Muswellbrook Shire Council

CONSTRUCTION SPECIFICATION

AUS-SPEC (Cot 09)

0161 Quality (construction)

Version 01

Amendment Record for this Specification Part

This Specification is Council's edition of the AUS-SPEC generic specification part and includes Council's primary amendments.

Details are provided below outlining the clauses amended from the Council edition of this AUS-SPEC Specification Part. The clause numbering and context of each clause are preserved. New clauses are added towards the rear of the specification part as special requirements clauses. Project specific additional script is shown in the specification as italic font.

The amendment code indicated below is 'A' for additional script 'M' for modification to script and 'O' for omission of script. An additional code 'P' is included when the amendment is project specific.

Amendment Sequence No.	Key Topic addressed in amendment	Clause No.	Amendment Code	Author Initials	Amendment Date
0	No amendment has been made	all	Nil		13 June 2012

Contents

0161 QUALITY (CONSTRUCTION)

1 SCOPE AND GENERAL

1.1 SCOPE

This worksection covers the contractual requirements for the Quality System documentation and operation.

1.2 CONTRACT REQUIREMENT

Standards
The Contractor shall establish, implement and maintain a Quality System in accordance with this worksection and the requirements of AS/NZS ISO 9001.

Applicable to work on and off site
The Quality System as expressed in the Quality Plan shall be used throughout the course of the Contract to ensure that the quality of the Contractor's and any sub-contractor's work complies with the requirements of the Contract Documents. This shall apply to all work under the Contract, both on site and off site.

Compliance with contract documents
Notwithstanding any statements to the contrary in the Contractor's Quality Manual or Quality Plan, no part of the Quality System shall be used to pre-empt, preclude or otherwise negate the requirements of any part of the Contract Documents.

Quality System requirements shall be used as an aid in achieving compliance with the Contract Documents and documenting such compliance. In no way shall they relieve the Contractor of its responsibility to comply with the Contract Documents.

1.3 CROSS REFERENCES

General
Related worksections: Conform to the following:

- 0167 *Integrated management.*

1.4 REFERENCED DOCUMENTS

The following documents are incorporated into this worksection by reference:

Standards

AS 1141	Methods for sampling and testing aggregates
AS 1141.11.1-2009	Particle size distribution - Sieving method
AS 1141.22-2008	Wet/dry strength variation
AS 1141.23-2009	Los Angeles value
AS 1289	Methods of testing soils for engineering purposes
AS 1289.3.1.1-2009	Soil classification tests - Determination of the liquid limit of a soil - Four point Casagrande method
AS 1289.3.3.1-2009	Soil classification tests - Calculation of the plasticity index of a soil
AS 1289.3.6.1-2009	Soil classification tests - Determination of the particle size distribution of a soil - Standard method of analysis by sieving
AS/NZS ISO 9000: 2006	Quality management systems—Fundamentals and vocabulary
AS/NZS 9001: 2008	Quality management systems—Requirements
AS ISO 10013: 2003	Guidelines for quality management system documentation
AS/NZS 19011: 2003	Guidelines for quality and/or environmental management systems auditing
SAA HB 90	The Construction Industry
SAA HB 90.3-2002	Guide to ISO 9001:2000

1.5 DEFINITIONS

For the purpose of this worksection, the definitions as in AS/NZS ISO 9000 and those below apply:

- Corrective action: Measures, including preventative measures, taken to rectify conditions which have caused or might cause nonconformity.

- Corrective action request (CAR): A formal advice/instruction from the Superintendent regarding departures from the Quality System or Methods as approved in the Quality Plan. Unless specifically noted, it will not require raising of a Nonconformance Report.
- Disposition: Action to be taken to resolve nonconformance. (Lot Specific)
- Hold point: A defined position in the construction/manufacturing stages of the Contract beyond which work shall not proceed without mandatory verification and acceptance by the Superintendent. The issue of a Nonconformance Report (NCR) or a Notice of Nonconformance (NNC) automatically creates a Hold Point.
- Inspection and test plan: The working document which identifies the specific inspections and tests to be carried out for works required by the Contract.
- Lot: A lot consists of any part of the works which has been constructed/manufactured under essentially uniform conditions and is essentially homogeneous with respect to material and general appearance. The whole of the work included in a lot shall be of a uniform quality without obvious changes in attribute values.
- Method statement (Procedures, Technical procedures, Process descriptions, Specific procedures): A document that specifies the key steps and sequence in the manufacture/construction for an activity; what, how and by whom it shall be done; what materials and equipment shall be used to achieve the required quality standards.
- Nonconformance report: A mandatory (standard format) report submitted by the Contractor that details the nonconforming work and the Contractor's proposed disposition of the nonconformance.
- Notice of nonconformance: Formal instruction from the Superintendent regarding product nonconformance from that specified. It automatically creates a Hold Point and requires a Nonconformance Report from the Contractor.
- Performance audit (Process audit, Technical procedure audit, Methods audit): An examination to evaluate whether established methods and procedures are being adhered to in practice.
- Product audit (Conformance audit, Service audit): An assessment of the conformity of the product with the specified technical requirements.
- Quality assurance: The management actions covering planning, quality control testing, inspection and verification procedures integrated with production to provide a product fit for the purpose.
- Quality assurance representative: Appointed by the Principal for a specific project and responsible for the auditing, review and surveillance of procedures and documentation required by the Contractor's approved Quality Plan.
- Quality check lists: Forms completed during the manufacture/construction process verifying key steps, and records required for the Quality Register. Check lists apply to each identified lot of work.
- Quality control: The operational techniques and activities that are used to fulfil the requirements of quality.
- Quality management representative: Appointed by the Contractor for a specific project with the authority and responsibility for the implementation and operation of the Quality Plan, to ensure that Quality System requirements are not subordinated to design and productivity.
- Quality manual: document setting out the general quality policies, procedures and practices of an organisation.
- Quality plan: The Quality Assurance documentation specific to a Contract which comprises of the Corporate Quality Manual with its job specific annexures, method statements, inspection and test plans and check lists.
- Quality register: The files containing all quality control records such as test results, completed check lists, certificates of compliance, consignment dockets for materials procured.
- Quality system: The organisational structure, responsibilities, procedures, processes and resources for implementing quality management.
- Quality system requirements (System requirement, Quality management requirement): The administrative activities affecting quality that need to be implemented and controlled to ensure that the product or a service meets specified quality requirements.
- Special processes: Those processes, the results of which cannot be directly examined to establish full conformance. Assurance of satisfactory conformance depends on evidence generated during the process.
- System audit: An examination of the documented Quality System represented by the Quality Manual, Quality Plan and Quality Register to evaluate their effectiveness in meeting the requirements of Australian Standards and the Specification.

- Traceability: The ability to trace the history, application or location of an item or activity, or similar items or activities, by means of recorded identification.
- Witness Point: A nominated position in the manufacture/construction stages of the Contract where the option of attendance may be exercised by the Superintendent, after notification of the requirement.
- Work instruction: A document that provides detailed guidance for the execution of a particular task.

1.6 ABBREVIATIONS

Abbreviations used in this worksection are:

- CAR: Corrective Action Request.
- CQS: Contract Quality System.
- ERF: Electronic Response Form.
- HP: Hold Point.
- ITP: Inspection and Test Plan.
- NATA: National Association of Testing Authorities.
- NCR: Nonconformance Report.
- NNC: Notice of Nonconformance.
- QA: Quality Assurance.
- QAR: Quality Assurance Representative (Principal).
- QC: Quality Control.
- QM: Quality Manual.
- QMR: Quality Management Representative (Contractor).
- QP: Quality Plan.
- QR: Quality Register.
- QS: Quality System.
- RFT: Request for Tender.
- SRD: System Requirement Description.
- WP: Witness Point.

2 QUALITY MANUAL AND QUALITY PLAN

2.1 QUALITY MANUAL

The Company Quality Manual shall cover and include the requirements for Quality System Documentation specified in AS/NZS ISO 9001, with guidance to preparation in AS/NZS ISO 10013.

It shall incorporate all applicable System Requirement Descriptions (SRDs) with reasons for those not regarded as applicable. Additionally it should include standard Method Statements and Inspection and Test Plans for the activities usually undertaken by the Contractor. It would be normal to have these in separate volumes.

2.2 QUALITY PLAN

The Quality System shall be incorporated in the project Quality Plan. The Company Quality Manual with its System Requirement Descriptions, standard Method Statements and Check Lists and the project specific components make up the Quality Plan. This is illustrated conceptually in Figure 2.1.

