DEVELOPMENT CONSTRUCTION SPECIFICATION

CQS

QUALITY SYSTEM REQUIREMENTS

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
Original	*Northern Rivers - Local Government Version*	*All*	*Original Edition*	*LCC*	*January 1999*
1	Major Revision as per Aus-Spec Bulletin Board Release 10	All	AMO	SPM	April 2003
2	Revisions as per Aus-Spec Bulletin Board releases 11 & 12	All	AMO	SPM	April 2003

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CQS-C MAXIMUM LOT SIZES AND MINIMUM TEST FREQUENCIES

CQS-D NONCONFORMANCE REPORT FORM

SPECIFICATION CQS
QUALITY SYSTEM REQUIREMENTS

GENERAL

CQS1 SCOPE

1. This Specification covers the contractual requirements for the Quality System documentation and operation. Quality assurance systems shall apply to all projects valued in excess of five hundred thousand dollars. Quality management systems shall apply to all other projects.

CQS2 PREAMBLE

Standards

1. The Contractor shall establish, implement and maintain a Quality System or Quality Management System in accordance with this Specification.

Applicable to Work On and Off Site

2. The Quality System or Quality Management System shall be used throughout the course of the project to ensure that the quality of the Contractor's and any sub-contractor's work complies with the requirements of this Specification. This shall apply to all work involved with the project, both on site and off site.

Compliance with P.C.A.'s requirements

3. 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 the P.C.A.. Quality System or Quality Management System elements shall be used as an aid in achieving compliance with the P.C.A's requirements and documenting such compliance. In no way shall they relieve the Contractor of his responsibility to comply with this Specification.

CQS3 REFERENCE DOCUMENTS

Documents Standards Test Methods

1. Documents referenced in this specification are listed in full below whilst being cited in the text in the abbreviated form or code indicated.

HB 90.3	-	The Construction Industry – Guide to ISO 9001:2000.
AS ISO 10013	-	Quality manuals - Guide to preparation.
AS/NZS ISO 9000		Quality management systems – Fundamentals and vocabulary.
AS/NZS ISO 9001		Quality management systems - Requirements.
AS/NZS ISO 10013		Guidelines for developing quality manuals.

CQS4 DEFINITIONS

Synonym or Abbreviation

1. For the purpose of this Specification, the definitions as in AS/NZS 3905.2 and AS/NZS ISO 8402 and those below apply:

Corrective Action

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

Corrective Action

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)

Rectification

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.

HP

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.

ITP

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

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.

- Procedures
- Technical Procedures
- Process Descriptions
- Specific Procedures

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.

NCR

	Synonym or Abbreviation
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.	***NNC***
Performance Audit An examination to evaluate whether established methods and procedures are being adhered to in practice.	***- Process &*** ***- Technical Procedure &*** ***- Methods Audit***
Product Audit An assessment of the conformity of the product with the specified technical requirements.	***- Conformance &- Service Audit***
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.	***QA***
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.	***QAR***
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 Management Representative Appointed by the Contractor for a specific project with the authority and responsibility for the implementation and operation of the Quality Plan.	***QMR***
Quality Management System System based on the international Small Business Quality Management Code. This system is designed as a method of implementing quality management practices for small businesses who have no current requirements for ISO9000, or who do not have the resources to implement and maintain it.	***QMS***
Quality Manual A document setting out the general quality policies, procedures and practices of an	***QM***

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. ***QP***

Synonym or Abbreviation

Quality Register

The files containing all quality control records such as test results, completed check lists, certificates of compliance, consignment dockets for materials procured. ***QR***

Quality System Elements

The administrative activities affecting quality that need to be implemented and controlled to ensure that the product or a service meets specified quality requirements. ***- System Element***
- Quality Management Element

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.

Witness Point

A nominated position in the manufacture/construction stages of the project where the option of attendance may be exercised by the Superintendent, after notification of the requirement. ***WP***

CQS5 ABBREVIATIONS

1. Abbreviations used in this specification are:

CAR	-	Corrective Action Request
CQS	-	Contract Quality System
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)
QM	-	Quality Manual
QMR	-	Quality Management Representative (Contractor)
QP	-	Quality Plan
QR	-	Quality Register
SED	-	System Element Description
WP	-	Witness Point

QUALITY MANUAL AND QUALITY PLAN

CQS6 QUALITY MANUAL

1. The Company Quality Manual shall cover and include the requirements as specified in the Quality System Documentation section of AS/NZS 3905.2 with guidance to preparation by AS/NZS 3913 and AS/NZS ISO 10013.

2. It shall incorporate all applicable System Element Descriptions 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. ***SEDs***

CQS7 QUALITY PLAN

1. The Quality System shall be incorporated in the project Quality Plan. The Company Quality Manual with its System Element Descriptions, standard Method Statements and Check Lists and the project specific components make up the Quality Plan. This is illustrated conceptionally in Figure CQS1. ***Content of QP***

