sequence using the same number set and R value for the remaining sub-Lots, to provide as many additional sampling locations as are required.

(l) For the next Lot, use the next number set located immediately below the last used number set, and so on down the column until the number set at the bottom of the column is used, then recommence the process using the number set at the top of the next column, until further notice from the Principal.

(m) Record the Lot number on a copy of Table Q6/L.2 to the right of the number set selected in step (d) above and indicate the date of the sampling on the table.

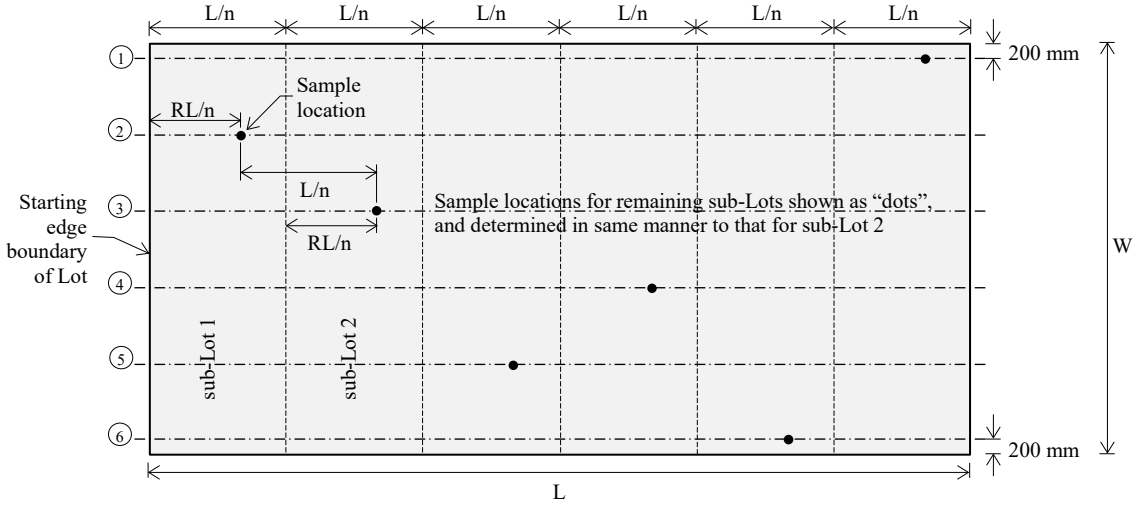

Figure Q6/L.1 – Sampling Locations for Rectangular Lot

Legend:

① Grid line reference

L Length of Lot

W Width of Lot

n Number of samples per Lot, from Table Q6/L.1

R Random fraction R value, from Table Q6/L.2

Notes:

(1) Figure shown above is based on the number of samples per Lot (n) = 6, and hence the number of sub-Lots shown is 6. For the purpose of illustrating application of the method, the number set selected is "235461", and the corresponding R value is "0.68" (which is the first number set under column A and in horizontal row group 9).

(2) As the first numeral of the selected number set is "2", the sample location in sub-Lot 1 lies on grid line 2. In accordance with step (g) above, the sample location in sub-Lot 1 will be at an offset distance of 0.68L/n from the starting edge boundary of the Lot.

(3) As the second numeral of the number set is "3", the sample location in sub-Lot 2 lies on grid line 3. In accordance with step (i) above, the sample location in sub-Lot 2 will be at an offset distance of (0.68L/n + L/n) from the starting edge boundary of the Lot, or at an offset distance of 0.68L/n from the common boundary between sub-Lot 1 and sub-Lot 2.

(4) The process is repeated to determine the sampling location for the remaining sub-Lots.

Table Q6/L.2 – 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 CHARACTERISTIC VALUES AND CONFORMITY

L3.1 Calculation of Characteristic Values

Calculate the minimum (lower limit) and maximum (upper limit) characteristic values of attribute Q for a Lot as follows, where:

Q_L = calculated minimum (lower limit) characteristic value of attribute Q

Q_U = calculated maximum (upper limit) characteristic value of attribute Q

(a) Sample Size = 1

$Q_L = Q_U$ = single test result

(b) Sample Size = 2

Q_L = lower of the two test results

Q_U = higher of the two test results

(c) Sample Size = 3 or more

$Q_L = \bar{x} - ks$

$Q_U = \bar{x} + ks$

where: $\bar{x}$ = arithmetic mean of test results

s = standard deviation of test results

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

k = acceptance constant from Table Q6/L.3

Table Q6/L.3 – Acceptance Constant *k*

Sample Size	3	4	5	6	7	8	9	10 to 14	15 to 19	20 or more
k [(1)]	0.52	0.62	0.67	0.72	0.75	0.78	0.81	0.83	0.90	0.95

Note:

(1) Based on 10% producer's risk, and 10% proportion defective.

L3.2 Conformity

A Lot achieves conformity if:

$Q_L \geq$ specified minimum (lower limit) characteristic value of attribute Q; or

$Q_U \leq$ specified maximum (upper limit) for characteristic value of the attribute Q.

ANNEXURE Q6/M – REFERENCED DOCUMENTS

M1 GENERAL

Refer to Clause 1.2.6.

TfNSW Specifications

TfNSW D&C R44	Earthworks

Australian and International Standards

AS/NZS ISO 9000	Quality management systems – Fundamentals and vocabulary
AS/NZS ISO 9001	Quality management systems – Requirements
AS/NZS ISO 10013	Quality management systems – Guidance for documented information
AS/NZS ISO 19011	Guidelines for auditing management systems
AS ISO 10005	Quality management systems – Guidelines for quality plans
AS ISO 15489.1	Information and documentation – Records management – Concepts and principles
AS ISO/IEC 17025	General requirements for the competence of testing and calibration laboratories
HB90.3	The Construction Industry Guide to ISO 9001:2000

M2 (NOT USED)