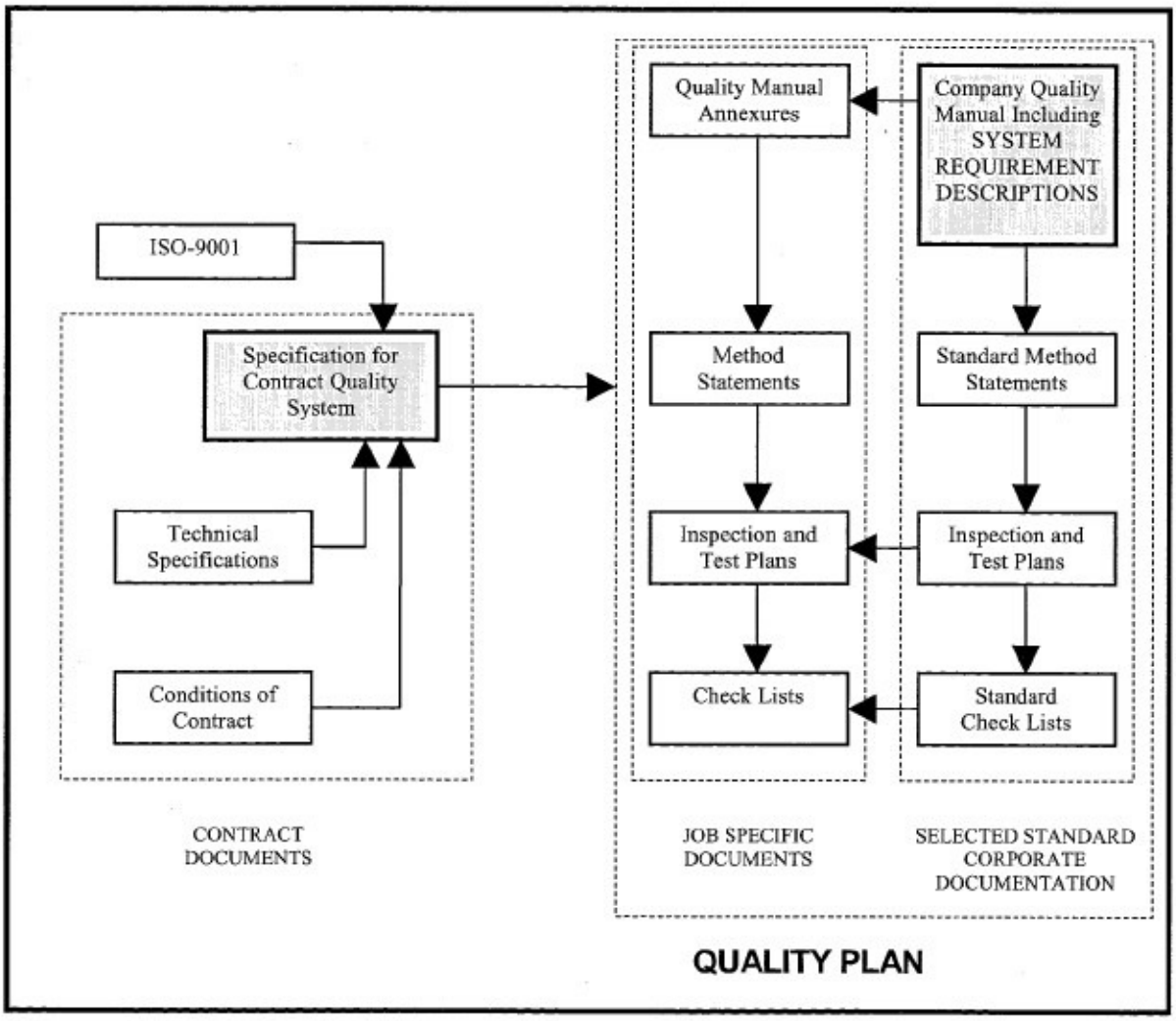


FIGURE 2.1 PROJECT QUALITY SYSTEM DOCUMENTATION

2.3 ANNEXURES TO QUALITY MANUAL

The following details shall be provided by appropriate annexures to the Company Quality Manual:

- Organisation structure—The organisation structure for the management of the project with details of the specific responsibilities and authorities of the nominated key personnel.
- Quality Management Representative. Including this person's qualifications, technical experience and present position together with responsibilities and authorities to resolve quality matters.
- Inspection and test personnel—The personnel or contracted testing organisations who will be conducting each type of compliance inspection of testing of completed works, their experience, qualification and responsibilities.
- Authority for construction process changes—The person authorised to change construction processes on site.

2.4 ADDENDA TO SYSTEM REQUIREMENT DESCRIPTIONS

The System Requirement Descriptions in the Company Quality Manual shall be augmented with suitable addenda to satisfy the requirements of this worksection.

2.5 REGISTER OF METHOD STATEMENTS

A Register of Method Statements giving the title, identifier and revision status, shall be provided. This Register shall list all Method Statements that are to be included in the Quality Plan for the Contract and shall include any suitable Method Statements already incorporated in the Company Quality Manual.

3 JOB SPECIFIC REQUIREMENTS

3.1 GENERAL

In the Quality Plan, the System Requirement Descriptions in the Company Quality Manual may need augmentation to cover the requirements of AS/NZS ISO 9001 and this worksection. This shall be provided in the form of suitable Annexures or where applicable included in the Method Statements or Inspection and Test Plans.

3.2 PROCESS CONTROL—METHOD STATEMENTS

Documentation
Method Statements describing in detail how construction processes are to be carried out shall be provided for all activities scheduled in Annexure B to the joint Annexures. This requirement applies to both contract and subcontracted work. The documentation shall cover, as applicable, planning, methods, verification and control.

Content
Method Statements shall include, as applicable, the following:

- Responsibilities.
- Sequence of operations.
- Work methods.
- Characteristics and tolerances to be met.
- Types of equipment.
- Materials.
- Safety requirements.
- Reference documents.
- Records produced.

Presentation
The presentation of Method Statements may be either descriptive, in the form of flow charts or a combination of both. In either case it must be accompanied by a Check List which shall include the relevant inspection and test points, surveying control points and Hold Points and the officer responsible to verify each check point.

System audit
A system audit of each Method Statement shall be carried out by the Contractor whilst the process is in effect.

Absence of a Method Statement
The absence of a Method Statement for activities where it has been specified will automatically create a Hold Point.

3.3 DOCUMENT AND DATA CONTROL

Records
In addition to the requirements of AS/NZS ISO 9001, the Quality Plan shall specify the method of keeping Quality Registers, tracking and handling of NCRs and NNCs and site correspondence.

3.4 CONTROL OF INSPECTION, MEASURING AND TESTING EQUIPMENT

NATA registration
The Quality Plan shall include the latest NATA advice of the terms of registration and current signatories for the laboratories which will be providing the compliance test reports.

Equipment accuracy
Inspection, testing and measuring equipment shall be capable of producing the precision and/or degree of accuracy specified in the referenced Test Methods and this shall be demonstrable by records of calibration.

3.5 PURCHASING

QS to cover all work
Except where the contract documents already stipulate another quality system standard for specific products or services, the quality assurance provisions detailed in this worksection shall apply to all subcontracted products or services which constitute work under the Contract.

Subcontracts
The Contractor shall ensure that the requirements of AS/NZS ISO 9001 and the requirements of this clause are included in all such subcontracts.

3.6 SUBMISSION OF MATERIAL SAMPLES

Process
Approval authority: The Superintendent. Repeat submissions as instructed by the Superintendent until approval is obtained.

Quality benchmark: The approved sample.

3.7 INSPECTION AND TESTING

Documentation
The Quality Plan shall include all inspections, tests and documentation necessary to ensure that the Works comply with Contract Documents.

Sampling and testing
Lots: All compliance inspections and tests shall be based on lots.

Random sampling
The Inspection and Test Plans shall include details of the sampling methods. Sampling shall not be restricted to locations dimensioned or otherwise defined for setting out the Works in the Drawings or Specification, but shall be undertaken in a random or unbiased manner, as approved by the Superintendent, at any location within the Works to demonstrate its compliance with the Specification.

Lot sizes frequency of testing
The maximum lot sizes and minimum testing frequencies are listed in the Annexures to the relevant Specifications and/or in Annexure C. Where no minimum frequency of testing, or maximum lot size is stated in the Specification, the Inspection and Test Plan(s) shall nominate appropriate frequencies for the Superintendent's approval.

Time limits
The Inspection and Test Plans shall also uphold any time limits for testing which may be imposed by the Technical Specifications.

Sampling and testing by NATA registered laboratory
Where Test Methods are nominated in the Technical Specifications, sampling and testing shall be carried out by a NATA registered laboratory accredited for those test methods and sampling procedures.

Sampling shall be conducted by personnel from the NATA registered laboratory which has been accredited for that sampling procedure and shall be supervised by the approved signatory from that laboratory.

Test results shall be reported on NATA endorsed test documentation which shall include a statement by the approved signatory certifying that the correct sampling procedures have been followed.

Special accreditation
In special circumstances the Principal may accredit a laboratory that is not NATA registered for specific tests or inspection procedures.

Consecutive numbering
Every testing agency or person providing written test reports for any and all testing undertaken shall use unique consecutive project specific serial numbering of the reports for identification and auditing purposes.

Reinstatement
The Contractor shall reinstate all core holes, test holes, excavations and any other disturbance resulting from any testing activity. The reinstatement shall be to a standard which is at least equal to the specified requirements for the particular work.

Testing responsibility
The responsibility for completion of inspections, tests and documentation shall be stated in the Quality Plan.

3.8 HOLD POINTS

Superintendent's Approval to Proceed
To assure compliance with the specified standards and requirements, mandatory Hold Points shall apply.

- Hold Points are those stages during the construction/manufacturing process where the Technical Specifications require 'approval by the Superintendent' or where a NCR or NNC has been issued.
- The Contractor shall not proceed past the HP until approval has been received from the Superintendent to proceed. For ease of identification Hold Points may also be annotated on the margins of Technical Specifications.

Requirements for approval to proceed

To obtain the approval to proceed from the Superintendent, the Contractor shall:

- provide the information required by the Technical Specifications
- ensure and certify that the particular lot/process is conforming;
- ensure and certify that all underlying and adjacent lots affected by the lot in question are conforming;
- submit the appropriate form (Check List, NCR or NNC) at least 24 hours prior to the time the Contractor wishes to proceed with the placement/construction of the next lot, unless some alternative arrangements have been agreed with the Superintendent.

Witness point

If the HP has resulted from a NCR or NNC, the Superintendent's approval may be conditional on a Witness point being included.

3.9 ITP CONTENT

Activities

An Inspection and Test Plan shall break down into distinct activities the process with which it is dealing and for each of those activities identify what inspections or tests, or both, are to be carried out.

Information to be provided

As a minimum, the ITP shall contain the following information:

- Item number/lot type reference(s).
- Activity description.
- Who is responsible for carrying out the inspection/test.
- Specification requirements or where impractical: specification reference.
- Specification tolerances.
- Sampling method.
- Test method.
- Test frequency.
- Identification of Hold or Witness Points.

Check list for each lot

An ITP shall have a Check List for completion for each particular lot.

3.10 INSPECTIONS

Incoming inspections shall be required for deliveries of materials that will be subsequently included in one or more lots. When completing Check Lists for particular Lots the inspection status shall be cited.

In-process and compliance inspections shall be completed by a responsible officer nominated in the Check List and certified by the Contractor's QMR that the work has been completed in accordance with the Contract Documents.

The Contractor shall establish and maintain a system to ensure and demonstrate that all products or parts of products requiring inspection and/or testing are so inspected and/or tested.

The Contractor shall also establish and maintain a system for identifying the inspection status for all lots of work.

3.11 PRODUCT IDENTIFICATION

Lots

All items of work shall be subdivided into lots as follows:

- Lot size – Lots shall be chosen by the Contractor but shall be within the limits given in Annexure C. In general, the size of the lot shall not exceed one day's output for each work process designated for lot testing.
- Lot numbers – Lot numbers shall be used as identifiers on all Quality System data.

- Lot identification – The Contractor shall determine the bounds of each lot before sampling and shall physically identify each lot clearly. The physical identification of a lot shall be maintained until the Contractor has ensured that the lot has achieved the specified quality.

