WESTERN AUSTRALIA

SPECIFICATION

QC

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
EXAMPLE 1	*Provision for acceptance of nonconformance with deduction in Payment*	*XYZ.00*	*AP*	*KP*	*2/6/97*

SPECIFICATION QC
QUALITY CONTROL REQUIREMENTS

CLAUSE CONTENTS PAGE

SPECIFICATION QC
QUALITY CONTROL REQUIREMENTS

GENERAL

QC1 SCOPE

1. This Specification covers the contractual requirements for the quality control testing and survey by the Contractor; including the minimum test frequencies to be employed to demonstrate conformance to the requirements of the technical specifications.

Testing and Survey

QC2 LOTS

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

2. Lots shall be chosen by the Contractor but shall be within the limits given in Annexure QC-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 Contractor 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

QC3 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 QC-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 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

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

QC4 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 Contractor shall appoint qualified surveyors who are eligible for membership of the Institution of Surveyors, Australia or the Institution of Engineering and Mining Surveyors, Australia to supervise and take responsibility for all Surveying Control. ***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 and shall be certified by the qualified surveyor responsible for the verification survey. ***Conformance Report***

QC5 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 Principal.

Copies of Records Contractor's Cost

MEASUREMENT AND PAYMENT

QC6 PAY ITEMS

1. Payment shall be made for all activities associated with testing, survey and supplier's documentation required to demonstrate conformance to the specification requirements.

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

Pay Item QCP1 QUALITY VERIFICATION AND CONTROL

1. The Lump Sum for this item shall include all costs for inspections, conformance surveys and testing required to verify that all aspects of the work under the Contract comply with the quality requirements of the Contract, including the ongoing compilation of quality records.

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

ANNEXURE QC-A
RANDOM SAMPLING

QC-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.

QC-A2 SAMPLING RATES

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

QC-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 QC-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 QC-A1;

