

SNOWY RIVER SHIRE COUNCIL

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 |
|------------------------|---|---------------|----------------|-----------------|----------------|
| <i>EXAMPLE 1</i> | <i>Provision for acceptance of nonconformance with deduction in Payment</i> | <i>XYZ.00</i> | <i>AP</i> | <i>KP</i> | <i>2/6/97</i> |
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SPECIFICATION CQC QUALITY CONTROL REQUIREMENTS

GENERAL

CQC1 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

CQC2 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 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 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

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 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 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 |
| <ul style="list-style-type: none"> (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 |

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 Principal.

**Copies of
Records
Contractor's
Cost**

MEASUREMENT AND PAYMENT

CQC6 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 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) per lot shall be as indicated in the specific Specification Parts which are summarised in the Sub-Annexure 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.

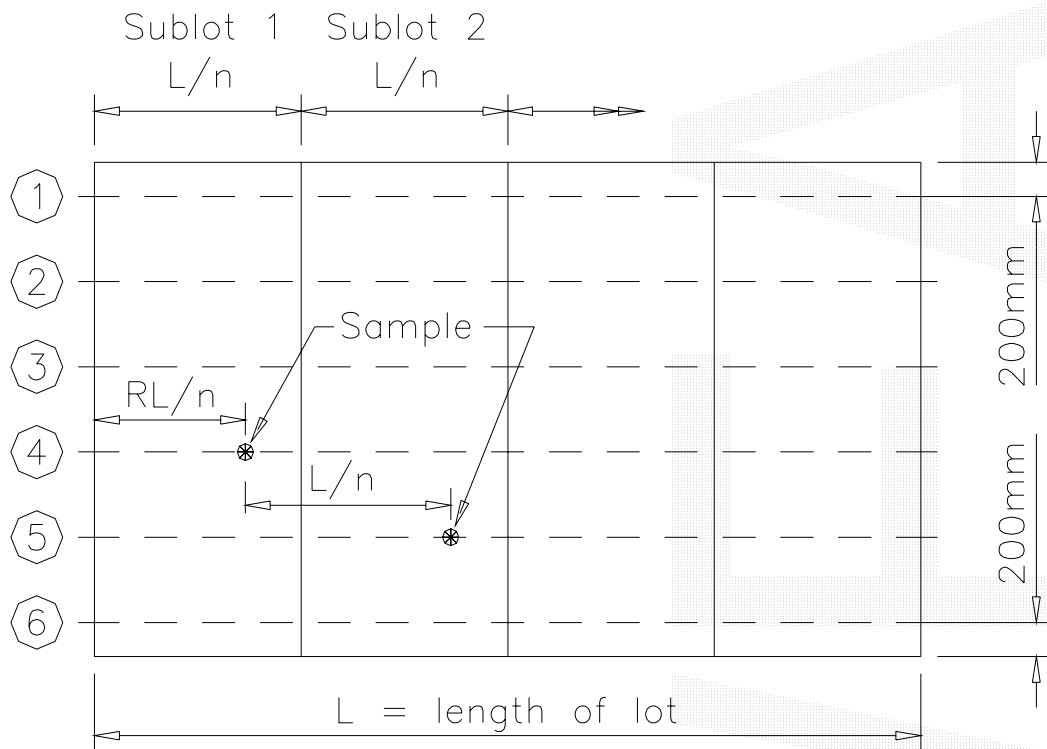


Figure CQC-A2 Sampling Locations for Rectangular Lot

| 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 |
| 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 | 5,000m ² | 1 per 1,000m ² * | AS1289.6.1.1 |
| | Compaction | 10,000m ² | 1 per 500m ² | AS1289.5.4.1 |
| Foundation for Embankments | Compaction | 5,000m ² | 1 per 500m ² | 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 * | 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 |
| 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 * | AS1289.3.3.1 |
| | 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 - Plasticity Index Compaction/Moisture Content | 1 contract 1 contract 1 drainage line/structure | 1 per 100m ³ * 1 per 100m ³ * 1 per 2 layers per 50m ² | AS1289.3.3.1 AS1289.5.7.1, AS1289.5.4.1 |
| Rock Fill for Gabions/ Wire Mattresses | Material Quality: - Wet Strength - Wet/Dry Strength Variation | 1 contract 1 contract | 1 per contract 1 per contract | AS1141.22 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 Filter Material - Grading (Type A, B, C, D) - Coefficient of Permeability (Type B) - Grading Variation after Treatment (Type B) - Wet Strength (Type C, D) - 10% Fines Wet/Dry (Type C, D) Geotextile | 1 contract/size 1 contract/size 1 contract/size 1 contract/size 1 contract/size 1 contract/size 1 contract | 1 per type/size 1 per type 1 per type 1 per type 1 per type 1 per type 1 per type | AS1141.11 AS1289.E5.1 ASTM-D2434-68 AS1141.11 AS1141.22 AS1141.22 |
| Excavation - Trench Base | Line and Grade Compaction | 1 drainage line 1 drainage line | 1 per drainage line 1 per 200 lin m* | Survey 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 |
| Mix Design | - 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 | |
| | Mix uniformity | 1 layer 1,000m ² | 1 per 500m ² | 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 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 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 | T160 |
| | Compaction/Moisture Content/ Dry Density Testing | One layer 5,000m ² or max 1 day's placement | 10 per 5,000m ² layer or 3 per lot if less | AS1289.5.2.1, T130, AS1289.5.4.1 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 - Refinery Cutback Bitumen - Polymer Modified Binder - Bitumen Adhesion Agent - Cutback Oils - Aggregate Precoating Agent - Aggregate | 1 tanker load 1 tanker load 1 tanker load 1 delivery 1 delivery/ tanker 1 delivery/ tanker 1 contract | 1 per tanker load 1 per tanker load 1 per tanker load 1 per delivery 1 per delivery/tanker 1 per delivery/tanker 1 per 400m3 | AS2758.2 |