Lot numbering

Each lot shall be given a unique lot number. The allocation of lot numbers shall be carried out by the Contractor to suit the circumstances, provided the lot numbering system complies with the following requirements:

- details of the numbering system are given in the Quality Plan
- the system shall be compatible with any numbering system used in the Contractor's construction programme so that lots are easily identified
- the lot number shall be entered in the Quality Register which shall provide at least the following information:
- three dimensional surveyed location of the lot (chainage of the start and finish points, lateral location and layer location) and/or the particular structure (eg. pier or abutment number, pour number)
- indication of conformance or nonconformance
- summary of test results (e.g. characteristic value) and
- location of test sites, test identification numbers and test results
- for nonconforming lots a new number, or numbers, shall be allocated to the resubmitted/subdivided lot(s), but reference shall be maintained to the original lot number.

Lot identification

Field identification: To ensure all site personnel can readily identify where the particular lots are in the field, the Contractor shall implement a field identification system which will clearly identify the bounds of each lot and the lot number. This identification system shall be detailed in the Quality Plan and shall be maintained during all stages of construction of the lot.

Work on a lot shall not commence until the field identification has been established.

Lot boundaries: The boundaries of a lot may be changed if subsequent events cause the original lot to be no longer essentially homogeneous. This will require appropriate notation in the Quality Register by the QMR.

Sampling and testing

Where Test Methods are nominated in the Technical Specifications, sampling and testing shall be carried out by a NATA registered laboratory accredited for those test methods and sampling procedures.

Sampling shall be conducted by personnel from the NATA registered laboratory which has been accredited for that sampling procedure and shall be supervised by the approved signatory from that laboratory.

Test results shall be reported on NATA endorsed test documentation which shall include a statement by the approved signatory certifying that the correct sampling procedures have been followed.

Special accreditation

In special circumstances the Principal may accredit a laboratory that is not NATA registered for specific tests or inspection procedures.

Reinstatement resulting from testing activity

The Contractor shall reinstate all core holes, test holes, excavations and any other disturbance resulting from any testing activity. The reinstatement shall be to a standard which is at least equal to the specified requirements for the particular work.

Random sampling

Random sampling techniques shall be used for each lot for the control of compaction of each continuous layer of earthworks, flexible pavement and asphalt. Annexure A, of this specification, defines the method to be used for determining test locations of random sampling in each lot.

Sampling locations

For quality control of processes other than compaction of layers of earthworks, flexible pavement and asphalt, the sampling locations will be proposed by the Contractor and will require the approval of the Superintendent.

Test results to meet tolerances for the lot

In all cases the samples shall be each considered to be representative of the lot and all test results will be required to meet the appropriate tolerances for the lot.

3.12 TRACEABILITY

Positive identification: The lot identification system, site records and sample numbering system shall allow test results to be positively identified with material incorporated in the works.

Traceability of concrete, asphalt and steel plate: Traceability is required for concrete loads, asphalt loads and steel plate as follows:

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

3.13 SURVEYING CONTROL

Separate system requirement: Surveying Control shall be treated as a separate System Requirement and shall include all measurement, calculation and record procedures necessary to:

- set out the Works
- verify conformance to the Drawings and Specification in relation to dimensions, tolerances and three dimensional position,
- determine lengths, areas or volumes of materials or products, where required for measurement of work.

Method Statement: The Method Statements for Surveying Control shall describe the process control parameters for special processes which cannot be fully verified by subsequent inspection and test.

Surveyor qualifications

The Contractor shall appoint qualified surveyors who are eligible for membership of the Institution of Surveyors, Australia or the Institution of Engineering and Mining Surveyors, Australia to supervise and take responsibility for all Surveying Control.

Equipment

The procedures and equipment used must be capable of attaining the tolerances nominated in the Specification.

Sampling locations

Sampling for conformance verification purposes shall not be restricted to the locations used to set out the Works.

Conformance verification surveys

Conformance verification survey for concrete base, concrete subbase and bound pavement layers shall be performed as soon as practicable, but in any event not later than one working day after the lot or component has become accessible for survey.

Survey conformance report

The Contractor shall submit a Survey Conformance Report for each lot or component where design levels, position and/or tolerances have been specified.

The Survey Conformance Report shall show ‘specified vs actual’ for position (defined by co-ordinates or chainage and offset), level and tolerance as appropriate and shall be certified by the qualified surveyor responsible for the verification survey.

Work is to be covered up

Where work is to be covered up after conformance has been achieved, a HOLD POINT shall apply until the Survey Conformance Report has been submitted.

Survey records

All survey records shall be included in the Quality Records and recorded in the Quality Register.

Verification field book pages shall be clearly labelled, dated and signed by the surveyor with cross indexed references to equipment used, lot/component identification and associated Survey Conformance Reports.

Where automatic data recording systems are used for verification surveys, a printout of both raw (field) data and reduced data shall be retained in a similar manner as conventional field books.

3.14 CONTROL OF QUALITY RECORDS

Quality register
The Contractor shall keep and maintain all Quality System records as required by AS/NZS ISO 9001 and this worksection. They shall be systematically recorded, indexed and filed so as to be retrievable and accessible to the Superintendent or an appointed Quality Auditor on a job basis within one working day of requisition.

Storage
Conformance records shall be stored and maintained such that they are readily retrievable and in facilities that provide a suitable environment to minimise deterioration or damage and to prevent loss.

Superintendent access to records
The Contractor shall make the quality records available to the Superintendent at all reasonable times. If requested by the Superintendent, the Contractor shall provide copies of the records or test results at no cost to the Principal.

Superintendent copy of the Quality Register
If requested by the Principal, within one month from the date of Practical Completion, the Contractor shall provide the Superintendent with a copy of the Quality Register, or parts thereof.

Finalisation
If requested by the Principal, within one month from the date of Practical Completion, the Contractor shall provide the Superintendent with a copy of the Quality Register, or parts thereof.

W.A.E.
The Contractor shall supply the Superintendent progressively with advice in writing of any amendments to design details for inclusion in Work-As-Executed Drawings (W.A.E).

3.15 NONCONFORMING WORKS

NCR within one day
All nonconforming works detected by the Contractor's Quality System shall be reported to the Superintendent via a Nonconformance Report within one working day of being detected. Nonconformance Reports shall be submitted with all records which indicate a departure from the requirements of the Contract Documents. The NCR shall indicate the proposed disposition.

If the disposition of the nonconformance cannot be determined within one working day, the Contractor shall submit a partially completed NCR identifying the nonconformance.

Disposition
The nonconforming product shall not be covered up unless a disposition has been accepted/approved by the Superintendent and implemented by the Contractor.

Reworking
Where nonconformance can be overcome by simply reworking the lot with the original process, a NCR will be required but a Hold Point will not apply.

NCR automatic Hold Point
With the exception of circumstances described in Clause 3.14.3 above, a NCR will automatically create a HOLD POINT which shall apply until conformance has been achieved and the Superintendent has signed the Authorisation to Proceed.

Corrective Action Request (CARs)
The Superintendent will issue a Corrective Action Request (CAR) when he detects nonconformance to the Contractors Quality System or Methods. Unless specifically stated, this will not create a Hold Point.

Notice of Nonconformance (NNCs)
Where the Superintendent's inspections, surveillance or audits detect product nonconformance, he will issue a Notice of Nonconformance (NNC). This will immediately create a HOLD POINT and the Contractor is required to submit a NCR in accordance with this Clause.

In instances where there is a discrepancy between the test results obtained by the Superintendent and those provided by the Contractor, the results from the Superintendent shall prevail except where the Superintendent may determine a specific audit test procedure to resolve the discrepancy.

Inspection of rectification work
Where required by the Superintendent, a Hold Point shall apply until the Superintendent has inspected the approved rectification work.

Standard NCR form
The Contractor shall prepare a standard form for use as a NCR. This shall include:

- Details of non-conformance.

- Proposed disposition.
- Provision for attachments.
- QAR comment/approval/rejection.
- Completion of disposition.
- Release of Hold Point.
- Corrective action to improve quality.
- Close out of NCR.

All actions shall be signed off by authorised representatives of the Contractor and Superintendent as applicable.

Alternative NCR Form

The Principal retains the right to determine that an alternative NCR form shall be utilised by the Contractor. An example of a NCR form is appended as Annexure D.

Register of NCRs and NNCs

The Contractor shall establish a suitable numbering and registration system for all NCRs and NNCs, including cross referencing as required.

Disposition in five working days

The Contractor shall nominate a proposed disposition for any nonconformance within five working days or shall show cause to the Superintendent for any further delay.

Under no circumstances will the deliberation on disposition of a nonconformance justify an extension of time to the Contract period.

3.16 DISPOSITION OF NONCONFORMANCE

Proposed Disposition

The Contractor shall advise the Superintendent in the NCR of the proposed disposition of the particular nonconformance. This proposed disposition will constitute corrective action for the lot or lots referred to in the NCR and may comprise one of the following:

- propose additional works to bring the lot up to the specified standard; or
- replace all or part of the lot to bring it up to the specified standard; or
- request utilisation of a lot for a reduced level of service if such a clause exists in the relevant Technical Specification; or
- for incidental defects, request that the Superintendent accept the lot without alteration as an exception with or without alteration to the respective unit rates.

Any proposed disposition shall be subject to the approval of the Superintendent. Reworked/replaced lots shall be verified to conform to the specified requirements.

3.17 CORRECTIVE ACTION

The Contractor will be required to indicate, on the NCR, corrective action appropriate to ensure that the Quality Plan is effective in avoiding recurrence of the nonconformance and continues to be effective.

3.18 STATISTICAL TECHNIQUES

Random sampling

Random sampling techniques shall be used for the control of compaction of each continuous layer of earthworks, flexible pavement and asphalt.

Test locations

Annexure A, defines the method to be used for determining test locations of random sampling and calculations for the characteristic value for a lot.

Lot sizes test frequencies

Annexure C, lists the maximum lot sizes and minimum test frequencies for the specified activities.

3.19 QUALITY AUDIT SCHEDULE

The Contractor's Quality Audit Schedule shall be included in the project Quality Plan. Guidance for the requirements of the auditing process is given in AS/NZS ISO 19011.

The Superintendent may require copies of the Audit Reports to be provided.

4 MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

Payment shall be made for all activities associated with the planning, establishment, implementation, operation and maintenance of the Quality System for the project.

These costs shall include all investigation, inspections, testing, rectification and maintenance of the Quality Register.

Cost adjustments, if applicable, will apply the same as to any other Pay Item in the Schedule.

4.2 PAY ITEMS

0161.1 Quality system documents and records

A lump sum for this item shall be provided for all costs associated with the preparation and submission of the Quality Plan, the provision of the QMR on site and the maintenance of the Quality Records during the course of the Contract.

Progress payments shall be calculated on the basis of 30% of the L.S. when the complete Quality Plan is available and the remainder on pro rata based on the monthly value of work done.