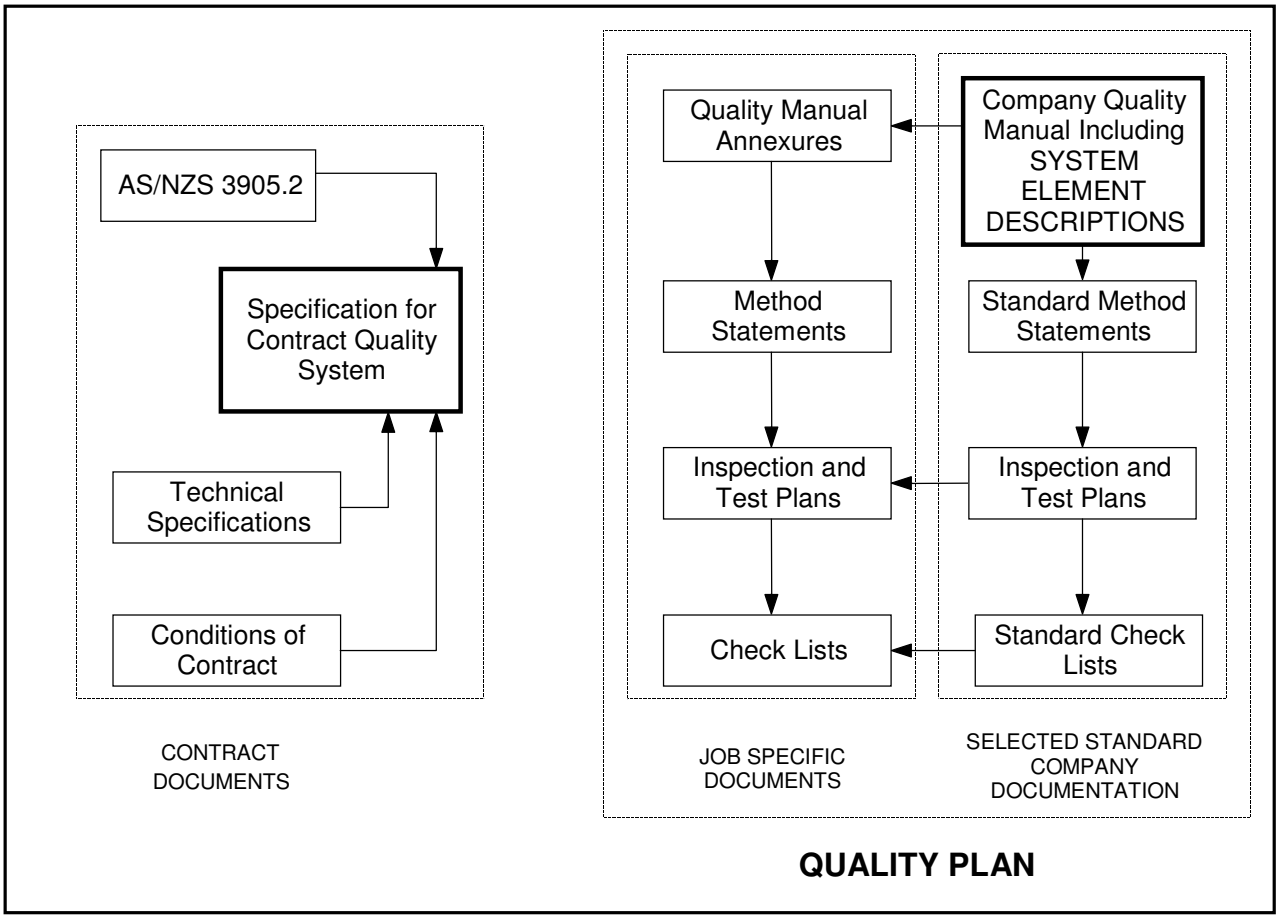

Figure CQS1 - Project Quality System Documentation

CQS8 ANNEXURES TO QUALITY MANUAL

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

CQS8.1 Organisation Structure

- The organisation structure for the management of the project with details of the specific responsibilities and authorities of the nominated key personnel. ***Structure***
- The Quality Management Representative (QMR) including this person's qualifications, technical experience and present position together with responsibilities and authorities to resolve quality matters. ***QMR***
- 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. ***Personnel***
- The person authorised to change construction processes on site. ***Authority for Changes***

CQS8.2 Addendums to System Element Descriptions

The System Element Descriptions in the Company Quality Manual shall be augmented with suitable addendums to satisfy the requirements of this Specification. ***Additional SEDs***

CQS8.3 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. ***Content***

JOB SPECIFIC REQUIREMENTS

CQS9 GENERAL

1. In the Quality Plan, the System Element Descriptions in the Company Quality Manual will need augmentation to cover the requirements of AS/NZS ISO 9002, AS/NZS 3905.2 and this Specification. This shall be provided in the form of suitable Annexures or where applicable included in the Method Statements or Inspection and Test Plans.

CQS10 METHOD STATEMENTS

Clause 4.9

1. Method Statements shall be provided for all activities scheduled in Annexure CQS-B. This requirement applies to both contract and subcontracted work. The documentation shall cover, as applicable, planning, methods, verification and control. ***Documentation***

2. 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. ***Presentation***

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

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

CQS11 DOCUMENT CONTROL

Clause 4.5

1. In addition to the requirements of AS/NZS ISO 9002 AS/NZS 3905.2, the Quality Plan shall specify the method of keeping Quality Registers, tracking and handling of NCRs and NNCs and site correspondence. ***Records***

2. A copy of AS/NZS 3905.2 and AS/NZS 9002 shall be kept on site if requested. ***AS on Site***

CQS12 MEASURING AND TESTING EQUIPMENT

Clause 4.11

1. 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. ***NATA Registration***

2. 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. ***Equipment Accuracy***

CQS13 PURCHASING

Clause 4.6

1. Except where the contract documents already stipulate another quality system standard for specific products or services, the quality assurance provisions detailed in this Specification shall apply to all subcontracted products or services which constitute work within the project. ***CQS to Cover All Work***

2. The Contractor shall ensure that the requirements of AS/NZS ISO 9002, AS/NZS 3905.2 and the requirements of this clause are included in all such subcontracts. ***Subcontracts***

CQS14 INSPECTION AND TEST PLANS

Clause 4.10

CQS14.1 Documentation

1. The Quality Plan shall include all inspections, tests and documentation necessary to ensure that the Works comply with this Specification. ***General Inclusions***

CQS14.2 Sampling and Testing

1. All compliance inspections and tests shall be based on lots. ***Lots***

2. 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. ***Random Sampling***

3. The maximum lot sizes and minimum testing frequencies are listed in the Annexures to the relevant Specifications and/or in Annexure CQS-C to this Specification. 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. ***Lot Sizes Frequency of Testing***

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

5. 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. ***Sampling and Testing***

6. In special circumstances the Council may appoint a laboratory that is not NATA registered for specific tests or inspection procedures that are not normally available in that area. ***Special Accreditation***

7. 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. ***Consecutive Numbering***

8. 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. ***Reinstatement***

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

CQS14.3 Hold Points

1. To assure compliance with the specified standards and requirements, mandatory ***Super-***

Hold Points shall apply. Hold Points are those stages during the construction/manufacturing process where the Technical Specifications require "approval by the Superintendent, P.C.A., Council" 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.

intendent's Approval to Proceed

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

Requirements for Approval to Proceed

- 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.