| Application Rates | Binder Aggregate | 1 day's operation 1 day's operation | Calculate per spray run 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 <ul style="list-style-type: none"> Grading Moisture Content Wet Strength Wet/Dry Strength Variation Particle Shape Fractured Faces Polishing Agg Friction Value - Mineral Filler - Bitumen Binder - Polymer Modified Bitumen <ul style="list-style-type: none"> Elasticity Recovery at 60°C Viscosity on ER at 60°C Torsional Recovery at 25°C Viscosity at 180°C - Bitumen Adhesion Agent <ul style="list-style-type: none"> Resistance to Stripping - Reclaimed Asphalt Pavement (RAP) - Bitumen Emulsion | 1 wk's prod'n 1 wk's prod'n 1 contract 1 contract 1 contract 1 contract 1 contract 1 contract 1 contract or 1 month's production 1 refinery batching 1 production batch by supplier 1 contract 1 stockpile 1 contract | 1 per day 1 per day)) 1 per) contract) or change in) material contract or 1 per month's production 1 per tanker load 1 per tanker load 1 per contract or change in material 1 per stockpile 1 per contract or change in material | AS2758.5 AS1141.11 AS1289.2.1.1 AS1141.22 AS1141.22 AS1141.14 AS1141.18 AS1141.42 AS2357 AS2008 MBT 21 MBT 21 MBT 22 MBT 11 T230 or nominated equivalent AS1141.11 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 Moisture Content Grading Binder Content | 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 AS2891.10 AS2891.3.3 AS2891.3.1 |
| | Resistance to Stripping | 1 production mix | 1 per mix per 5000t or once per month (whichever is the most frequent) | T640 |

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

| ACTIVITY | KEY QUALITY VERIFICATION REQUIREMENTS | MAXIMUM LOT SIZE | MINIMUM TEST FREQUENCY | TEST METHOD |
|-------------------------------|---|------------------|------------------------|-------------------|
| 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 | 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 B11

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 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 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 · 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 |

* 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 |
| | Surface Dimensions | Single Fabrication | As required to confirm design dimensions | measure |
| 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 |
| | 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 | " | |
| Paint Application | - 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: <ul style="list-style-type: none"> - uPVC Pipes - Ductile Iron Pipes - Copper Pipe - Polyethylene Pipe - Stop Valves Material - Non Return Valves - Spring Hydrants | 1 contract 1 contract 1 contract 1 contract 1 contract 1 contract 1 contract | 1 per contract " " " " " | AS2977 AS2280 and AS2129 AS1432 AS1159 AS2638 and AS2129 AS3578 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 Sub-Annexure B13 | | | |
| Concrete Encasement | Refer Sub-Annexure B13 | | | |
| 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 |
| 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 - Ductile Iron Pipes - Vitrified Clay Pipes - Precast Access Chambers | 1 contract 1 contract 1 contract 1 contract | 1 per contract " " " | AS1477 AS2280 and AS2129 AS1741 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 Sub-Annexure B13 | | | |
| Laying and Jointing of Pipes, Access Chambers, Structures | Geometry | 1 line | 1 per line | Survey |
| Thrust and Anchor Blocks | Refer Sub-Annexure B13 | | | |
| Concrete Encasement | Refer Sub-Annexure B13 | | | |
| Cast-in-situ Access Chambers | Material Quality - Tri-Calcium Aluminate Content - Fineness Index - Minimum Cement Content | 1 contract 1 contract 1 contract | 1 per contract per source " " | AS3972 AS3972 AS3972 |
| Acceptance Test of Gravitation Mains and Access Chambers | - Compressed Air Testing - Hydrostatic Testing | 1 line 1 per test length Test length = 1370m pipeline dia.(mm) | 1 per line 1 per line | As specified C402.36 C402.37 As specified C402.38 |
| 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 | |

**SPECIFICATION CQC
QUALITY CONTROL REQUIREMENTS**

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