0161.2 Quality verification and control

The Lump Sum for this item shall include all costs for inspections, conformance surveys and testing required to verify that all aspects of the work under the Contract comply with the Quality Assurance provisions of the Contract.

Payments shall be made pro rata on the monthly value of work done.

5 ANNEXURE A - RANDOM SAMPLING AND STATISTICAL ANALYSIS

5.1 GENERAL

Statistical techniques shall be used to control relative compaction of each:

- Continuous layer of earthworks.
- Selected subgrade zone.
- Flexible pavement layers.
- Asphalt layers.
- Coring in concrete pavements.
- Which are generally rectangular in area.

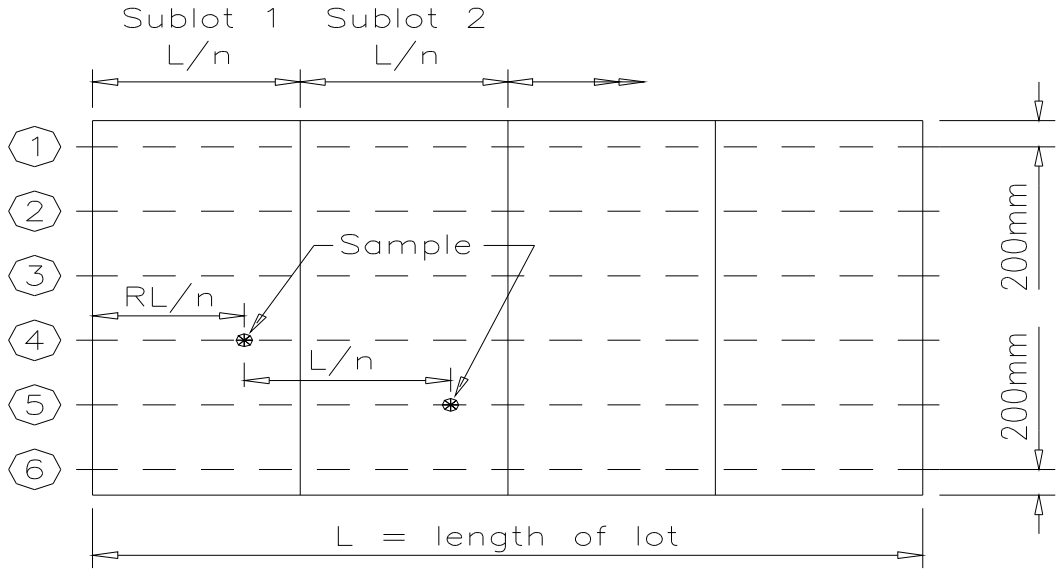
5.2 SAMPLING RATES

The number of samples (n) shall be as indicated in the specific specification which are summarised in the Sub-Annexures to Annexure C.

5.3 RANDOM SAMPLING LOCATIONS

Sampling locations within a lot shall be determined as follows:

- Representing the lot as a rectangle, sub-divide the lot lengthwise into equi-area sub-lots in accordance with the number of samples selected (n);
- Establish six grid lines within the lot, as illustrated in Sampling Locations for Rectangular Lot;
- Throw a die to select a number between 1 and 6. This determines which grid line to use for the sample location in sub-lot 1;
- Throw die to select a group (1-6) in Table A1
- Throw die twice to select two random numbers (between 1 and 6) for row and column in Table A1 and obtain random fraction R;
- Length co-ordinate for sample location in Sub-lot 1 = RL/n;
- For sample location in next sub-lot:-
  . Add L/n to previous length co-ordinate.
  . Add 1 (on a cycle of 6) to previous grid line.



Add L/n to previous length co-ordinate.

Add 1(on a cycle of 6) to previous grid line.

Figure A2 Sampling locations for rectangular lot

Calculation for statistical conformance of a lot

The calculation of the characteristic value of attribute (Q) for the lot shall be as follows:

$Q = A^m - ks$

where

A^m = arithmetic mean of attribute test results for all sub-lots

k = acceptance constant from **Acceptance Constance** *k* (based on 10% producer's risk)

s = standard deviation of sub-lot attribute test results

$$= \left(\frac{sum\ of \left(x - \bar{x} \right)^2}{n - 1} \right)^{1/2}$$

A lot achieves conformance if Q is equal to or greater than the specified lower limit for characteristic value of the attribute.

If Q is less than the specified lower limit for characteristic value and reworking is subsequently undertaken, the complete lot shall be resampled and retested to verify conformance.

ACCEPTANCE CONSTANT *k*

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

Table A1 - Table of random fractions

GROUP	ROW	COLUMN					
		(1)	(2)	(3)	(4)	(5)	(6)
(1)	(1)	0.78178	0.45467	0.00347	0.27296	0.00020	0.36517
	(2)	0.59678	0.67931	0.25434	0.59054	0.32444	0.41504
	(3)	0.14464	0.17269	0.61154	0.18291	0.83242	0.50776
	(4)	0.89010	0.44764	0.07451	0.20428	0.49513	0.91440
	(5)	0.91941	0.47726	0.33160	0.30670	0.65114	0.36852
	(6)	0.51085	0.38148	0.22169	0.66578	0.67050	0.69559
(2)	(1)	0.81891	0.48626	0.88892	0.82994	0.16941	0.81528
	(2)	0.37410	0.60232	0.12070	0.79017	0.32981	0.34908
	(3)	0.45921	0.15648	0.58052	0.37413	0.08124	0.97145

GROUP	ROW	COLUMN					
		(1)	(2)	(3)	(4)	(5)	(6)
	(4)	0.86614	0.94719	0.78872	0.91972	0.45149	0.15107
	(5)	0.26590	0.41140	0.95477	0.81267	0.24018	0.07324
	(6)	0.95205	0.39438	0.73697	0.59427	0.71146	0.00575
(3)	(1)	0.18694	0.36502	0.17828	0.84312	0.57003	0.58583
	(2)	0.91211	0.86936	0.43030	0.27672	0.47393	0.10342
	(3)	0.80714	0.34295	0.00775	0.90855	0.33368	0.21842
	(4)	0.67579	0.92686	0.18005	0.00645	0.11256	0.05278
	(5)	0.03184	0.69876	0.16676	0.43346	0.86992	0.03275
	(6)	0.15623	0.02905	0.72763	0.19095	0.80847	0.39729
(4)	(1)	0.72109	0.17970	0.22505	0.35561	0.98935	0.27818
	(2)	0.37348	0.19381	0.43331	0.75033	0.99963	0.42232
	(3)	0.12129	0.32386	0.56705	0.87165	0.84460	0.92955
	(4)	0.54948	0.08844	0.47061	0.78419	0.18731	0.93485
	(5)	0.15097	0.44967	0.48759	0.84161	0.19212	0.05146
	(6)	0.32360	0.66850	0.99382	0.94050	0.96449	0.96217
(5)	(1)	0.68091	0.54191	0.10910	0.94237	0.23161	0.15167
	(2)	0.97121	0.83626	0.70896	0.45296	0.69475	0.11264
	(3)	0.19723	0.98260	0.57429	0.94789	0.64457	0.20809
	(4)	0.84036	0.14095	0.29451	0.40256	0.34521	0.64924
	(5)	0.97500	0.98056	0.82276	0.97130	0.77329	0.89855
	(6)	0.83244	0.30828	0.06882	0.68471	0.71081	0.91649
(6)	(1)	0.75892	0.29685	0.70044	0.91238	0.53356	0.45239
	(2)	0.13229	0.19701	0.36074	0.32254	0.62045	0.26691
	(3)	0.34789	0.22179	0.91891	0.87651	0.91011	0.97469
	(4)	0.97211	0.68943	0.12831	0.50006	0.20793	0.61151
	(5)	0.24954	0.17809	0.56093	0.51524	0.69135	0.68967
	(6)	0.10062	0.11852	0.47089	0.64765	0.44644	0.35548

6 ANNEXURE B - METHOD STATEMENT REQUIREMENTS

6.1 GENERAL

Method Statements are required to describe the key steps and sequence in the construction activities, how and by whom each step shall be undertaken and what materials and equipment shall be used. Method Statements may include a flow chart to clarify the sequence of key steps. One or more Method Statements may address a Construction Activity.

Each Method Statement will be supported by a Checklist which shall identify relevant inspections, test points, materials requirements and Hold Points. Each requirement on the Check List will have an officer responsible identified and will require the nominated officer to sign off the requirement so indicating its satisfactory execution.

Method Statements and Check Lists shall be compatible with the appropriate Inspection and Test Plan. Check Lists will be completed for each lot of work during construction and compiled with other documents to comprise the Quality Register.

The Contractor shall submit Method Statements and Check Lists to describe the key steps in those Construction Activities listed below that are identified with a preceding asterisk (*).

Table B1 - Construction activities (insert new numbers)

Item	Enter * here if required	Activity	Specification number
1		Control of traffic	1101
2		Temporary roadways and detours	1101
3		Control of erosion and sedimentation	1102
4		Clearing and grubbing	1111
5		Earthworks—Cut	1112
6		Earthworks—Blasting	1112
7		Earthworks—Unsuitable material	1112
8		Earthworks—Embankment	1112
9		Earthworks—Compaction and quality control	1112

Item	Enter * here if required	Activity	Specification number
10		Siting, excavation, bedding, backfilling and compaction of stormwater drainage	1351
11		Installation of pipe drainage	1352
12		Installation of precast box culverts	1353
13		Siting and installation of drainage structures	1354
14		Installation of lined open drains including kerb and gutter	1121
15		Kerb and gutter replacement	1122
16		Provision of subsurface drainage as subsoil drains, pavement drains or free draining layer	1171, 1172 1173, 1174
17		Stabilisation of pavement or subgrade materials	1113
18		Construction of stabilised pavement layers	1113, 1141
19		Trimming of subgrade and pavement layers	1141
19a		Construction of flexible pavement layers	1141
20		Bituminous cold mix	1142
21		Sprayed bituminous surfacing	1143
22		Construction of asphaltic concrete pavement layers	1144
23		Construction of concrete pavement layers	1131-1135
24		Cold milling of asphalt and base course	1136
25		Segmental paving	1145
26		Bituminous slurry surfacing	1146
27		Pavement markings	1191
28		Signposting	1192
29		Guide posts	1193
30		Guardfence	1194
31		Boundary fencing	1195
32		Street lighting	1196
33		Installation of concrete safety barrier	1163
34		Minor concrete works	0310
35		Landscaping	0250
36		Construction of masonry walls	0292
37		Construction of crib retaining walls	0293
38		Installation of service conduits	1391
39		Trenchless conduit installation	1392
40		Road openings and restorations	1151, 1152
41		Water supply reticulation and pump stations	1341
42		Sewerage system reticulation and pump stations	1361

7 ANNEXURE C - MAXIMUM LOT SIZES AND MINIMUM TEST FREQUENCIES

7.1 GENERAL

The maximum lot sizes and minimum test frequencies are separately specified for all major activities covered by the worksections as listed hereunder.