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

Witness Point

CQS14.4 Content

1. As a minimum, the Inspection and Test Plans shall contain the following information:

Information to be Provided

- item number/lot type reference(s)
- activity description
- specification requirements or where impractical: specification reference
- sampling method
- test method
- test frequency

2. Inspection and Test Plans will typically have an associated Check List which shall require completion for each particular lot.

Check List for Each Lot

CQS15 INSPECTIONS

1. 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

Clause 4.10.2

Lots the inspection status shall be cited.

2. In-process and compliance inspections shall be completed by a responsible officer nominated in the Check List and certified by the Contractor's QMR indicating that the work has been completed in accordance with this Specification. ***Clause 4.10.3***

3. 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. ***Clause 4.10.3***

4. The Contractor shall also establish and maintain a system for identifying the inspection status for all lots of work. ***Clause 4.10.4***

CQS16 IDENTIFICATION

Clause 4.8

CQS16.1 Lots

1. All items of work shall be divided into lots.

2. Lots shall be chosen by the Contractor but shall be within the limits given in Annexure CQS-C. In general, the size of the lot shall not exceed one day's output for each work process designated for lot testing. ***Lot Size***

3. Lot numbers shall be used as identifiers on all Quality System data. ***Lot Numbers***

4. 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 Identification***

CQS16.2 Lot Numbering

1. 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: ***Numbering System***

- the lot number shall be entered in the Quality Register which shall provide at least the following information:
  - three dimensional 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 (eg. 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 ***Non-conforming***

the original lot number. ***Lots***

CQS16.3 Lot Identification

1. 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. ***Field Identification***

2. 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. ***Lot Boundaries***

CQS17 TRACEABILITY ***Clause 4.8***

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

2. Traceability is required for concrete loads, asphalt loads and steel plate as follows: ***Materials for Traceability***

(a) 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 despatch time, testing details and location of placement.

(b) 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.

CQS18 SURVEYING CONTROL

1. Surveying Control shall be treated as a separate System Element and shall include all measurement, calculation and record procedures necessary to: ***Requirements***

(a) set out the Works

(b) verify conformance to the Drawings and Specification in relation to dimensions, tolerances and three dimensional position,

(c) determine lengths, areas or volumes of materials or products, where required for measurement of work.

2. The Method Statements for Surveying Control shall address the process control parameters in AS/NZS 3905.2 for special processes which cannot be fully verified by subsequent inspection and test. ***Clause 4.9***

3. The Principal shall appoint suitably qualified persons experienced in engineering surveying to supervise and take responsibility for all Surveying Control. ***Surveyor Qualifications***

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

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

6. 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. ***Conformance Report***

7. 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. ***Submission of Report***

8. 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. ***Quality Register***

CQS19 RECORDS

Clause 4.16

1. The Contractor shall keep and maintain all Quality System records as required by AS/NZS ISO 9002, AS/NZS 3905.2 and this Specification. They shall be systematically recorded, indexed and filed so as to be retreivable and accessible to the Superintendant or his appointed Qaulity Auditor on a job basis within one working day of requisition. ***Quality Register***

2. 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. ***Storage***

3. 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 P.C.A.. ***Copies of Records Contractor's Cost***

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

5. 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.). ***W.A.E.***

CQS20 NONCONFORMANCE

Clause 4.13

1. 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 ***NCR Within One Day***

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.

2. 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

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

Reworking

4. 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.

Authorisation to Proceed

5. With the exception of circumstances described in paragraph 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.

CARs

6. 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.

NNCs

7. 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 an NCR in accordance with this Clause.

Inspection and Rectification

8. 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 proceedure to resolve the discrepancy.

Standard Form

9. The Contractor shall utilise the standard form for use as an NCR. This form is included as Annexure CQS-D to this specification. All actions shall be signed off by authorised representatives of the Contractor and Superintendent as applicable.

Register of NCRs & NNCs

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

Disposition in 5 Days

11. 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.

Clause 4.13.2

CQS21 DISPOSITION OF NONCONFORMANCE

Proposed Disposition

1. 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:

(a) propose additional works to bring the lot up to the specified standard; or

(b) replace all or part of the lot to bring it up to the specified standard; or

(c) request utilisation of a lot for a reduced level of service if such a clause exists in the relevant Technical Specification; or

(d) for incidental defects, request that the Superintendent accept the lot without alteration as an exception with or without alteration to the respective unit rates.

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

CQS22 CORRECTIVE ACTION

Clause 4.14.2

1. 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.

QP Corrective Action

CQS23 STATISTICAL TECHNIQUES

Clause 4.20

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

Random Sampling

2. Annexure CQS-A defines the method to be used for determining test locations of random sampling in each lot.

Test Locations

3. Annexure CQS-C lists the maximum lot sizes and minimum test frequencies for the specified activities.

Lot Sizes and Test Frequencies

4. For compaction control of processes other than layers of earthworks, flexible pavement and asphalt, the sampling procedure will be proposed by the Contractor in his method statement and will require the approval of the Superintendent. In such cases the samples shall be each considered to be representative and all test results will be required to meet the appropriate tolerances for the lot.

Sampling Procedure for Compaction

CQS24 QUALITY AUDITS

Clause 4.17

1. 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 SAA QS5.

Audit Schedule

2. The Audit Reports shall be provided for the Superintendent.

Audit Reports

SPECIAL REQUIREMENTS

CQS25 RESERVED

CQS26 RESERVED

ANNEXURE CQS-A

RANDOM SAMPLING

CQS-A1 GENERAL

1. Random sampling of test locations shall be used to control relative compaction of each layer of:

   (i) earthworks
   (ii) selected material zone
   (iii) flexible pavement
   (iv) asphalt

which are generally rectangular in area.

CQS-A2 SAMPLING RATES

1. The number of samples (n) shall be as indicated in the specific Specification parts which are summarised in the Sub-Annexures to this Quality Requirements Specification.

