DEVELOPMENT CONSTRUCTION SPECIFICATION

CQC

QUALITY CONTROL 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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ANNEXURES

SPECIFICATION CQC
QUALITY CONTROL REQUIREMENTS

GENERAL

CQC1 SCOPE

1. This Specification covers the requirements for the quality control testing and survey for a project, including the minimum test frequencies to be employed to demonstrate conformance to the requirements of the technical specifications. ***Testing and Survey***

CQC2 LOTS

1. All items of work shall be divided into lots. Each lot shall be given a unique lot number.

2. Lots shall be chosen by the Superintendent but shall be within the limits given in Annexure CQC-B. 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. The lot numbers shall be used as identifiers on all surveys and test results. ***Lot Numbers***

4. The Superintendent shall determine the bounds of each lot before sampling and shall identify each lot clearly. ***Lot Identification***

5. The boundaries of a lot may be changed if subsequent events cause the original lot to be no longer essentially homogeneous. ***Lot Boundaries***

6. The lot identification system and sample numbering system shall allow test results to be positively identified with material incorporated in the works. ***Test Results***

CQC3 SAMPLING AND TESTING

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

2. The maximum lot sizes and minimum testing frequencies are listed in the Annexures to the relevant Specifications and/or in Annexure CQC-B to this Specification. Where no minimum frequency of testing, or maximum lot size is stated in the Specification, the Contractor shall nominate appropriate frequencies for the Superintendent's approval. ***Lot Sizes Frequency of Testing***

3. 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. ***Sampling Locations***

4. 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 ***Sampling and Testing***

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.

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

6. 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***

7. 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 CQC-A defines the method to be used for determining test locations of random sampling in each lot. ***Random Sampling***

8. 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. ***Sampling Locations***

9. 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. ***All Test Results to Meet Tolerances***

CQC4 SURVEYING

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

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

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

5. The Contractor shall submit a Survey Conformance Report to the Superintendent 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***

CQC5 RECORDS

1. 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

2. The Contractor shall submit all conformance records to the Superintendent for inspection and approval. 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

ANNEXURE CQC-A
RANDOM SAMPLING

CQC-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
   (v)
   (vi)
   (vii)

which are generally rectangular in area.

CQC-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".

CQC-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 CQC-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 CQC-A1;

   (v) Throw die twice to select two random numbers (between 1 and 6) for row and column in Table CQC-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.

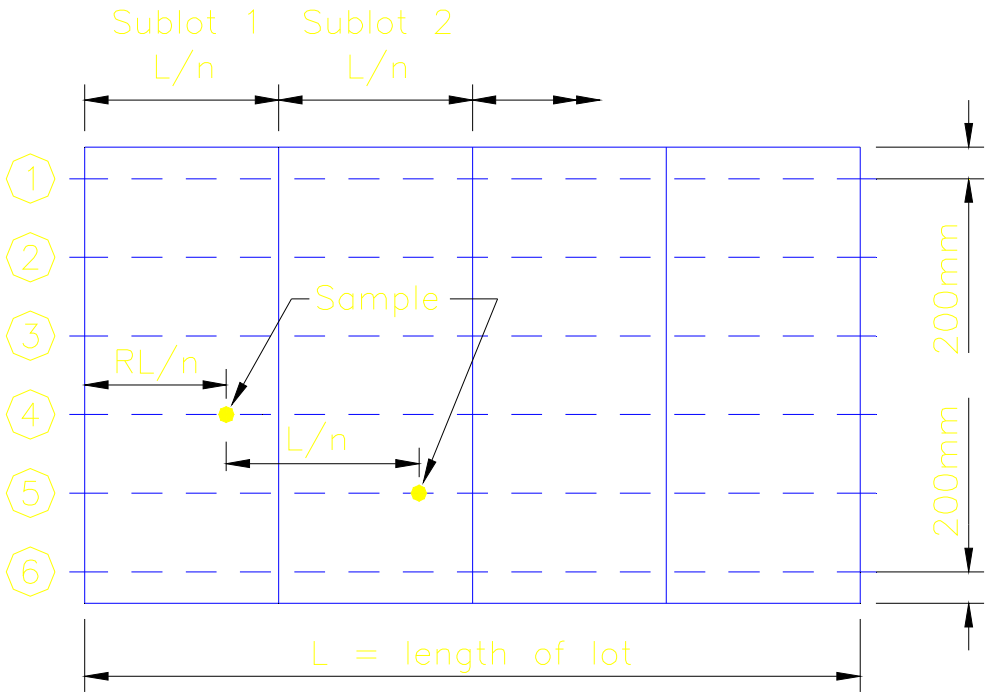

Figure CQC-A2 — Sampling Locations for Rectangular Lot

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 CQC-A1 - Table of Random Fractions

ANNEXURE CQC-B
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 CQC-B

Item	Sub-Annexure	Required (*) for this Contract	Reference Specification	Sub-Annexure Heading
1	B1		C213	Earthworks
2	B2		C220 C221 C222 C223 C224	Stormwater Drainage - Pipe Culverts, Box Culverts, Open Drains, Kerb & Gutter, Drainage Structures
3	B3		C230 C231 C232 C233	Subsurface Drainage
4	B4		C241	Stabilisation
5	B5		C242	Flexible Pavements
6	B6		C244	Sprayed Bituminous Surfacing
7	B7		C245	Asphaltic Concrete
8	B8		C247 C248	Ready Mixed Concrete Production and Supply
9	B9		C247	Mass Concrete Subbase
10	B10		C248	Plain or Reinforced Concrete Base