The requirements applicable to this Contract are identified in Table C1 with an asterisk indicating that only these details are attached in this Annexure.

Where material/product quality certification can be obtained from the supplier, tests listed per contract/separable part need not be repeated.

On large projects the Superintendent may relax the testing frequency after the Contractor has demonstrated consistent conformance to the quality requirements.

Table C1 Requirements relevant to contract

Item	Sub-annexure	Required (*) for this Contract	Reference Worksection	Sub-annexure heading
1	C1		1112	Earthworks (Roadways)

Item	Sub-annexure	Required (*) for this Contract	Reference Worksection	Sub-annexure heading
2	C2		1351, 1352, 1353, 1354, 1121, 1122	Water cycle management—Stormwater drainage, Pipe drainage, Precast box culverts, Drainage structures, open drains including kerb and gutter, Kerb and gutter replacement
3	C3		1171, 1172, 1173, 1174	Pavement moisture control—Subsurface drainage, Subsoil and foundation drains, Pavement drains, Drainage mats
4	C4		1113	Stabilisation
5	C5		1141	Flexible pavements
6	C6		1142	Bituminous cold mix
7	C7		1143	Sprayed bituminous surfacing
8	C8		1144	Asphaltic concrete
9	C9		1131	Rolled concrete subbase
10	C10		1132	Mass concrete subbase
11	C11		1133	Plain and reinforced concrete base
12	C12		1134	Steel fibre reinforced concrete base
13	C13		1135	Continuously reinforced concrete base
14	C14		1131, 1132, 1133, 1134, 1135, 0319	Ready mixed concrete production and supply
15	C15		1145	Segmental paving
16	C16		1146	Bituminous slurry surfacing
17	C17		1191	Pavement markings
18	C18		1192	Signposting
19	C19		0319	Minor concrete works
20	C20		0257	Landscape – roadways and street trees
21	C21		0292	Masonry walls
22	C22		0293	Crib retaining walls
23	C23		1341	Water supply reticulation and pump stations
24	C24		1361	Sewerage system reticulation and pump stations

7.2 SUB-ANNEXURE C1

1112 *Earthworks (Roadways)*

Activity	Key quality verification requirements	Maximum lot size	Minimum test frequency	Test method
Stripping topsoil	Surface levels	10,000 m²	1 Cross Section per 25 m	Survey
Excavation	Geometry	10,000 m²	1 Cross Section per 25 m	Survey
Floor of cuttings	Material quality—CBR Compaction	5,000 m² 10,000 m²	1 per 1,000 m² * 1 per 500 m²	AS 1289.6.1.1 AS 1289.5.4.1 or AS 1289.5.7.1
Blasting	Ground vibration/noise control	1 day's blasting	Continuous monitoring	
Foundation for Embankments	Compaction	5,000 m²	1 per 500 m²	AS 1289.5.4.1 or AS 1289.5.7.1
Embankments —General	Geometry Material quality—CBR	One layer 10,000 m² One layer 5,000 m²	1 Cross Section per 25 m 1 per 800 m³	Survey AS 1289.6.1.1

Activity	Key quality verification requirements	Maximum lot size	Minimum test frequency	Test method
	Compaction/Moisture content	One layer 5,000 m²	1 per 250 m³	AS 1289.5.1.1 AS 1289.5.4.1 AS 1289.5.7.1
Embankments —Select zone	Geometry Material quality —Particle size distribution —CBR Compaction/moisture content	One layer 10,000 m² 10,000 m² 10,000 m² One layer 5,000 m²	1 Cross Section per 25 m 1 per 1,000 m³ * 1 per 500 m³ * 1 per 250 m³ *	Survey AS 1289.6.1.1 AS 1289.5.1.1 AS 1289.5.4.1 AS 1289.5.7.1
Fill adjacent to bridges, wingwalls, retaining walls and culverts	Material Quality —Particle size distribution —Plasticity index Compaction/moisture content	 1 Structure 1 Structure 1 Structure	 1 per 200 m³ * 1 per 200 m³ * 1 per layer	 AS 1289.3.3.1 AS 1289.5.1.1 AS 1289.5.4.1 AS 1289.5.7.1

* Note: or part thereof, per lot.

7.3 SUB-ANNEXURE C2

WATER CYCLE MANAGEMENT (1351 *Stormwater drainage*, 1325 *Pipe drainage*, 1353 *Precast box culverts*, 1354 *Drainage structures*, 1121 *Open drains including kerb and channel (gutter)*, 1122 *Kerb and channel (gutter) replacement)*

Activity	Key quality verification requirements	Maximum lot size	Minimum test frequency	Test method
Supply of precast units	Precast quality— Suppliers documentary evidence and certification	1 batch	1 per type/size/ class per batch	
Siting and Excavation	Geometry	1 drainage line/structure	1 per drainage line/structure	Survey
Excavation by Blasting	Peak particle velocity	1 drainage line/structure	1 per drainage line/structure	Measure
Foundation	Compaction	1 drainage line/structure	1 per 20 lin m *	AS 1289.5.4.1
Material surrounding steel structures	Material quality —pH/Electrical resistivity	 1 drainage line/structure	 1 per material	AS 1289.4.3.1 AS 1289.4.4.1
Bedding	Material quality —Particle size distribution Compaction/moisture content	 1 contract 1 drainage line/structure	 1 per 200 m³ * 1 per layer, per 20 lin m	 AS 1141.11.1 AS 1289.5.4.1 AS 1289.5.7.1
Concrete bedding or lining	Geometry		1 Cross Section per 25 m	Survey and 3 m Straight Edge
Installation of precast units	Geometry	1 drainage line/structure	1 per drainage line/structure	Survey
Selected backfill	Material quality: —Maximum particle size —Plasticity index Compaction/moisture content	 1 contract 1 contract 1 drainage line/structure	 1 per 100 m³ * 1 per 100 m³ * 1 per 2 layers per 50 m²	 AS 1289.3.3.1 AS 1289.5.4.1 AS 1289.5.7.1
Rock fill for gabions/ wire mattresses	Material quality: —Wet strength —Wet/dry strength variation	 1 contract 1 contract	 1 per contract 1 per contract	 AS 1141.22 AS 1141.22
Kerb and gutter	Geometry	1 contract	1 Cross section per 25 m	Survey and 3 m straight edge

* Note: or part thereof, per lot

7.4 SUB-ANNEXURE C3

Pavement Moisture Control (1171 *Subsurface drainage*, 1172 *Subsoil and foundation drains*, 1173 *Pavement drains*, 1174 *Drainage mats)*

Activity	Key quality verification requirements	Maximum lot size	Minimum test frequency	Test method
Material supply	Material quality—Supplier's documentary evidence and certification of:			
	Pipe	1 contract/size	1 per type/size	
	Filter material			
	—Grading (Type A, B, C, D)	1 contract/size	1 per type	AS 1141.11.1
	—Coefficient of permeability (Type B)	1 contract/size	1 per type	AS 1289.5.1.1 ASTM-D2434-68
	—Grading variation after Treatment (Type B)	1 contract/size	1 per type	AS 1141.11.1
	—Wet Strength (Type C, D)	1 contract/size	1 per type	AS 1141.22
	—10% Fines Wet/Dry (Type C, D)	1 contract/size	1 per type	AS 1141.22
	Geotextile	1 contract	1 per type	
Excavation—Trench base	Line and Grade	1 drainage line	1 per 200 lin m	Survey
	Compaction	1 drainage line	1 per 200 lin m*	AS 1289.5.4.1
Bedding and backfill —Filter material	Compaction	1 drainage line	1 per drainage line	AS 1289.5.4.1
—Selected backfill	Compaction	1 drainage line	1 per 200lin m*	AS 1289.5.4.1
—Earth backfill	Compaction	1 drainage line	1 per 200lin m*	AS 1289.5.4.1
Drainage mat	Geometry	2000m²	1 Cross Section per 25 m	Survey

* Note: or part thereof, per lot

7.5 SUB-ANNEXURE C4

1113 *Stabilisation*

Activity	Key quality verification requirements	Maximum lot size	Minimum test frequency	Test method
Material supply	Material Quality—Supplier's documentary evidence and certification of:			
	—Cement	1 contract	1 per 100t	AS 3972 and AS 2350 (various)
	—Quicklime			
	Available lime (CaO content)	1 contract	1 per 100t	AS 3583.12
	Slaking rate	1 contract	1 per 100t	T432
	Particle size Dist'n	1 contract	1 per contract	AS 1141.11.1
	—Hydrated lime			
	Available Lime (CaOH2)	1 contract	1 per 100t	AS 3583.12
	Residue on sieving	1 contract	1 per contract	AS 3583.14
	—Ground blast furnace slag	1 contract	1 per month	AS 3583.2 and AS 3582.2
	—Flyash	1 contract	1 per month	AS 3583.1 and AS 3582.1
	—Blended stabilising agent	1 contract	1 per month	AS 2350.4
	—Water			
	Chloride ion content	1 contract	1 per contract	AS 3583.13
	Sulphate ion content	1 contract	1 per contract	AS 1289.4.2.1
	Undissolved solids	1 contract	1 per contract	
Mix design	NATA certification—Supplier's	1 mix	1 per mix	

Activity	Key quality verification requirements	Maximum lot size	Minimum test frequency	Test method
	documentary evidence and certification			
Stationary mixing plant	Application rate of stabilising agent	1 day's production	1 per 100t	
	Compressive strength of product	1 day's production	1 per 100t	AS 1289.6.1.1
In-situ spreading	Spread rate	1 layer 1,000 m²	1 per lot or 1 per 500m²	
	Mix uniformity	1 layer 1,000 m²	1 per 500m²	Visual
Trimming and compaction	Geometry	1 layer 2,000 m², max 1 day's placement	One cross section per 25 m	Survey
	Surface quality	"	10 per 200 m lane length *	3 m straight edge
	Average layer thickness	"	1 per lot	Survey
	Average width	"	1 per lot	Measure/survey
	Relative compaction/moisture content	"	3 per lot	AS 1289.5.7.1 AS 1289.5.8.1

* Note: or part thereof, per lot.