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

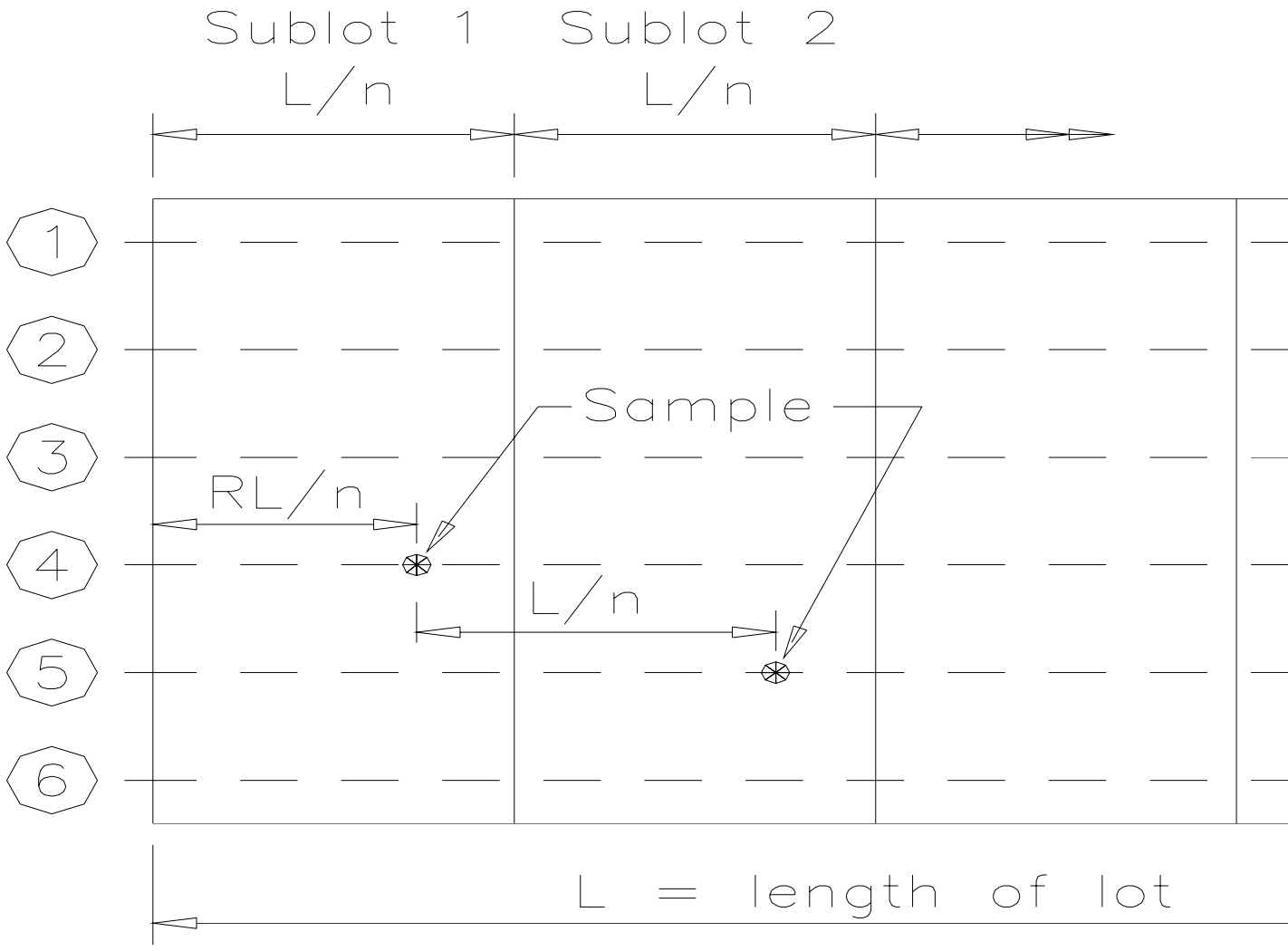

Figure QC-A2 — Sampling Locations for Rectangular Lot

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 QC-A1 - Table of Random Fractions

ANNEXURE QC-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 QC-B

Item	Sub-Annexure	Required (*) for this Contract	Reference Specification	Sub-Annexure Heading
1	B1		213	Earthworks
2	B2		220 221 222 223 224 229	Stormwater Drainage - Pipe Drainage, Precast Box Culverts, Drainage Structures, Open Drains, Kerb Replacement
3	B3		230 231 232 233	Subsurface Drainage - Subsoil and Foundation Drains, Pavement Drains, Drainage Mats
4	B4		241	Stabilisation
5	B5		242	Flexible Pavements
6	B6		243	Bituminous Cold Mix
7	B7		244	Sprayed Bituminous Surfacing
8	B8		245	Asphaltic Concrete
9	B9		246	Rolled Concrete Subbase
10	B10		247	Mass Concrete Subbase
11	B11		248	Plain or Reinforced Concrete Base
12	B12		249	Steel Fibre Reinforced Concrete Base
13	B13		250	Continuously Reinforced Concrete Base
14	B14		246, 247, 248 249, 250, 271	Ready Mixed Concrete Production and Supply
15	B15		254	Segmental Paving
16	B16		255	Bituminous Microsurfacing

Item	Sub-Annexure	Required (*) for this Contract	Reference Specification	Sub-Annexure Heading
17	B17		261	Pavement Markings
18	B18		262	Signposting
19	B19		271	Minor Concrete Works
20	B20		273	Landscaping
21	B21		274	Masonry Walls
22	B22		276	Crib Retaining Walls

Sub-Annexure B1
EARTHWORKS (Specification 213)

