

EARTHWORKS

- E.1. AUSTRALIAN STANDARDS
- E.1.1 EARTHWORKS SHALL BE COMPLETED IN ACCORDANCE WITH:
- * AS 3798 GUIDELINES ON EARTHWORKS FOR COMMERCIAL AND RESIDENTIAL DEVELOPMENTS.
 - * AS 1289 METHODS OF TESTING SOILS FOR ENGINEERING PURPOSES.
 - * AS 2870 RESIDENTIAL SLABS AND FOOTINGS - CONSTRUCTION.
 - * AS 1726 GEOTECHNICAL SITE INVESTIGATIONS.

E.2. CONTRACT DETAILS

E.2.1 THIS CONTRACT IS A LUMP SUM CONTRACT AND IS NOT SUBJECT TO ADJUSTMENT FOR RISE OR FALL OF COSTS. THE LUMP SUM TENDER SHALL INCLUDE ALL PROVISIONAL SUMS. IT IS THE TENDERER'S RESPONSIBILITY TO VISIT AND INSPECT THE SITE, TO MAKE THEIR OWN ASSESSMENT OF THE CONDITIONS OF THE SITE AND THE WORK INVOLVED, PARTICULARLY IN RELATION TO ROCK, UNSUITABLE CLAYS AND GROUNDWATER. UNFORESEEN DIFFICULTIES FOR WHICH PROVISION HAS NOT BEEN MADE IN THE TENDER WILL IN NO WAY RELIEVE THE CONTRACTOR FROM THE FULL EXECUTION OF THE CONTRACT.

E.3. DUST CONTROL

E3.1 THE CONTRACTOR IS RESPONSIBLE FOR CONTROLLING AND MINIMISING THE GENERATION OF DUST ON THE SITE.

E.3.2 THE CONTRACTOR SHALL COMPLY WITH THE PROVISIONS INCLUDED IN "A GUIDELINE FOR MANAGING THE IMPACTS OF DUST AND ASSOCIATED CONTAMINANTS FROM LAND DEVELOPMENT SITES, CONTAMINATED SITES REMEDIATION AND OTHER RELATED ACTIVITIES" PUBLISHED BY THE DEPARTMENT OF ENVIRONMENT AND CONSERVATION IN JANUARY 2011. THIS SHALL INCLUDE, BUT IS NOT LIMITED TO, SUBMISSION OF A DUST MANAGEMENT PLAN TO THE SUPERINTENDENT AND THE LOCAL AUTHORITY WITHIN 14 DAYS OF THE DATE OF ACCEPTANCE OF TENDER. DUST GENERATING WORKS SHALL NOT COMMENCE ON SITE UNTIL APPROVAL IS RECEIVED BY THE SUPERINTENDENT AND LOCAL AUTHORITY.

E.3.3 THE CLASSIFICATION OF THE SITE IS STATED IN THE TENDER SUMMARY. THE CONTRACTOR SHALL FAMILIARISE THEMSELV WITH THE ABOVE PUBLICATION AND PERFORM ALL MEASURES SPECIFIED THEREIN FOR THE APPLICABLE CLASSIFICATION.

E.4. MATERIALS - STRUCTURAL FILL

E.4.1 UNLESS SPECIFIED IN A GEOTECHNICAL REPORT, STRUCTURAL FILL SHALL BE CLEAN GRANULAR FREE DRAINING MATERIAL, WITH A MAXIMUM PARTICLE SIZE OF 2.36mm AS DEFINED IN AS 1289 AND SHALL HAVE THE FOLLOWING PROPERTIES:

(i) PLASTICITY INDEX EQUAL TO 0% (I.E. NON-PLASTIC) FOR FRACTIONS FINER THAN 0.075mm.

(ii) CLEAN, COHESIONLESS, FREE DRAINING AND FREE OF ALL SILTY, ORGANIC OR ANY OTHER DELETERIOUS INCLUSIONS.

(iii) CONTAIN NO MORE THAN 5% (BY WEIGHT) OF FRACTIONS FINER THAN 0.075mm.

(iv) THE RATIO OF MAXIMUM TO MINIMUM DENSITY SHALL BE GREATER THAN 1.20.

(v) A MINIMUM PERMEABILITY OF 5m/DAY WHEN COMPACTED AT 95% MMDD.

E.4.2 THE CONTRACTOR SHALL PROVIDE TEST RESULTS FROM A NATA REGISTERED LABORATORY.