7.6 SUB-ANNEXURE C5

1141 *Flexible pavements*

Activity	Key quality verification requirements	Maximum lot size	Minimum test frequency	Test method
Base and subbase supply	Material quality—Supplier's documentary evidence and certification	1 Contract		
	—Particle size distribution		1 per 1,000t	AS 1289.3.6.1
	—Fine particle size distribution ratio		1 per 1,000t	AS 1289.3.6.3
	—Liquid Limit		1 per 1,000t	AS 1289.3.1.1
	—Plastic Limit		1 per 1,000t	AS 1289.3.3.1
	—Plasticity Index		1 per 1,000t	AS 1289.3.3.1
	—Maximum dry compressive strength		1 per 5,000t	T114
	—Particle shape		1 per 1,000t	AS 1141.14
	—Aggregate wet strength		1 per 5,000t	AS 1141.22
	—Wet/Dry strength variation		1 per 5,000t	AS 1141.22
	—Modified Texas Triaxial classification		1 per contract	T171
	—Unconfined compressive strength (Modified)		1 per 5,000t	T116
	—Unconfined compressive strength (Bound)	1 Contract	1 per mix design	T131
Placement	Geometry: Alignment & level	One layer 2,000 m² or	1 Cross Section per	Survey
	—Width & Surface Trim	max 1 day's placement	15 m 10 per selected 200 lin. m	Measure & 3m Straight Edge
	Deflection control—Benkelman beam	One layer 5,000 m² or max 1 day's placement	4 per 1,000 m², minimum 10 per lot	T160
	Compaction/moisture content / dry density testing	One layer 5,000 m² or max 1 day's placement	10 per 5,000 m² layer or 3 per lot if less	T130 AS 1289.5.2.1 AS 1289.5.4.1 AS 1289.5.8.1

7.7 SUB-ANNEXURE C6

1142 *Bituminous cold mix*

Activity	Key quality verification requirements	Maximum lot size	Minimum test frequency	Test method
Materials supply	Material Quality—Supplier's documentary evidence and certification of:			
	—Coarse aggregates	1 contract or		AS 2758.5
	Grading	1 mth's prod'n	1 per month	AS 1141.11.1
	Wet strength	1 contract	1 per contract or	AS 1141.22
	Wet/dry strength	"	change in	AS 1141.15
	Flakiness index	"	material	AS 1141.18
	Fractured faces			
	—Fine aggregates	1 contract or		
	Grading	1 mth's prod'n	1 per month	AS 1141.11.1
	—Mineral filler	1 contract or 1 mth's prod'n	1 per month	AS 2150
	—Class 170 or 320 bitumen binder	1 contract or 1 mth's prod'n	1 per month	AS 2008
	Cutback bitumen	1 delivery/ tanker	1 per delivery/ tanker	AS 2157
	Flux Oil and Cutter Oil	1 delivery/ tanker	1 per delivery/ tanker	AS 3568
Mix design	Approval of mix and NATA documentation. Supplier's documentary evidence and certification.	1 mix per contract (less than 12 months old)	1 per mix	Approval
Production mix	Grading Binder	Each production lot or 1 day's production (whichever is the lesser)	1 per contract or as requested by Superintendent (sampling by production lot)	AS 1141.11.1 AS/NZS 2891. 3.1

7.8 SUB-ANNEXURE C7

1143 Sprayed bituminous surfacing

Activity	Key quality verification requirements	Maximum lot size	Minimum test frequency	Test method
Materials supply	Material Quality - Suppliers documentary evidence and certification of:			
	—Class 170 bitumen	1 tanker load	1 per tanker load	AS 2008
	—Refinery cutback bitumen	1 tanker load	1 per tanker load	AS 2157
	—Polymer modified binder	1 tanker load	1 per tanker load	AS 2341.21
	—Bitumen Adhesion agent	1 delivery	1 per delivery	
	—Cutback oils	1 delivery/ tanker	1 per delivery/tanker	AS 3568
	—Aggregate precoating agent	1 delivery/ tanker	1 per delivery/ tanker	
	—Aggregate	1 contract	1 per 400 m^3	AS 2758.2
Application rates	Binder	1 day's operation	Calculate per spray run	
	Aggregate	1 day's operation	Calculate per spray run	

* Note: or part thereof, per lot

7.9 SUB-ANNEXURE C8

1144 *Asphaltic concrete (Roadways)*

Activity	Key quality verification requirements	Maximum lot size	Minimum test frequency	Test method
Materials supply	Material quality—Supplier's documentary evidence and certification of:			
	—Coarse & fine aggregates			AS 2758.5
	Grading	1 wk's prod'n	1 per day	AS 1141.11.1
	Moisture content	1 wk's prod'n	1 per day	AS 1289.2.1.1
	Wet strength	1 contract	)	AS 1141.22
	Wet/dry strength	1 contract	) 1 per	AS 1141.22
	variation	1 contract	) contract	AS 1141.14
	Particle shape	1 contract	) or change in	AS 1141.18
	Fractured faces	1 contract	) material	AS 1141.42
	Polishing agg friction value			
	—Mineral filler	1 contract or 1 month's production	contract or 1 per month's production	AS 2150
	—Bitumen binder	1 refinery batching	1 per tanker load	AS 2008
	—Polymer modified bitumen			
	Elasticity recovery at 60°C	1 production batch by supplier	1 per tanker load	MBT 21
	Viscosity on ER at 60°C			MBT 21
	Torsional recovery at 25°C			MBT 22
	Viscosity at 180°C			MBT 11
	—Bitumen adhesion agent	1 contract	1 per contract or change in material	T230 or nominated equivalent
	Resistance to stripping			
	—Reclaimed asphalt pavement (RAP)	1 stockpile	1 per stockpile	AS 1141.11.1
	—Bitumen emulsion	1 contract	1 per contract or change in material	AS 1160
Mix design—Nominated mix	Approval of mix and NATA certification. Supplier's documentary evidence and certification	1 mix per contract	1 per mix	
Production mix	Temperature		1 per truck load	Measure
	Moisture content	1144 7 from Spec		AS/NZS 2891.10
	Grading	1144 Asphaltic concrete as		AS/NZS 2891.3.3
	Binder content	included as separate table below. Additionally, max lot size one 12 hr shift's production.		AS/NZS 2891.3.1
	Resistance to stripping	1 production mix	1 per mix per 5000 t or once per month (whichever is the most frequent)	T640
Laying and compaction	Temperature	1 day's laying per site	1 per truck load	Measure
	Levels	1 day's laying per site	1 cross section per 25 m	Survey
	Shape	1 day's laying	10 per 200 m* lane length	3 m Straight Edge
	Relative compaction/layer	1 day's laying	6 cores per lot	AS 2891.9.3 or

Activity	Key quality verification requirements	Maximum lot size	Minimum test frequency	Test method
	thickness		10 nuclear density tests per lot	Nuclear Density Meter

* Note: or part thereof, per lot.

Minimum Testing Frequencies For Asphalt Production

Quantity of asphalt in production lot	Minimum frequency of testing
Less than 100 tonnes	One per 50 tonnes or part thereof
101 to 300 tonnes	One per 100 tonnes or part thereof
301 to 600 tonnes	One per 150 tonnes or part thereof
Over 600 tonnes	One per 200 tonnes or part thereof

7.10 SUB-ANNEXURE C9

Placement of 1131 *Rolled concrete subbase*

Activity	Key quality verification requirements	Maximum lot size	Minimum test frequency	Test method
Concrete Supply	Refer Sub-Annexure C14: Ready-mixed concrete production and supply			
	Flyash	Contract	1 per contract	AS 3582.1
	Consistency (Index of compactibility)	1 day's production	1 per day's production per mix type	AS 1012.3.4
	Drying shrinkage	Contract	1 per contract per mix design	AS 1012.13
	Compressive strength of mix designs	Contract	3 per contract per mix design	AS 1012.9
Placement	Compressive strength (7 day and/or 28 day)	1 layer 2000 m² or 1 day's production	1 per 50 tonnes of each mix type	AS 1012.8.1 AS 1012.9
	Field density	1 layer 2000 m² or 1 day's production	3 per 1000 m² layer or 3 per lot if less	AS 1289.5.8.1
	Thickness and surface level	1 layer 2000 m² or 1 day's production	10 stations per 1000 m² or minimum of 4 for smaller lots	Survey
	Profile factor (straight edge tolerance)	1 layer 2000 m² or 1 day's production	10 stations per 1000 m² or minimum of 4 for smaller lots	3 m straight edge

7.11 SUB-ANNEXURE C10

Placement of 1132 *Mass concrete subbase*

Activity	Key quality verification requirements	Maximum lot size	Minimum test frequency	Test method
Concrete supply	Refer Sub-Annexure C14: Ready-mixed concrete Production and supply			
	Concrete/air temperature	50 m³	1 per 50 m³	Measure
	Air content	50 m³	1 per 50 m³	AS 1012.4.2
	Consistency—Slump	50 m³	1 per load	AS 1012.3.1
	Compressive strength (7 day)	50 m³	1 pair per 50 m³	AS 1012.1 AS 1012.8.1 AS 1012.9
	Compressive strength (28 day)	50 m³	1 pair per 50 m³	AS 1012.1 AS 1012.8.1

Activity	Key quality verification requirements	Maximum lot size	Minimum test frequency	Test method
				AS 1012.9
Placement	Thickness	50 m³	5 m grid on plan area	Survey and check with subgrade survey
	Geometry	50 m³	1 cross section per 15 m	Survey 3 m straight edge
Curing	Material quality—Supplier's documentary evidence and certification	1 contract	1 per production batch	AS 3799 AS 1160
	Application rate	1 day's work	1 per 1000 m²	
Joints	Geometry	50 m³	All joints	Survey

7.12 SUB-ANNEXURE C11

Placement of 1133 *Plain and reinforced concrete base*

Activity	Key quality verification requirements	Maximum lot size	Minimum test frequency	Test method
Concrete Supply	Refer Sub-Annexure C14: Ready-Mixed Concrete Production and Supply			
	Concrete/Air Temperature	50 m³	1 per 50 m³	Measure
	Air Content	50 m³	1 per 50 m³	AS 1012.4.2 Method 2
	Consistency - Slump	50 m³	1 per load	AS 1012.3.1
	Compressive Strength (7 day)	50 m³	1 pair per 50 m³	AS 1012.1 AS 1012.8.1 AS 1012.9
	Compressive Strength (28 day)	50m³	1 pair per 50 m³	AS 1012.1 AS 1012.8.1 AS 1012.9
Placement	Relative Compaction			
	—Machine placed	50 m³	1 per 50 m³*	AS 1012.14
	—Hand placed	Area between 2 consecutive const. joints or 50 m³ (whichever is the lesser)	2 per lot	AS 1012.14
	Thickness	50 m³	5 m grid on plan area	Survey
	Geometry	50 m³	1 cross section per 15 m	Survey and 3 m straight edge
Ride Quality	Profile factor	1000 m²	10/lane/lot	3 m straight edge
Surface Texture	Texture depth	1000 m²	2 per lot	Survey
Curing	Material quality - supplier's documentary evidence and certification	1 contract	1 per production batch	AS 3799 AS 1160
	Application rate	1 day's work	1 per 1000 m²*	
Joints	Sealant material quality supplier's documentary evidence and certification	1 contract	1 per prod'n batch	
	Geometry	50 m³	All joints	Survey

* Note: or part thereof, per lot.