CQS-A3 RANDOM SAMPLING LOCATIONS

1. Sampling locations within a lot for the control of relative compaction shall be determined as follows:

   (i) 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).
   (ii) Establish six grid lines within the lot, as illustrated in Figure CQS-A2;
   (iii) 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;
   (iv) Throw die to select a group (1-6) in Table CQS-A1;
   (v) Throw die twice to select two random numbers (between 1 and 6) for row and column in Table CQS-A1 and obtain random fraction R;
   (vi) Length co-ordinate for sample location in Sub-lot 1 = RL/n;
   (vii) 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.

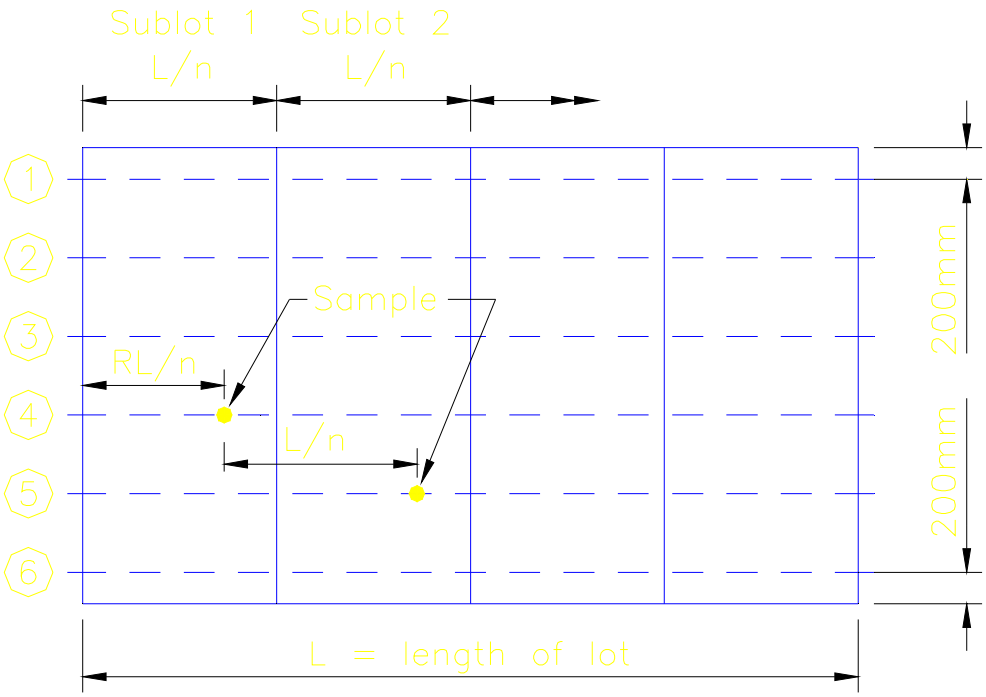

Figure CQS-A2 □ Sampling Locations for Rectangular Lot

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
	(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

Table CQS-A1 - Table of Random Fractions

ANNEXURE CQS-B
METHOD STATEMENT REQUIREMENTS

CQS-B1 GENERAL

1. 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.

2. Each Method Statement will be supported by a Check List 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.

3. 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.

4. 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 CQS-B1 - Construction Activities

Item	Enter * here if required	Activity	Specification Number
1		Control of Traffic	C201
2		Temporary Roadways and Detours	C201
3		Control of Erosion and Sedimentation	C211
4		Clearing and Grubbing	C212
5		Earthworks - Cut	C213
6		Earthworks - Unsuitable Material	C213
7		Earthworks - Embankment	C213
8		Compaction and Quality Control	C213
9		Siting, Excavation, Bedding, Backfilling and Compaction of Stormwater Drainage	C220
10		Installation of Pipe Drainage	C221
11		Installation of Precast Box Culverts	C222
12		Siting and Installation of Drainage Structures	C223
13		Construction of Lined Open Drains including Kerb and Gutter	C224

Item	Enter * here if required	Activity	Specification Number
14		Stabilisation of Pavement or Subgrade Materials	C241
15		Provision of Subsurface Drainage as subsoil drains, pavement drains or free draining layer	C230-C233
16		Construction of Flexible Pavement Layers	C242
17		Construction of Concrete Pavement Layers	C247-C248
18		Construction of Asphaltic Concrete Pavement Layers	C245
19		Sprayed Bituminous Surfacing	C244
20		Bituminous Microsurfacing	C255
21		Construction of Segmental Paving	C254
22		Pavement Marking	C261
23		Minor Concrete Works	C271
24		Landscaping	C273

Item	Enter * here if required	Activity	Specification Number

ANNEXURE CQS-C

MAXIMUM LOT SIZES AND MINIMUM TEST FREQUENCIES

GENERAL

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

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

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

Contents of Annexure CQS-C

Item	Sub-Annexure	Required (*) for this Contract	Reference Specification	Sub-Annexure Heading
1	C1		C213	Earthworks
2	C2		C220 C221 C222 C223 C224	Stormwater Drainage - Pipe Culverts, Box Culverts, Open Drains, Kerb & Gutter, Drainage Structures
3	C3		C230 C231 C232 C233	Subsurface Drainage
4	C4		C241	Stabilisation
5	C5		C242	Flexible Pavements
6	C6		C244	Sprayed Bituminous Surfacing
7	C7		C245	Asphaltic Concrete
8	C8		C247 C248	Ready Mixed Concrete Production and Supply
9	C9		C247	Mass Concrete Subbase

Item	Sub-Annexure	Required (*) for this Contract	Reference Specification	Sub-Annexure Heading
10	C10		C248	Plain or Reinforced Concrete Base
11	C11		C255	Bituminous Microsurfacing
12	C12		C254	Segmental Paving
13	C13		C271	Minor Concrete Works
14	C14		C261	Pavement Markings
15	C15		C262	Signposting
16	C16		C273	Landscaping
17	C17		C401	Water Reticulation
18	C18		C402	Sewerage System

Sub-Annexure C1

EARTHWORKS (Specification C213)