Item	Sub-Annexure	Required (*) for this Contract	Reference Specification	Sub-Annexure Heading
11	B11		C255	Bituminous Microsurfacing
12	B12		C254	Segmental Paving
13	B13		C271	Minor Concrete Works
14	B14		C261	Pavement Markings
15	B15		C262	Signposting
16	B16		C273	Landscaping
17	B17		C401	Water Reticulation
18	B18		C402	Sewerage System

Sub-Annexure B1

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 Compaction	5,000m^2 10,000m^2	1 per 1,000m^2 * 1 per 500m2	AS1289.6.1.1 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

Road Carriageway Embankments - Select Zone	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
	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 B2

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	1 contract	1 per $100m^3$ *	
	- Plasticity Index	1 contract	1 per $100m^3$ *	AS1289.3.3.1
	Compaction/Moisture Content	1 drainage line/structure	1 per 2 layers per $50m^2$	AS1289.5.7.1, 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 B3

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 (Type B)	1 contract/size	1 per type	AS1289.E5.1 ASTM-D2434-68
	- Grading Variation after Treatment (Type B)	1 contract/size	1 per type	AS1141.11
	- Wet Strength (Type C, D)	1 contract/size	1 per type	AS1141.22
	- 10% Fines Wet/Dry (Type C, D)	1 contract/size	1 per type	AS1141.22
	Geotextile	1 contract	1 per type	
Excavation - Trench Base	Line and Grade	1 drainage line	1 per drainage line	Survey
	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 B4

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 Compaction	Geometry	1 layer 2,000m^2, max 1 day's placement	One cross section per 25m	Survey

	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 B5

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 Distribu-tion 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 5,000m^2 or max 1 day's placement	4 per 1,000m^2 minimum 10 per lot	T160
	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 B6

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 B7

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) material	AS1141.18
	· Polishing Agg Friction Value	1 contract		AS1141.42
	- Mineral Filler	1 contract or 1 month's production	contract or 1 per month's production	AS2357
	- Bitumen Binder	1 refinery batching	1 per tanker load	AS2008

ACTIVITY	KEY QUALITY VERIFICATION REQUIREMENTS	MAXIMUM LOT SIZE	MINIMUM TEST FREQUENCY	TEST METHOD
	- Polymer Modified Bitumen	1 production batch by supplier	1 per tanker load	MBT 21
	· Elasticity Recovery at 60°C			MBT 21
	· Viscosity on ER at 60°C			MBT 22
	· Torsional Recovery at 25°C			MBT 11
	· Viscosity at 180°C			
	- 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
	- 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	

ACTIVITY	KEY QUALITY VERIFICATION REQUIREMENTS	MAXIMUM LOT SIZE	MINIMUM TEST FREQUENCY	TEST METHOD
Production Mix	Temperature		1 per truck load	Measure
	Moisture Content	Refer Table C245.7 from Spec C245 Asphaltic Concrete as included as separate table below. Additionally, max lot size one 12 hr shift's production.		AS2891.10
	Grading			AS2891.3.3
	Binder Content			AS2891.3.1
	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 B8

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 2µm	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

ACTIVITY	KEY QUALITY VERIFICATION REQUIREMENTS	MAXIMUM LOT SIZE	MINIMUM TEST FREQUENCY	TEST METHOD
	- 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
	- 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 75µm	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 B9

MASS CONCRETE SUBBASE (Specification C247)

ACTIVITY	KEY QUALITY VERIFICATION REQUIREMENTS	MAXIMUM LOT SIZE	MINIMUM TEST FREQUENCY	TEST METHOD
Concrete Supply	Refer Sub-Annexure B8: 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 B10

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 B8: 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 certification	1 contract	1 per production batch	AS3799 AS1160
	Application Rate	1 day's work	1 per 1000m^2*	
Joints	Sealant Material Quality Supplier's documentary evidence and certification	1 contract	1 per prod'n batch	
	Geometry	50m^3	All joints	Survey

* Note: or part thereof, per lot

Sub-Annexure B11

BITUMINOUS MICROSURFACING (Specification C255)

ACTIVITY	KEY QUALITY VERIFICATION REQUIRMENTS	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 Residual Binder Content	1 day's prod'n or 50m^3 (whichever is the lesser)	2 per 50m^3* 2 per 50m^3*	AS2891.3.1 AS2891.3.1
Laying	Levels Surface Quality	1 layer, max 200m^3 1 layer, max 200m^3	1 cross section per 15m 10 per 100m* lane length	Survey 3m Straight Edge

* Note: or part thereof, per lot

Sub-Annexure B12

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 B13

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 B14

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 B15

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 B16

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 B17

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	1 contract	"	AS2638 and AS2129
	Material			
	- 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	1 line	1 per 2 layers	AS1289.5.7.1

ACTIVITY	KEY QUALITY VERIFICATION REQUIREMENTS	MAXIMUM LOT SIZE	MINIMUM TEST FREQUENCY	TEST METHOD
Compaction			max 100m^2	
Switchgear and Controlgear Assembly	Electrical function	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	

Sub-Annexure B18

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	AS1152
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 =	1 per line	As specified C402.38

ACTIVITY	KEY QUALITY VERIFICATION REQUIREMENTS	MAXIMUM LOT SIZE	MINIMUM TEST FREQUENCY	TEST METHOD
		1370m 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	