7.13 SUB-ANNEXURE C12

Placement of 1134 *Steel fibre reinforced concrete base*

Activity	Key quality verification requirements	Maximum lot size	Minimum test frequency	Test method

Activity	Key quality verification requirements	Maximum lot size	Minimum test frequency	Test method
Concrete supply	Refer Sub-Annexure C14: Ready-mixed concrete production and supply			
	Concrete/air temperature	A production lot	As required by Superintendent	Measure
	Air content	1 contract	1 per contract	AS 1012.4.2 Method 2
	Consistency—Slump	50 m³	1 per load	AS 1012.3.1
	Compressive strength (7 day)	50 m³	1 pair per 50 m³	AS 1012.1 AS 1012.8.1 AS 1012.9
	Compressive strength (28 day)	50 m³	1 pair per 50 m³	AS 1012.1 AS 1012.8.1 AS 1012.9
	Drying shrinkage	1 day's production or 150 m³ (whichever is the lesser)	3 per lot	AS 1012.13
Placement	Relative compaction			
	—Machine placed	50 m³	1 per 50 m³	AS 1012.14
	—Hand placed	Area between 2 consecutive const. joints	2 per lot	AS 1012.14
	Thickness	50 m³	5 m grid on plan area	Survey
	Geometry	50 m³	1 cross section per 15 m	Survey 3 m straight edge
Ride Quality	Profile factor	50 m³	All lanes	3 m str. edge
Surface Texture	Texture depth	50 m³	2 per 50 m³	Survey
Curing	Material quality—Supplier's documentary evidence and certification	1 contract	1 per production batch	AS 3799 AS 1160
	Application Rate	1 day's work	1 per 1000 m²	
Joints	Material quality—Sealant supplier's documentary evidence and certification	1 contract	1 per production batch	
	Geometry	50 m³	All joints	Survey and 3 m straight edge
Steel Supply	Material quality—Supplier's documentary evidence and certification	1 Contract	1 per contract	AS/NZS 4671
	Steel reinforcement	1 Contract	1 per contract	AS/NZS 4671
	Steel fibre	1 Contract	1 per contract	ASTM A 820/820m

7.14 SUB-ANNEXURE C13

Placement of 1135 *Continuously reinforced concrete base*

Activity	Key quality verification requirements	Maximum lot size	Minimum test frequency	Test method
Steel supply	Material quality—Supplier's documentary evidence and certification	1 Contract	1 per contract	AS/NZS 4671
Concrete supply	Refer Sub-Annexure C14: Ready-mixed concrete production and supply			
	Concrete/air temperature	A production lot	As required by Superintendent	Measure
	Air content	1 Contract	1 per contract	AS 1012.4.2 Method 2

Activity	Key quality verification requirements	Maximum lot size	Minimum test frequency	Test method
	Consistency—Slump	50 m³	1 per load	AS 1012.3.1 AS 1012.3.3
	Compressive strength (7 day)	50 m³	1 pair per 50 m³	AS 1012.1 AS 1012.8.1 AS 1012.9
	Compressive strength (28 day)	50 m³	1 pair per 50 m³	AS 1012.1 AS 1012.8.1 AS 1012.9
	Drying shrinkage	1 day's production or 150 m³ (whichever is the lesser)	3 per lot	AS 1012.13
Placement	Relative compaction			
	—Machine placed	50 m³	1 per 50 m³	AS 1012.14
	—Hand placed	Area between 2 consecutive const. joints	2 per lot	AS 1012.14
	Thickness	50 m³	5 m grid on plan area	Survey
	Geometry	50 m³	1 cross section per 15 m	Survey 3 m Straight Edge
Ride quality	Profile factor	50 m³	All lanes	3 m Str.Edge
Surface texture	Texture depth	1 day's work	1 per 2000 m²	T240
Curing	Material quality—Supplier's documentary evidence and certification	1 contract	1 per production batch	AS 3799 AS 1160
	Application rate	1 day's work	1 per 1000 m²	
Joints	Material quality—Sealant supplier's documentary evidence and certification	1 contract	1 per production batch	
	Geometry	1 day's work	All joints	Survey & 3 m Straight edge

7.15 SUB-ANNEXURE C14

Ready-Mixed Concrete Production & Supply (Worksections: 0319 *Minor concrete works*, 1131 *Rolled concrete subbase*, 1132 *Mass concrete subbase,* 1133 *Plain and reinforced concrete base,* 1134 *Steel fibre reinforced concrete base,* 1135 *Continuously reinforced concrete base)*

Activity	Key quality verification requirements	Maximum lot size	Minimum test frequency	Test method
Raw materials supply	Material quality—Supplier's documentary evidence and certification of:			
	Cement	1 mth's prod'n	1 per week	AS 3972
	Flyash	1 mth's prod'n	1 per month	AS 3582.1
	Water	1 contract	1 per contract	AS 3583.13, AS 1289.4.2.1
	Admixtures	1 mth's prod'n	1 per month	AS 1478.1
	Fine aggregates			
	—Grading	1 wk's prod'n	1 per 200 m³ concrete*	AS 1141.11.1
	—Moisture content	N/A	1 per day	
	—Sulphate soundness	1 contract	1 per contract	AS 1141.24
	—Bulk density	1 contract	1 per contract	AS 2758.1
	—Unit mass (Particle density)	1 contract	1 per contract	AS 2758.1
	—Water absorption	1 contract	1 per contract	AS 2758.1
	—Material finer 2 μm	1 contract	1 per contract	AS 2758.1
	—Deleterious material (Impurities/reactive)	1 contract	1 per contract	AS 2758.1
	Coarse aggregates			

Activity	Key quality verification requirements	Maximum lot size	Minimum test frequency	Test method
	—Grading	1 wk's prod'n	1 per 200 m³ concrete*	AS 1141.11.1
	—Moisture content	N/A	1 per day	
	—Wet strength	1 contract	1 per contract	AS 1141.22
	—Wet/dry strength variation	1 contract	1 per contract	AS 1141.22
	—Sulphate soundness	1 contract	1 per contract	AS 1141.24
	—Particle shape	1 contract	1 per contract	AS 1141.14
	—Fractured faces	1 contract	1 per contract	AS 1141.18
	—Bulk density	1 contract	1 per contract	AS 2758.1
	—Unit mass (Particle density)	1 contract	1 per contract	AS 2758.1
	—Water absorption	1 contract	1 per contract	AS 2758.1
	—Material finer 75 µm	1 contract	1 per contract	AS 2758.1
	—Weak particles	1 contract	1 per contract	AS 2758.1
	—Light particles	1 contract	1 per contract	AS 2758.1
	—Deleterious materials (impurities/reactive)	1 contract	1 per contract	AS 2758.1
	—Iron unsoundness	1 contract	1 per contract	AS 2758.1
	—Falling/dusting unsoundness	1 contract	1 per contract	AS 2758.1
Mix design	Compressive strength	1 contract mix	1 per mix per contract	AS 1012.9
	Aggregate moisture content	1 contract mix	1 per mix per contract	
	Consistency—Slump	1 contract mix	1 per mix per contract	AS 1012.3.1
	Air content	1 contract mix	1 per mix per contract	AS 1012.4.2 Method 2
	Shrinkage	1 contract mix	1 per mix per contract	AS 1012.13

* Note: or part thereof, per lot.

7.16 SUB-ANNEXURE C15

1145 *Segmental paving*

Activity	Key quality verification requirements	Maximum lot size	Minimum test frequency	Test method
Materials supply	Material quality—Supplier's documentary evidence and certification of:			
	—Concrete segmental paving units	1 contract	1 per contract	
	—Clay segmental paving units	1 contract	1 per contract	
	—Bedding sand		1 per contract or	
	Grading	1 contract	change in material	AS 1141.11.1
	—Joint filling sand		1 per contract or	
	Grading	1 contract	change in material	AS 1141.11.1
Base	Geometry	One layer 5000 m², max 1 day's placement	One cross section per 25 m	Survey
	Surface quality	"	10 per 200 m² or lot	3 m Straight Edge
Edge restraints	Refer '*Minor concrete works'*	1 day's placement	1 per 10 lin m	Measure/ Survey
Laying paver units	Joint width	1 day's placement	All joints	Measure
	Geometry	1 day's placement	One cross section per 15 m	Survey

Activity	Key quality verification requirements	Maximum lot size	Minimum test frequency	Test method
	Surface quality	1 day's placement	10 per 200 m² or lot	3 m Straight Edge

7.17 SUB-ANNEXURE C16

1146 *Bituminous slurry surfacing*

Activity	Key quality verification requirements	Maximum lot size	Minimum test frequency	Test method
Materials supply	Material Quality—Supplier's documentary evidence and certification of:			
	—Bitumen (prior to emulsification)	1 contract	1 per contract or change in material	AS 2008
	—Bitumen Emulsion			
	Residual Binder Content (Residue from Evaporation)	1 contract	2 per bulk delivery	AS 1160, App.D
	—Mineral aggregates			
	Degradation factor	1 contract	1 per contract or 6 month period	AS 1141.25.3
	Los angeles value	1 contract	"	AS 1141.23
	Aggregate wet strength	1 contract	"	AS 1141.22
	Wet/dry strength variation	1 contract	"	AS 1141.22
	Polished aggregate friction value	1 contract	"	AS 1141.42
	Sand equivalent	1 contract	"	AS 1289.3.7.1
	—Mineral filler	1 month's prod'n	"	AS 2150
	—Combined aggregate grading	1 contract	"	AS 1141.11.1 AS 1141.12
Mix Design - Nominated Mix	Approval of mix and NATA certification —Supplier's documentary evidence and certification	1 contract	1 per mix	
Mix Properties	Wear loss	1 contract	1 per mix	ISSA TB 100
	Traffic time	1 contract	1 per mix	ISSA TB 139
	Adhesion	1 contract	1 per mix	ISSA TB 114 or ISSA TB 144
Production Mix	Grading	1 day's prod'n or 50 m³ (whichever is the lesser)	2 per 50 m³*	AS/NZS 2891.3.1
	Residual binder content		2 per 50 m³*	AS 1160
Laying	Levels	1 layer, max 200 m³	1 cross section per 15 m	Survey
	Surface quality	1 layer, max 200 m³	10 per 100 m* lane length	3 m Straight Edge

* Note: or part thereof, per lot.