ACTIVITY	KEY QUALITY VERIFICATION REQUIREMENTS	MAXIMUM LOT SIZE	MINIMUM TEST FREQUENCY	TEST METHOD
Stripping Topsoil	Surface Levels	10,000m^2	1 Cross Section per 25m	Survey
Excavation	Geometry	10,000m^2	1 Cross Section per 25m	Survey
Floor of Cuttings	Material Quality - CBR	5,000m^2	1 per 1,000m^2 *	AS1289.6.1.1
	Compaction	10,000m^2	1 per 500m2	AS1289.5.4.1
Foundation for Embankments	Compaction	5,000m^2	1 per 500m2	AS1289.5.4.1
Embankments				
- General	Geometry	One layer 10,000m^2	1 Cross Section per 25m	Survey
	Material Quality - CBR	One layer 5,000m^2	1 per 800m^3	AS1289.6.1.1
	Compaction/Moisture Content	One layer 5,000m^2	1 per 250m^3	AS1289.5.1.1 AS1289.5.4.1 AS1289.5.7.1
Road Carriageway Embankments				
- Select Zone	Geometry	One layer 10,000m^2	1 Cross Section per 25m	Survey
	Material Quality			
	- Maximum Particle Size	10,000m^2	1 per 1,000m^3 *	AS1289.6.1.1
	- CBR	10,000m^2	1 per 500m^3 *	
	Compaction/Moisture Content	One layer 5,000m2	1 per 250m^3	AS1289.5.1.1, AS1289.5.4.1 AS1289.5.7.1

Fill Adjacent to Structures: Bridges, Retaining Walls and Cast-in-Situ Culverts	Material Quality			
	- Maximum Particle Size	1 Structure	1 per 200m^3 *	AS1289.3.3.1
	- Plasticity Index	1 Structure	1 per 200m^3 *	
	Compaction/Moisture Content	1 Structure	1 per layer	AS1289.5.1.1, AS1289.5.4.1 AS1289.5.7.1

* Note: or part thereof, per lot.

Sub-Annexure C2

STORMWATER DRAINAGE - PIPE CULVERTS, BOX CULVERTS, OPEN DRAINS INCLUDING KERB & GUTTER, DRAINAGE STRUCTURES

(Specifications C220, C221, C222, C223, C224)

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
Foundation	Compaction	1 drainage line/structure	1 per 20 lin m *	AS1289.5.4.1
Material surrounding Steel Structures	Material Quality - pH/Electrical Resistivity	1 drainage line/structure	1 per material	AS1289.4.3.1 AS1289.4.4.1
Bedding	Material Quality - Particle Size Distribution Compaction/Moisture Content	1 contract 1 drainage line/structure	1 per 200m^3 * 1 per layer, per 20 lin m	AS1141.11 AS1289.5.7.1, AS1289.5.4.1
Concrete Bedding or Lining	Geometry		1 Cross Section per 25m	Survey and 3m 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	1 per 100m^3 * 1 per 100m^3 * 1 per 2 layers	 AS1289.3.3.1 AS1289.5.7.1,

		line/structure	per 50m^2	AS1289.5.4.1
Rock Fill for Gabions/ Wire Mattresses	Material Quality:			
	- Wet Strength	1 contract	1 per contract	AS1141.22
	- Wet/Dry Strength Variation	1 contract	1 per contract	AS1141.22
Kerb and Gutter	Geometry		1 Cross Section per 25m	Survey and 3m Straight Edge

* Note: or part thereof, per lot.

Sub-Annexure C3

SUBSURFACE DRAINAGE (Specifications C230, C231, C232, C233)

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	AS1141.11
	- Coefficient of Permeability	1 contract/size	1 per type	AS1289.E5.1
	(Type B)			ASTM-D2434-68
	- Grading Variation after	1 contract/size	1 per type	AS1141.11
	Treatment (Type B)			
	- Wet Strength (Type C, D)	1 contract/size	1 per type	AS1141.22
	- 10% Fines Wet/Dry	1 contract/size	1 per type	AS1141.22
	(Type C, D)			
	Geotextile	1 contract	1 per type	
Excavation -	Line and Grade	1 drainage line	1 per drainage	Survey
Trench Base			line	
	Compaction	1 drainage line	1 per 200 lin m*	AS1289.5.4.1
Bedding and Backfill				
- Filter Material	Compaction	1 drainage line	1 per drainage line	AS1289.5.4.1
- Selected Backfill	Compaction	1 drainage line	1 per 200 lin m*	AS1289.5.4.1
- Earth Backfill	Compaction	1 drainage line	1 per 200 lin m*	AS1289.5.4.1
Drainage Mat	Geometry	2000m^2	1 Cross Section per 25m	Survey

* Note: or part thereof, per lot

Sub-Annexure C4

STABILISATION (Specification C241)

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	AS3972
	- Quicklime			
	□ Available Lime (CaO content)	1 contract	1 per 100t	AS3583.12
	□ Slaking Rate	1 contract	1 per 100t	T432
	□ Particle Size Dist'n	1 contract	1 per contract	AS1141.11
	- Hydrated Lime			
	□ Available Lime ($CaOH_2$)	1 contract	1 per 100t	AS3583.12
	□ Residue on Sieving	1 contract	1 per contract	AS3583.14
	- Ground Blast Furnace Slag	1 contract	1 per month	AS3583.2
	- Flyash	1 contract	1 per month	AS3583.1
	- Blended Stabilising Agent	1 contract	1 per month	
	- Water			
	Chloride ion content	1 contract	1 per contract	AS3583.13
	Sulphate ion content	1 contract	1 per contract	AS1289.4.2.1
	Undissolved solids	1 contract	1 per contract	
Mix Design	NATA certification - Supplier's documentary evidence and certification	1 mix	1 per mix	
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 400t	AS1289.6.1.1
In-Situ Spreading	Spread rate	1 layer 1,000m^2	1 per lot or 1 per 500m^2	
Trimming and	Geometry	1 layer 2,000m^2, max 1 day's	One cross	Survey

Compaction		placement	section per 25m	
	Surface Quality	"	10 per 200m lane length *	3m Straight Edge
	Average Layer thickness	"	1 per lot	
	Average Width	"	1 per lot	Measure/Survey
	Relative Compaction/Moisture Content	"	3 per lot	AS1289.5.7.1 AS1289.5.8.1

* Note: or part thereof, per lot.