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 *	AS 1289.6.1.1
	Compaction	10,000m^2	1 per 500m^2	AS 1289.5.4.1
Blasting	Ground Vibration/Noise Control	1 day's blasting	Continuous monitoring	
Foundation for Embankments	Compaction	5,000m^2	1 per 500m^2	AS 1289.5.4.1
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	AS 1289.6.1.1
	Compaction/Moisture Content	One layer 5,000m^2	1 per 250m^3	AS 1289.5.1.1 AS 1289.5.4.1 AS 1289.5.7.1
Embankments - Select Zone	Geometry	One layer 10,000m^2	1 Cross Section per 25m	Survey
	Material Quality			
	- Particle Size Distribution	10,000m^2	1 per 1,000m^3 *	
	- CBR	10,000m^2	1 per 500m^3 *	AS 1289.6.1.1
	Compaction/Moisture Content	One layer 5,000m^2	1 per 250m^3 *	AS 1289.5.1.1 AS 1289.5.4.1 AS 1289.5.7.1
Fill Adjacent to Bridges, Wingwalls, Retaining Walls and Culverts	Material Quality			
	- Particle Size Distribution	1 Structure	1 per 200m^3 *	
	- Plasticity Index	1 Structure	1 per 200m^3 *	AS 1289.3.3.1
	Compaction/Moisture Content	1 Structure	1 per layer	AS 1289.5.1.1 AS 1289.5.4.1 AS 1289.5.7.1

* Note: or part thereof, per lot

Sub-Annexure B2
STORMWATER DRAINAGE - PIPE DRAINAGE, PRECAST BOX CULVERTS, DRAINAGE STRUCTURES, OPEN DRAINS, KERB REPLACEMENT
(Specifications 220, 221, 222, 223, 224, 229)

ACTIVITY	KEY QUALITY VERIFICATION REQUIREMENTS	MAXIMUM LOT SIZE	MINIMUM TEST FREQUENCY	TEST METHOD
Supply of Precast Units	Precast Quality - Suppliers documentary evidence and certification	1 batch	1 per type/size/ class per batch	
Siting and Excavation	Geometry	1 drainage line/structure	1 per drainage line/structure	Survey
Excavation by Blasting	Peak Particle Velocity	1 drainage line/structure	1 per drainage line/structure	Measure
Foundation	Compaction	1 drainage line/structure	1 per 20 lin m *	AS 1289.5.4.1
Material surrounding Steel Structures	Material Quality - pH/Electrical Resistivity	1 drainage line/structure	1 per material	AS 1289.4.3.1 AS 1289.4.4.1
Bedding	Material Quality			
	- Particle Size Distribution	1 contract	1 per 200m^3 *	AS 1141.11
	Compaction/Moisture Content	1 drainage line/structure	1 per layer, per 30 lin m	AS 1289.5.4.1 AS 1289.5.7.1
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 *	AS 1289.3.3.1
	Compaction/Moisture Content	1 drainage line/structure	1per 2 layers per 50m^2	AS 1289.5.4.1 AS 1289.5.7.1
Rock Fill for Gabions/ Wire Mattresses	Material Quality:			
	- Wet Strength	1 contract	1 per contract	AS 1141.22
	- Wet/Dry Strength Variation	1 contract	1 per contract	AS 1141.22

* Note: or part thereof, per lot

Sub-Annexure B3
SUBSURFACE DRAINAGE - SUBSOIL AND FOUNDATION DRAINS, PAVEMENT DRAINS, DRAINAGE MATS
(Specifications 230, 231, 232, 233)

ACTIVITY	KEY QUALITY VERIFICATION REQUIREMENTS	MAXIMUM LOT SIZE	MINIMUM TEST FREQUENCY	TEST METHOD
Material Supply	Material Quality - Supplier's documentary evidence and certification of:			
	Pipe	1 contract/size	1 per type/size	
	Filter Material			
	- Grading (Type A, B, C, D)	1 contract/size	1 per type	AS 1141.11
	- Coefficient of Permeability (Type B)	1 contract/size	1 per type	AS 1289.E5.1 ASTM-D2434-68
	- Grading Variation after Treatment (Type B)	1 contract/size	1 per type	AS 1141.11
	- Wet Strength (Type C, D)	1 contract/size	1 per type	AS 1141.22
	- 10% Fines Wet/Dry (Type C, D)	1 contract/size	1 per type	AS 1141.22
	Geotextile	1 contract	1 per type	
Excavation - Trench Base	Line and Grade	1 drainage line	1 per 200 lin m	Survey
	Compaction	1 drainage line	1 per 200 lin m*	AS 1289.5.4.1
Bedding and Backfill				
- Filter Material	Compaction	1 drainage line	1 per drainage line	AS 1289.5.4.1
- Selected Backfill	Compaction	1 drainage line	1 per 200lin m*	AS 1289.5.4.1
- Earth Backfill	Compaction	1 drainage line	1 per 200lin m*	AS 1289.5.4.1
Drainage Mat	Geometry	2000m^2	1 Cross Section per 25m	Survey