7.18 SUB-ANNEXURE C17

1191 *Pavement markings*

Activity	Key quality verification requirements	Maximum lot size	Minimum test frequency	Test method
Materials supply	Material Quality—Supplier's documentary evidence and certification of:			
	—Paint	1 contract	1 per contract or	AS 4049.3

Activity	Key quality verification requirements	Maximum lot size	Minimum test frequency	Test method
			change in material	
	—Glass beads	1 contract	"	AS 2009
	—Thermoplastic material	1 contract	"	AS 4049.2
	—Raised pavement markers	1 contract	"	AS 1906.3
Paint application	Wet film thickness	1 contract	1 per site visit or change in pressure settings	AS/NZS 1580.107.3
	Application rate of glass beads	1 contract	1 per site visit or change in pressure settings	1191 *Pavement markings* Annexure A
Thermoplastic Application	Cold film thickness	1 contract	1 per site visit or change in pressure settings	Measure by micrometer
	Application rate of glass beads	1 contract	1 per site visit or change in pressure settings	1911 *Pavement markings* Annexure A

7.19 SUB-ANNEXURE C18

1192 *Signposting*

Activity	Key quality verification requirements	Maximum lot size	Minimum test frequency	Test method
Materials supply	Material quality—Supplier's documentary evidence and certification of:			
	—Sign blanks	1 contract	1 per contract, or change in material	AS 1743
	—Aluminium extrusion backing	1 contract	"	AS 1866
	—Retro-reflective material	1 contract	"	AS 1743
	—Non-reflective paint	1 contract	"	AS 2311
	—Non-reflective sheet material		"	
	—Steel sign support structures		"	
	—Grade	1 contract	"	AS 1627.9
	—Protective treatment	1 contract	"	AS 4680 and AS 1214
Concrete foundations	Refer 'Minor concrete works'			

7.20 SUB-ANNEXURE C19

0319 *Minor concrete works*

Activity	Key quality verification requirements	Maximum lot size	Minimum test frequency	Test method
Subgrade	Compaction	1000 lin m or 1000 m²	1 per 200 lin m or 200 m²	AS 1289.5.4.1
Gravel subbase construction	Compaction	1 day's placement	1 per 100 lin m or 100 m²	AS 1289.5.4.1
	Subbase geometry	1 day's placement	1 per 25 lin m	3 m straight edge
Steel supply	Material quality—Suppliers documentary evidence and certification	1 delivery	1 per production batch	
Concrete supply	Refer Sub-Annexure C14: Ready-mixed concrete production and supply			
	Consistency—Slump	15 m³	1 per load	AS 1012.3.1
	Compressive strength (7 and 28 day)	15 m³	2 pairs per 15 m³	AS 1012.1 AS 1012.8.1 AS 1012.9
Concrete	Finished Levels	15 m³	1 cross section	Survey and

Activity	Key quality verification requirements	Maximum lot size	Minimum test frequency	Test method
placement	Surface dimensions	Single fabrication	per 15 m As required to confirm design dimensions	3 m straight edge measure
Backfilling	Material quality —Maximum particle size —Plasticity index Compaction	1 contract/ material type 1 contract/ material type 1 day's work or max 200 m²	1 per 200 m³ or lot 1 per 200 m³ or lot 1 per 200 m² or lot	 AS 1289.3.3.1 AS 1289.5.4.1
Sprayed concrete	Test panels and cores Compressive strength cores Curing material quality—Supplier's documentary evidence and certification	1 contract 15 m³ 1 contract	3 test panels and 4 cores per mix design 2 per 15 m³ 1 per production batch	AS 1012.4.2 AS 1012.9 AS 1012.14 AS 1012.4.2 AS 1012.9 AS 1012.14

7.21 SUB-ANNEXURE C20

0257 *Landscape – roadways and street trees*

Activity	Key quality verification requirements	Maximum lot size	Minimum test frequency	Test method
Seed	Certification of authenticity for the prescribed mix	1 contract	Certification for each production batch delivered	
Imported topsoil	Material quality —pH —Organic content —Soluble salt content	 10,000 m² 10,000 m² 10,000 m²	 1 per 500 m³ * 1 per 500 m³ * 1 per 500 m³ *	AS 4419
Mulch for planting	Material quality	1 Contract	1 Contract	AS 4454

* Note: or part thereof, per lot.

7.22 SUB-ANNEXURE C21

0292 *Masonry walls*

Activity	Key quality verification requirements	Maximum lot size	Minimum test frequency	Test method
Alignment	Set out	Contract	25 m sections	Survey
Footing	Concrete slump	Contract	1 per load	AS 1012.3.1
	Concrete strength	Contract	1 per contract or 100 m³ (whichever is the lesser)	AS 1012.9
Concrete grout	Strength	Contract	As required by Superintendent	AS 1012.9
Backfilling	Drainage layer grading	Contract	1 per contract	AS 1141.11.1
Foundations and backfill	Compaction	Contract or 200 lineal metres (whichever is the lesser)	3 per 200 lineal metres	AS 1289.5.4.1

7.23 SUB-ANNEXURE C22

0293 *Crib retaining walls*

Activity	Key quality verification requirements	Maximum lot size	Minimum test frequency	Test method

Alignment	Set out	Contract	25 m sections	Survey
Footing	Concrete slump Concrete strength	Contract Contract	1 per load 1 per contract or 100 m³ (whichever is the lesser)	AS 1012.3.1 AS 1012.9
Backfilling	Quality and plasticity Drainage layer grading	Contract Concrete	1 per contract 1 per contract	AS 1289.3.3.1 AS 1141.11.1
Foundations and backfill	Compaction	Contract or 200 lineal metres (whichever is the lesser)	3 per 200 lineal metres	AS 1289.5.4.1

7.24 SUB-ANNEXURE C23

1341 *Water supply reticulation and pump stations*

Activity	Key quality verification requirements	Maximum lot size	Minimum test frequency	Test method
Materials Supply	Material quality—Supplier's documentary evidence and certification of:			
	—uPVC pipes	1 contract	1 per contract	AS 1477
	—Ductile iron pipes	1 contract	"	AS 2280 and AS 2129
	—Copper pipe	1 contract	"	AS 1432
	—Polyethylene pipe	1 contract	"	AS/NZS 4130
	—Stop valves material	1 contract	"	AS 2638 and AS 2129
	—Non return valves	1 contract	"	AS 4794
	—Spring hydrants	1 contract	1 per contract	AS 2544 or AS 3952
Siting and excavation	Geometry	1 line	1 per line	Survey
Bedding	Material quality —Grading	1 contract	1 per contract per source	AS/NZS 2032
Thrust and anchor blocks	Refer sub-annexure C13			
Concrete encasement	Refer sub-annexure C13			
Chamber covers and frames	Geometry	1 cover/frame	1 per cover/frame	survey
Testing of pipelines	Pressure testing	1 line	1 per line	As specified 1341 *Water – reticulation and pump stations* Clause 5.1
Backfill and compaction	Compaction	1 line	1 per 2 layers max 100 m²	AS 1289.5.7.1
Switchgear and controlgear assembly	Electrical function	each installation	1 factory test per installation	AS 3439
Commissioning of pumping station	Certification testing of electrical installation in accordance with relevant Australian Standards	1 installation	1 per installation	

7.25 SUB-ANNEXURE C24

1361 *Sewerage system reticulation and pump station*

Activity	Key quality verification requirements	Maximum lot size	Minimum test frequency	Test method
Materials Supply	Material quality—Supplier's documentary evidence and certification of:			
	—uPVC pipes	1 contract	1 per contract	AS/NZS 1477

Activity	Key quality verification requirements	Maximum lot size	Minimum test frequency	Test method
	—Ductile iron pipes	1 contract	"	AS/NZS 2280 and AS 2129
	—Vitrified clay pipes	1 contract	"	AS 1741
	—Precast access chambers	1 contract	"	AS 4198
Siting and excavation	Geometry	1 line/ structure	1 per line/ structure	Survey
Bedding	Material quality—Grading	1 contract	1 per contract per source	AS 1152
Concrete bedding	Refer Sub-Annexure C13			
Laying and jointing of pipes, access chambers, structures	Geometry	1 line	1 per line	Survey
Thrust and anchor blocks	Refer Sub-Annexure C13			
Concrete encasement	Refer Sub-Annexure C13			
Cast-in-situ access chambers	Material quality			
	—Tri-calcium aluminate content	1 contract	1 per contract per source	AS 3972
	—Fineness index	1 contract	"	AS 3972
	—Minimum cement content	1 contract	"	AS 3972
Acceptance test of gravitation mains & access chambers	—Compressed air testing	1 line	1 per line	As specified 1361 *Sewerage systems – reticulation and pump stations* Clauses 4.4 and 4.5
	—Hydrostatic testing	1 per test length Test length = 1370 m pipeline dia.(mm)	1 per line	1361 *Sewerage systems – reticulation and pump stations* Clause 4.6
Backfill and compaction	Compaction	1 line	1 per 2 layers max 100 m²	AS 1289.5.7.1
Switchgear and controlgear assembly	Electrical compliance	each installation	1 factory test per installation	AS 3439
Commissioning of pumping station	Certification testing of electrical installation in accordance with relevant Australian Standards	1 installation	1 per installation	

8 ANNEXURE D - NONCONFORMANCE REPORT

NONCONFORMANCE REPORT NCR No: ……..
EXAMPLE Date: …….
CONTRACT: ……..
PRODUCT OR SERVICE: ……
SUB-CONTRACTOR (if appropriate): ……
INSPECTION & TEST PLAN No: ……
LOT No AND DESCRIPTION/LOCATION: ……
……
……
DETAILS OF NONCONFORMANCE: ……
……
……
……
PROPOSED DISPOSITION: ……
……
……
……
IS A SUPPLEMENTARY REPORT ATTACHED?: YES □ NO □
CLIENT APPROVED □
COMMENT: ……
REJECTED □
COMMENT:……..….
……
CLIENT SIGNATURE: …….. DATE: ……

DISPOSITION COMPLETED (Contractor) …… DATE: ……

RELEASE OF HOLD POINT (Client) …… DATE: ……

CLOSE OUT OF NONCONFORMANCE REPORT:
CONTRACTOR QMR: …….. DATE: ……...