Sub-Annexure C5

FLEXIBLE PAVEMENTS (Specification C242)

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	AS1289.3.6.1
	- Fine Particle Size Distribution Ratio		1 per 1,000t	AS1289.3.6.3
	- Liquid Limit		1 per 1,000t	AS1289.3.1.1
	- Plastic Limit		1 per 1,000t	AS1289.3.3.1
	- Plasticity Index		1 per 1,000t	AS1289.3.3.1
	- Maximum Dry Compressive Strength		1 per 5,000t	T114
	- Particle Shape		1 per 1,000t	AS1141.14
	- Aggregate Wet Strength		1 per 5,000t	AS1141.22
	- Wet/Dry Strength Variation		1 per 5,000t	AS1141.22
	- 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 2,000m^2 or	1 Cross Section per 15m	Survey
	Width & Surface Trim	max 1 day's placement	10 per selected 200 lin m*	Measure & 3m Straight Edge
	Deflection Control - Benkelman Beam	One layer	4 per 1,000m^2 minimum 10 per	T160

		5,000m^2 or max 1 day's placement	lot	
	Compaction/Moisture Content/	One layer 5,000m^2 or	10 per 2,000m^2 layer or	AS1289.5.2.1, T130, AS1289.5.4.1
	Dry Density Testing	max 1 day's placement	3 per lot if less	AS1289.5.8.1

* Note: or part thereof, per lot.

Sub-Annexure C6

SPRAYED BITUMINOUS SURFACING (Specification C244)

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	
	- Refinery Cutback Bitumen	1 tanker load	1 per tanker load	
	- Polymer Modified Binder	1 tanker load	1 per tanker load	
	- Bitumen Adhesion Agent	1 delivery	1 per delivery	
	- Cutback Oils	1 delivery/ tanker	1 per delivery/tanker	
	- Aggregate Precoating Agent	1 delivery/ tanker	1 per delivery/tanker	
	- Aggregate	1 contract	1 per 400m3	AS2758.2
Application Rates	Binder	1 day's operation	Calculate per spray run	
	Aggregate	1 day's operation	Calculate per spray run	

† One per Contract or change in material

* Note: or part thereof, per lot

Sub-Annexure C7

ASPHALTIC CONCRETE (Specification C245)

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			AS2758.5
	□ Grading	1 wk's prod'n	1 per day	AS1141.11
	□ Moisture Content	1 wk's prod'n	1 per day	AS1289.2.1.1
	□ Wet Strength	1 contract	)	AS1141.22
	□ Wet/Dry Strength Variation	1 contract	) 1 per	AS1141.22
	□ Particle Shape	1 contract	) contract	AS1141.14
	□ Fractured Faces	1 contract	) or change in	AS1141.18
	□ Polishing Agg Friction Value	1 contract	) material	AS1141.42
	- Mineral Filler	1 contract or 1 month's production	contract or 1 per month's production	AS2154
	- Bitumen Binder	1 refinery batching	1 per tanker load	AS2008
	- 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	AS1141.11

ACTIVITY	KEY QUALITY VERIFICATION REQUIREMENTS	MAXIMUM LOT SIZE	MINIMUM TEST FREQUENCY	TEST METHOD
	- Bitumen Emulsion	1 contract	1 per contract or change in material	AS1160
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	C245.7 from Spec C245 Asphaltic Concrete as included as separate table below. Additionally, max lot size one 12 hr shift's production.	1 per truck load	Measure
	Moisture Content			AS2891.10
	Grading			AS2891.3.3
	Binder Content			AS2891.1.1
	Resistance to Stripping	1 production mix	1 per mix per 5000t 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 25m	Survey
	Shape	1 day's laying	10 per 200m* lane length	3m Straight Edge
	Relative Compaction/Layer Thickness	1 day's laying	6 cores per lot 10 nuclear density tests per lot	AS2891.9.3 or Nuclear Density Meter

* Note: or part thereof, per lot

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

Table C245.7 Minimum Testing Frequencies for Asphalt Production

Sub-Annexure C8

READY-MIXED CONCRETE PRODUCTION & SUPPLY

(Specifications C247, C248)

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	AS3583.13, AS1289.4.2.1
	Admixtures	1 mth's prod'n	1 per month	AS 1478
	Fine Aggregates (C248 only)			
	- Grading	1 wk's prod'n	1 per 200m^3 concrete*	AS1141.11
	- Moisture Content	N/A	1 per day	
	- Sulphate Soundness	1 contract	1 per contract	AS1141.24
	- 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□m	1 contract	1 per contract	AS 2758.1
	- Deleterious Material (Impurities/Reactive)	1 contract	1 per contract	AS 2758.1
	- Combined Aggregates (C247 and C248)			
	- Grading	1 wk's prod'n	1 per 200m^3 concrete*	AS1141.11
	- Moisture Content	1 wk's prod'n	1 per day	
	- Wet Strength	1 contract	1 per contract	AS1141.22
	- Wet/Dry Strength Variations	1 contract	1 per contract	AS1141.22
	- Sulphate Soundness	1 contract	1 per contract	AS1141.24
	- Particle Shape	1 contract	1 per contract	AS1141.14

ACTIVITY	KEY QUALITY VERIFICATION REQUIREMENTS	MAXIMUM LOT SIZE	MINIMUM TEST FREQUENCY	TEST METHOD
	- Fractured Faces	1 contract	1 per contract	AS1141.18
	- 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□m	1 contract	1 per contract	AS 2758.1
Raw Materials Supply (Cont'd)	- 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	AS1012.9
	Aggregate Moisture Content	1 contract mix	1 per mix per contract	
	Consistency - Slump	1 contract mix	1 per mix per contract	AS1012.3.1
	Air Content	1 contract mix	1 per mix per contract	AS1012.4 Method 2
	Shrinkage	1 contract mix	1 per mix per contract	AS1012.13

* Note: or part thereof, per lot

Sub-Annexure C9

MASS CONCRETE SUBBASE (Specification C247)