* Note: or part thereof, per lot

Sub-Annexure B4
STABILISATION (Specification 241)

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 100t	AS1289.6.1.1
In-Situ Spreading	Spread rate	1 layer 1,000m^2	1 per 500m^2	
	Verification requirements mix uniformity	1000m^2	1 per 500	Visual
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 242)

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 week's supply		
	- Particle Size Distribution		1 per 1,000t	AS 1289.3.6..1
	- Fine Particle Size Distribution Ratio		1 per 1,000t	AS 1289.3.6.3
	- Liquid Limit		1 per 1,000t	AS 1289.3.1.1
	- Plastic Limit		1 per 1,000t	AS 1289.3.3.1
	- Plasticity Index		1 per 1,000t	AS 1289.3.3.1
	- Maximum Dry Compressive Strength		1 per 5,000t	WA 140.1
	- Particle Shape		1 per 1,000t	AS 1141.14
	- Aggregate Wet Strength		1 per 5,000t	AS 1141.22
	- Wet/Dry Strength Variation		1 per 5,000t	AS 1141.22
	- 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 max 1 day's placement	1 Cross Section per 15m	Survey
	Width & Surface Trim		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	WA326.1
	Compaction/Moisture Content / Dry Density Testing	One layer 5,000m^2 max 1 day's placement	10 per 5,000m^2 layer or 3 per lot if less	WA133.1/133.2 AS 1289.5.2.1 AS 1289.5.4.1 AS 1289.5.8.1

Sub-Annexure B6
BITUMINOUS COLD MIX (Specification 243)

ACTIVITY	KEY QUALITY VERIFICATION REQUIREMENTS	MAXIMUM LOT SIZE	MINIMUM TEST FREQUENCY	TEST METHOD
Materials Supply	Material Quality - Supplier's documentary evidence and certification of:			
	- Coarse Aggregates	1 contract or		AS 2758.5
	· Grading	1 mth's prod'n	1 per month	AS 1141.11
	· Wet Strength	1 contract	1 per contract or	AS 1141.22
	· Wet/dry Strength	"	change in	AS 1141.15
	· Flakiness Index	"	material	AS 1141.18
	· Fractured Faces	"		
	- Fine Aggregates	1 contract or		
	· Grading	1 mth's prod'n	1 per month	AS 1141.11
	- Mineral Filler	1 contract or 1 mth's prod'n	1 per month	AS2357
	- Class 170 or 320 Bitumen	1 contract or 1 mth's prod'n	1 per month	AS 2008
	Cutback Bitumen	1 delivery / tanker	1 per delivery tanker	AS 2157
	Flux Oil and Cutter Oil	1 delivery / tanker	1 per delivery tanker	AS 3568
Mix Design	Approval of mix and NATA documentation. Supplier's documentary evidence and certification.	1 mix per contract (less than 12 months old)	1 per mix	Approval
Production Mix	Grading Binder	Each production lot or 1 day's production (whichever is the lesser)	1 per contract or as requested by Superintendent (sampling by production lot)	AS 2891.3.1 AS 2891.3.1

Sub-Annexure B7
SPRAYED BITUMINOUS SURFACING (Specification 244)

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 400m^3	AS 2758.2
Application Rates	Binder	1 day's operation	Calculate per spray run	
	Aggregate	1 day's operation	Calculate per spray run	

* Note: or part thereof, per lot

Sub-Annexure B8
ASPHALTIC CONCRETE (Specification 245)

ACTIVITY	KEY QUALITY VERIFICATION REQUIREMENTS	MAXIMUM LOT SIZE	MINIMUM TEST FREQUENCY	TEST METHOD
	Sub-Annexure B8 will be included with the converted WA IMEA Asphaltic Concrete Specification into AUS-SPEC format.			