ACTIVITY	KEY QUALITY VERIFICATION REQUIREMENTS	MAXIMUM LOT SIZE	MINIMUM TEST FREQUENCY	TEST METHOD
Concrete Supply	Refer Sub-Annexure C8: Ready-Mixed Concrete Production and Supply			
	Concrete/Air Temperature	50m^3	1 per 50m^3	Measure
	Air Content	50m^3	1 per 50m^3	AS1012.4 Method 2
	Consistency - Slump	50m^3	1 per load	AS1012.3.1
	Compressive Strength (7 day)	50m^3	1 pair per 50m^3	AS1012.1 AS1012.8 AS1012.9
	Compressive Strength (28 day)	50m^3	1 pair per 50m^3	AS1012.1 AS1012.8 AS1012.9
Placement	Thickness	50m^3	5m grid on plan area	Survey and check with subgrade survey
	Geometry	50m^3	1 cross section per 15m	Survey and 3m Straight Edge
Curing	Material Quality - Supplier's documentary evidence and certification	1 contract	1 per production batch	AS3799 AS1160
	Application Rate	1 day's work	1 per 1000m^{2*}	
Joints	Geometry	50m^3	All joints	Survey

* Note: or part thereof, per lot

Sub-Annexure C10

PLAIN OR REINFORCED CONCRETE BASE (Specification C248)

ACTIVITY	KEY QUALITY VERIFICATION REQUIREMENTS	MAXIMUM LOT SIZE	MINIMUM TEST FREQUENCY	TEST METHOD
Concrete Supply	Refer Sub-Annexure C8: Ready-Mixed Concrete Production and Supply			
	Concrete/Air Temperature	$50m^3$	1 per $50m^3$	Measure
	Air Content	$50m^3$	1 per $50m^3$	AS1012.4 Method 2
	Consistency - Slump	$50m^3$	1 per load	AS1012.3.1
	Compressive Strength (7 day)	$50m^3$	1 pair per $50m^3$	AS1012.1 AS1012.8 AS1012.9
	Compressive Strength (28 day)	$50m^3$	1 pair per $50m^3$	AS1012.1 AS1012.8 AS1012.9
Placement	Relative Compaction			
	- Machine Placed	$50m^3$	1 per $50m^3$*	AS1012.14
	- Hand Placed	Area between 2 consecutive const. joints or $50m^3$ (whichever is the lesser)	2 per lot	AS1012.14
	Thickness	$50m^3$	5m grid on plan area	Survey
	Geometry	$50m^3$	1 cross section per 15m	Survey and 3m Straight Edge
Ride Quality	Profile Factor	$1000m^2$	10/lane/lot	3m Straight Edge
Surface Texture	Texture Depth	$1000m^2$	2 per lot	
Curing	Material Quality - Supplier's documentary evidence and	1 contract	1 per production	AS3799

	certification Application Rate	 1 day's work	batch 1 per 1000m^{2}*	AS1160
Joints	Sealant Material Quality Supplier's documentary evidence and certification Geometry	1 contract 50m^{3}	1 per prod'n batch All joints	 Survey

* Note: or part thereof, per lot

Sub-Annexure C11

BITUMINOUS MICROSURFACING (Specification C255)

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	AS2008
	- Bitumen Emulsion			
	□ Residual Binder Content (Residue from Evaporation)	1 contract	2 per bulk delivery	AS1160, App.D
	- Mineral Aggregates			
	□ Degradation Factor	1 contract	1 per contract or 6 month period	AS1141.25
	□ Los Angeles Value	1 contract	"	AS1141.23
	□ Aggregate Wet Strength	1 contract	"	AS1141.22
	□ Wet/Dry Strength Variation	1 contract	"	AS1141.22
	□ Polished Aggregate Friction Value	1 contract	"	AS1141.42
	□ Sand Equivalent	1 contract	"	AS1289.3.7.1
	- Mineral Filler	1 month's prod'n	"	AS2357
	- Combined Aggregate Grading	1 contract	"	AS1141.11, AS1141.12
Mix Design - Nominated Mix	Approval of mix and NATA certification - Supplier's documentary evidence and certification	1 contract	1 per mix	
Production Mix	Grading	1 day's prod'n or $50m^3$ (whichever is	2 per $50m^3$*	AS2891.3.1
	Residual Binder Content		2 per $50m^3$*	AS2891.3.1

		the lesser)		
Laying	Levels	1 layer, max 200m^3	1 cross section per 15m	Survey
	Surface Quality	1 layer, max 200m^3	10 per 100m* lane length	3m Straight Edge

* Note: or part thereof, per lot

Sub-Annexure C12

SEGMENTAL PAVING (Specification C254)

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 change in material	
	□ Grading	1 contract		AS1141.11
	- Joint Filling Sand		1 per contract or change in material	
	□ Grading	1 contract		AS1141.11
Base	Geometry	One layer 5000m^2, max 1 day's placement	One cross section per 25m	Survey
	Surface Quality	"	10 per 200m^2 or lot	3m 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 15m	Survey
	Surface Quality	1 day's placement	10 per 200m^2 or lot	3m Straight Edge

* Note: or part thereof, per lot

Sub-Annexure C13

MINOR CONCRETE WORKS (Specification C271)

ACTIVITY	KEY QUALITY VERIFICATION REQUIREMENTS	MAXIMUM LOT SIZE	MINIMUM TEST FREQUENCY	TEST METHOD
Subgrade	Compaction	1000 lin m or 1000m^2	1 per 200 lin m or 200m^2	AS1289.5.4.1
Gravel Subbase Construction	Compaction	1 day's placement	1 per 100 lin m or 100m^2	AS1289.5.4.1
	Subbase Geometry	1 day's placement	1 per 25 lin m	3m Straight Edge
Steel Supply	Material Quality - Suppliers documentary evidence and certification	1 delivery	1 per production batch	
Ready-Mixed Concrete Supply	Material Quality - Suppliers documentary evidence and certification	1 contract	1 per mix type	
	Consistency - Slump	15m^3	1 per load	AS1012.3 Method 1
	Compressive Strength (7 and 28 day)	15m^3	2 pairs per 15m^3	AS1012.1, AS1012.8, AS1012.9
Concrete Placement	Finished Levels	15m^3	1 cross section per 15m	Survey and 3m Straight Edge
Backfilling	Material Quality			
	- Maximum particle size	1 contract/ material type	1 per 200m^3 or lot	
	- Plasticity Index	1 contract/ material type	1 per 200m^3 or lot	AS1289.3.3.1
	Compaction	1 day's work or max 200m^2	1 per 200m^2 or lot	AS1289.5.4.1
Sprayed Concrete	Test Panels and Cores	1 contract	3 test panels and 4 cores per mix design	AS1012.4, AS1012.9 AS1012.14

ACTIVITY	KEY QUALITY VERIFICATION REQUIREMENTS	MAXIMUM LOT SIZE	MINIMUM TEST FREQUENCY	TEST METHOD
	Compressive Strength Cores	$15m^3$	2 per $15m^3$	AS1012.4, AS1012.9 AS1012.14
	Curing Material Quality - Supplier's documentary evidence and certification	1 contract	1 per production batch	

* Note: or part thereof, per lot

Sub-Annexure C14

PAVEMENT MARKINGS (Specification C261)

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 change in material	
	- Glass Beads	1 contract	"	
	- Thermoplastic Material	1 contract	"	
	- Raised Pavement Markers	1 contract	"	
Paint Application	Wet Film Thickness	1 contract	1 per site visit or change in pressure settings	AS 1580.107.3
	Application Rate of Glass Beads	1 contract	1 per site visit or change in pressure settings	Annexure C261A
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	Annexure C261A

Sub-Annexure C15

SIGNPOSTING (Specification C262)

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	
	- Aluminium Extrusion Backing	1 contract	"	
	- Retro-reflective Material	1 contract	"	
	- Non-reflective Paint	1 contract	"	
	- Non-reflective Sheet Material	1 contract	"	
	- Steel Sign Support Structures	1 contract	"	
Concrete Foundations	Refer 'Minor Concrete Works'			

Sub-Annexure C16

LANDSCAPING (Specification C273)

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			AS4419
	- pH	10,000m^2	1 per 500m^3	
	- Organic Content	10,000m^2	1 per 500m^3	
	- Soluble Salt Content	10,000m^2	1 per 500m^3	
Mulch for Planting	Material Quality	1 contract	1 contract	AS4454

Sub-Annexure C17

WATER RETICULATION (Specification C401)

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	AS2977
	- Ductile Iron Pipes	1 contract	"	AS2280 and AS2129
	- Copper Pipe	1 contract	"	AS1432
	- Polyethylene Pipe	1 contract	"	AS1159
	- Stop Valves Material	1 contract	"	AS2638 and AS2129
	- Non Return Valves	1 contract	"	AS3578
	- Spring Hydrants	1 contract	1 per contract	AS2544 or AS3952
Siting and Excavation	Geometry	1 line	1 per line	Survey
Bedding	Material Quality			
	- Grading	1 contract	1 per contract per source	AS2032
Thrust and Anchor Blocks	Refer Annexure C13			
Concrete Encasement	Refer 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 C401.28
Backfill and Compaction	Compaction	1 line	1 per 2 layers max 100m^2	AS1289.5.7.1
Switchgear and Controlgear Assembly	Electrical function	each installation	1 factory test per installation	AS3439

ACTIVITY	KEY QUALITY VERIFICATION REQUIREMENTS	MAXIMUM LOT SIZE	MINIMUM TEST FREQUENCY	TEST METHOD
Commissioning of Pumping Station	Certification testing of electrical installation in accordance with relevant Australian Standards	1 installation	1 per installation	

Sub-Annexure C18

SEWERAGE SYSTEM (Specification C402)

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	AS1477
	- Ductile Iron Pipes	1 contract	"	AS2280 and AS2129
	- Vitrified Clay Pipes	1 contract	"	AS1741
	- Precast Access Chambers	1 contract	"	AS4198
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 Annexure C13			
Laying and Jointing of Pipes, Access Chambers, Structures	Geometry	1 line	1 per line	Survey
Thrust and Anchor Blocks	Refer Annexure C13			
Concrete Encasement	Refer Annexure C13			
Cast-in-situ Access Chambers	Material Quality			
	- Tri-Calcium Aluminate Content	1 contract	1 per contract per source	AS3972
	- Fineness Index	1 contract	"	AS3972
	- Minimum Cement Content	1 contract	"	AS3972
Acceptance Test of Gravitation Mains and Access Chambers	- Compressed Air Testing	1 line	1 per line	As specified C402.36 C402.37
	- Hydrostatic Testing	1 per test length Test length = 1370m	1 per line	As specified C402.38

ACTIVITY	KEY QUALITY VERIFICATION REQUIREMENTS	MAXIMUM LOT SIZE	MINIMUM TEST FREQUENCY	TEST METHOD
		pipeline dia.(mm)		
Backfill and Compaction	Compaction	1 line	1 per 2 layers max 100m^2	AS1289.5.7.1
Switchgear and Controlgear Assembly	Electrical Compliance	each installation	1 factory test per installation	AS3439
Commissioning of Pumping Station	Certification testing of electrical installation in accordance with relevant Australian Standards	1 installation	1 per installation	

ANNEXURE CQS-D - CONTRACT QUALITY YSTEM REQUIREMENTS

NONCONFORMANCE REPORT NCR No: .....

EXAMPLE Date: .....

CONTRACT:.... ....

PRODUCT OR SERVICE:..... ....

SUB-CONTRACTOR (if appropriate): ....

INSPECTION & TEST PLAN No: ....

LOT No & DESCRIPTION/LOCATION:.....

.....

DETAILS OF NONCONFORMANCE: .....

.....

.....

.....

PROPOSED DISPOSITION: .....

.....

.....

.....

IS A SUPPLEMENTARY REPORT ATTACHED: YES □ ..... NO □

CLIENT APPROVED □ COMMENT:.....

.....

REJECTED □ .....

CLIENT SIGNATURE:.. ....DATE: .....

DISPOSITION COMPLETED (CONTRACTOR)..... ....DATE: .....

RELEASE OF HOLD POINT (CLIENT).... ....DATE: :.....

CLOSE OUT OF NONCONFORMANCE REPORT:

CONTRACTOR QMR:.. ....DATE: E:.....