QUALITY CONTROL REQUIREMENTS

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

Sub-Annexure B9
ROLLED CONCRETE SUB-BASE (Specification 246)

ACTIVITY	KEY QUALITY VERIFICATION REQUIREMENTS	MAXIMUM LOT SIZE	MINIMUM TEST FREQUENCY	TEST METHOD
Concrete Supply	Refer Sub-Annexure B14: Ready-Mixed Concrete Production and Supply			
	Flyash	Contract	1 per contract	AS 3582.1
	Consistency (Index of Compactibility)	1 day's production	1 per day's production per mix type	AS 1012.3.4
	Drying Shrinkage	Contract	1 per contract per mix design	AS 1012.13
	Compressive Strength of Mix Designs	Contract	3 per contract per mix design	AS 1012.9
Placement	Compressive Strength (7 day and/or 28 day)	1 layer 2000m^2 or 1 day's production	1 per 50 tonnes of each mix type	AS 1012.8 AS 1012.9
	Field Density	1 layer 2000m^2 or 1 day's production	3 per 1000m^2 layer or 3 per lot if less	AS 1289.5.8.1
	Thickness and Surface Level	1 layer 2000m^2 or 1 day's production	10 stations per 1000m^2 or minimum of 4 for smaller lots	Survey
	Profile Factor (straight edge tolerance)	1 layer 2000m^2 or 1 day's production	10 stations per 1000m^2 or minimum of 4 for smaller lots	3m Straight edge

Sub-Annexure B10
PLACEMENT OF MASS CONCRETE SUB-BASE (Specification 247)

ACTIVITY	KEY QUALITY VERIFICATION REQUIREMENTS	MAXIMUM LOT SIZE	MINIMUM TEST FREQUENCY	TEST METHOD
Concrete Supply	Refer Sub-Annexure B14: 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 AS1021.8 AS1012.9
	Compressive Strength (28 day)	50m^3	1 pair per 50m^3	AS1012.1 AS1021.8 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 3m Straight Edge
Curing	Material Quality - Supplier's documentary evidence and certification	1 contract	1 per production batch	AS 3799 AS 1160
	Application Rate	1 day's work	1 per 1000m^2	
Joints	Geometry	50m^3	All joints	Survey

Sub-Annexure B11
PLACEMENT OF PLAIN CONCRETE BASE (Specification 248)

ACTIVITY	KEY QUALITY VERIFICATION REQUIREMENTS	MAXIMUM LOT SIZE	MINIMUM TEST FREQUENCY	TEST METHOD
Concrete Supply	Refer Sub-Annexure B14: 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	Survey
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 B12
STEEL FIBRE REINFORCED CONCRETE BASE (Specification 249)

ACTIVITY	KEY QUALITY VERIFICATION REQUIREMENTS	MAXIMUM LOT SIZE	MINIMUM TEST FREQUENCY	TEST METHOD
Concrete Supply	Refer Sub-Annexure B14: Ready-Mixed Concrete Production and Supply			
	Concrete/Air Temperature	A production lot	As required by Superintendent	Measure
	Air Content	1 contract	1 per contract	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
	Drying Shrinkage	1 day's production or 150m^3 (whichever is the lesser)	3 per lot	AS 1012.13
Placement	Relative Compaction			
	- Machine Placed	50m^3	1 per 50m^3	AS1012.14
	- Hand Placed	Area between 2 consecutive const. joints	2 per lot	AS1012.14
	Thickness	50m^3	5m grid on plan area	Survey
	Geometry	50m^3	1 cross section per 15m	Survey 3m Straight Edge
Ride Quality	Profile Factor	50m^3	All lanes	3m Straight Edge
Surface Texture	Texture Depth	50m^3	2 per 50m^3	Survey
Curing	Material Quality - Supplier's documentary evidence and certification	1 contract	1 per production batch	AS 3799 AS 1160
	Application Rate	1 day's work	1 per 1000m^2	
Joints	Material Quality - Sealant Supplier's documentary evidence and certification	1 contract	1 per production batch	
	Geometry	50m^3	All joints	Survey and 3m straight edge
Steel Supply	Material Quality - Supplier's documentary evidence and certification	1 Contract	1 per contract	AS 1302 AS 1303 AS 1304
	Steel Reinforcement	1 Contract	1 per contract	AS 1302 AS 1303

ACTIVITY	KEY QUALITY VERIFICATION REQUIREMENTS	MAXIMUM LOT SIZE	MINIMUM TEST FREQUENCY	TEST METHOD
	Steel Fibre	1 Contract	1 per contract	AS 1304 ASTM A 820

Sub-Annexure B13
PLACEMENT OF CONTINUOUSLY REINFORCED CONCRETE BASE (Specification 250)

ACTIVITY	KEY QUALITY VERIFICATION REQUIREMENTS	MAXIMUM LOT SIZE	MINIMUM TEST FREQUENCY	TEST METHOD
Steel Supply	Material Quality - Supplier's documentary evidence and certification	1 contract	1 per contract	AS 1302 AS 1303 AS 1304
Concrete Supply	Refer Sub-Annexure B14: Ready-Mixed Concrete Production and Supply			
	Concrete/Air Temperature	A production lot	As required by Superintendent	Measure
	Air Content	1 contract	1 per contract	AS1012.4 Method 2
	Consistency - Slump	50m^3	1 per load	AS1012.3.1 AS1012.3.3
	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
	Drying Shrinkage	1 day's production or 150m^3 (whichever is the lesser)	3 per lot	AS1012.13
Placement	Relative Compaction			
	- Machine Placed	50m^3	1 per 50m^3	AS1012.14
	- Hand Placed	Area between 2 consecutive const. joints	2 per lot	AS1012.14
	Thickness	50m^3	5m grid on plan area	Survey
	Geometry	50m^3	1 cross section per 15m	Survey 3m Straight Edge
Ride Quality	Profile Factor	50m^3	All lanes	3m Straight Edge
Surface Texture	Texture Depth	1 day's work	1 per 2000m^2	T240
Curing	Material Quality - Supplier's documentary evidence and certification	1 contract	1 per production batch	AS 3799 AS1160
	Application Rate	1 day's work	1 per 1000m^2	
Joints	Material Quality - Sealant Supplier's documentary evidence and certification	1 contract	1 per production batch	
	Geometry	1 day's work	All joints	Survey and 3m Straight Edge

Sub-Annexure B14
READY-MIXED CONCRETE PRODUCTION & SUPPLY
(Specifications 246, 247, 248, 249, 250, 271)

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	AS3972
	Flyash	1 mth's prod'n	1 per month	AS3582.1
	Water	1 contract	1 per contract	AS 3583.13, AS1289.4.2.1
	Admixtures	1 mth's prod'n	1 per month	AS 1478
	Fine Aggregates			
	- 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
	Coarse Aggregates			
	- Grading	1 wk's prod'n	1 per 200m^3 concrete*	AS1141.11
	- Moisture Content	N/A	1 per day	
	- Wet Strength	1 contract	1 per contract	AS1141.22
	- Wet/Dry strength variation	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	AS 1141.18
	- Bulk Density	1 contract	1 per contract	AS 2758.1
	- Unit Mass (Particle density)	1 contract	1 per contract	AS 2758.1
	- Water Absorption	1 contract	1 per contract	AS 2758.1
	- Material Finer 75μm	1 contract	1 per contract	AS 2758.1
	- Weak Particles	1 contract	1 per contract	AS 2758.1
	- Light Particles	1 contract	1 per contract	AS 2758.1
	- Deleterious Materials	1 contract	1 per contract	AS 2758.1

ACTIVITY	KEY QUALITY VERIFICATION REQUIREMENTS	MAXIMUM LOT SIZE	MINIMUM TEST FREQUENCY	TEST METHOD
	(Impurities/Reactive)			
	- 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	AS 1012.4 Method 2
	Shrinkage	1 contract mix	1 per mix per contract	AS 1012.13

* Note: or part thereof, per lot

Sub-Annexure B15
SEGMENTAL PAVING (Specification 254)

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 · Grading	1 contract	1 per contract or change in material	AS1141.11
	- Joint Filling Sand · Grading	1 contract	1 per contract or change in material	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

Sub-Annexure B16
BITUMINOUS MICROSURFACING (Specification 255)

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	
Mix Properties	Wear Loss	1 contract	1 per mix	ISSA TB 100
	Traffic Time	1 contract	1 per mix	ISSA TB 139
	Adhesion	1 contract	1 per mix	ISSA TB 114 or ISSA TB 144
Production Mix	Grading	1 day's prod'n or 50m^3 (whichever is the lesser)	2 per 50m^3*	AS2891.3.1
	Residual Binder Content		2 per 50m^3*	AS2891.3.1
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 B17
PAVEMENT MARKINGS (Specification 261)

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 261A
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 261A

Sub-Annexure B18
SIGNPOSTING (Specification 262)

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 B19
MINOR CONCRETE WORKS (Specification 271)

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	AS 1289.5.4.1
Gravel Subbase Construction	Compaction	1 day's placement	1 per 100 lin m or 100m^2	AS 1289.5.4.1
	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	
Concrete Supply	Refer Sub-Annexure B14: Ready-Mixed Concrete Production and Supply			
	Consistency - Slump	15m^3	1 per load	AS 1012.3.1
	Compressive Strength (7 and 28 day)	15m^3	2 pairs per 15m3	AS 1012.1 AS 1012.8 AS 1012.9
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	AS 1289.5.4.1
Sprayed Concrete	Test Panels and Cores	1 contract	3 test panels and 4 cores per mix design	AS1012.4, AS1012.9 AS1012.14
	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	

Sub-Annexure B20
LANDSCAPING (Specification 273)

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			AS 4419
	- 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	AS 4454

* Note: or part thereof, per lot.

Sub-Annexure B21
MASONRY WALLS (Specification 274)

ACTIVITY	KEY QUALITY VERIFICATION REQUIREMENTS	MAXIMUM LOT SIZE	MINIMUM TEST FREQUENCY	TEST METHOD
Alignment	Set Out	Contract	25m sections	Survey
Footing	Concrete Slump	Contract	1 per load	AS 1012.3.1
	Concrete Strength	Contract	1 per contract or 100m^3 (whichever is the lesser)	AS 1012.9
Concrete Grout	Strength	Contract	As required by Superintendent	AS 1012.9
Backfilling	Drainage Layer Grading	Contract	1 per contract	AS 1141.11
Foundations and Backfill	Compaction	Contract or 200 lineal metres (whichever is the lesser)	3 per 200 lineal metres	AS 1289.5.4.1

Sub-Annexure B22
CRIB RETAINING WALLS (Specification 276)

ACTIVITY	KEY QUALITY VERIFICATION REQUIREMENTS	MAXIMUM LOT SIZE	MINIMUM TEST FREQUENCY	TEST METHOD
Alignment	Set Out	Contract	25m sections	Survey
Footing	Concrete Slump	Contract	1 per load	AS 1012.3.1
	Concrete Strength	Contract	1 per contract or 100m^3 (whichever is the lesser)	AS 1012.9
Backfilling	Quality and Plasticity	Contract	1 per contract	AS 1289.3.3.1
	Drainage Layer Grading	Contract	1 per contract	AS 1141.11
Foundations and Backfill	Compaction	Contract or 200 lineal metres (whichever is the lesser)	3 per 200 lineal metres	AS 1289.5.4.1