E.5. MATERIALS - GENERAL FILL

E.5.1 GENERAL FILL SHALL BE CLEAN GRANULAR MATERIAL WITH MAXIMUM PARTICLE SIZE OF 37.5mm AS DEFINED IN AS 1289 AND SHALL HAVE THE FOLLOWING PROPERTIES:

(i) PLASTICITY INDEX EQUAL TO 0% (IE NON-PLASTIC) FOR FRACTIONS FINER THAN 0.075mm.

(ii) CLEAN, COHESIONLESS, FREE DRAINING AND FREE OF ALL SILTY, ORGANIC OR ANY OTHER DELETERIOUS INCLUSIONS.

(iii) A MINIMUM PERMEABILITY OF 5m/DAY WHEN COMPACTED AT 95% MMDD.

E.6. CLEARING

E.6.1 THE CONTRACTOR SHALL CONFIRM WITH THE DEVELOPER WHETHER A CLEARING PERMIT IS REQUIRED PRIOR TO COMMENCING WORKS. WHERE CLEARING WORKS ARE SUBJECT TO A CLEARING PERMIT, THE CONTRACTOR SHALL OBTAIN A COPY OF THE PERMIT AND COMPLY WITH ITS CONDITIONS.

E.6.2 CLEARING SHALL INCLUDE THE GRUBBING OUT OF TREE ROOTS TO THE DEEPER OF
(A) 600mm BELOW THE NATURAL SURFACE, OR
(B) 400mm BELOW THE FINISHED CUT SURFACE; OR
(C) AS OTHERWISE NOTED ON THE DRAWINGS.

E.6.3 AS LITTLE AS POSSIBLE OF THE SURFACE SOIL SHALL BE REMOVED DURING CLEARING OPERATIONS.

E.6.4 THE CONTRACTOR SHALL TAKE PRECAUTIONS TO MINIMISE DAMAGE TO GROWING TREES AND SHRUBS, FENCES AND OTHER IMPROVEMENTS OUTSIDE THE DESIGNATED AREAS. ANY DAMAGE SHALL BE MADE GOOD AT THE CONTRACTOR'S EXPENSE.

E.6.5 THE SPOILS OF ALL CLEARING AND GRUBBING OPERATIONS SHALL BE REMOVED FROM THE SITE. NO SPOILS OF CLEARING AND GRUBBING SHALL BE PUSHED BEYOND THE LIMITS OF THE SITE OR BURNT.

E.6.6 THE CONTRACTOR SHALL ENSURE THAT THE MOVEMENT OF TOPSOIL AND VEGETATION MATTER DOES NOT CONTRAVENE THE REQUIREMENTS OF THE AGRICULTURAL AND RELATED RESOURCES PROTECTION ACT 1976. FOR MORE INFORMATION, CONTACT THE DEPARTMENT OF AGRICULTURE WA.

E.7. CUTTING TO DESIGN LEVELS

E.7.1 ANY AREAS WHICH ARE OVER EXCAVATED SHALL BE REFILLED TO THE DESIGN LEVELS SHOWN ON THE DRAWINGS. ANY REFILLING SHALL BE PLACED AS SPECIFIED IN SECTIONS E.7 AND E.8 "FILLING TO DESIGN LEVELS" OF THE SPECIFICATION.

E.7.2 ALL CUT SURFACES SHALL BE FINISHED BY PROOF ROLLING AND, WHERE SPECIFIED ON LANDSCAPE DOCUMENTATION, RESPREADING OF TOPSOIL.

E.7.3 ANY AREA IN WHICH ROCK IS EXCAVATED, THE ROCK SHALL BE OVER-EXCAVATED TO A MINIMUM DEPTH OF 600mm BELOW FINISHED LEVEL AND REPLACED WITH COMPACTED STRUCTURAL FILL.

E.8. FILLING TO DESIGN LEVELS (STRUCTURAL FILL)

E.8.1 STRUCTURAL FILL SHALL BE USED IN THE FOLLOWING SITUATIONS:

* BACKFILL TO WALLS AND OTHER CONSTRUCTED WORKS SUCH AS PIPES, ACCESS CHAMBERS ETC.

* REFILL TO OVER EXCAVATED AREAS (INCLUDING ROCK REMOVAL).
* WITHIN 600mm OF ANY LOT FILLING AREAS.
* SUBGRADE FILL BELOW ROAD PAVEMENTS.

E.8.2 FILL MATERIAL SHALL BE PLACED IN LAYERS NOT EXCEEDING 300mm THICK WHICH SHALL BE VARIED TO SUIT THE MATERIAL BEING PLACED AND THE METHOD OF COMPACTION.

E.8.3 EACH LAYER OF FILL MATERIAL SHALL BE COMPACTED TO ACHIEVE A MINIMUM DENSITY RATIO OF 95% MMDD.

EARTHWORKS (CONTINUE)

E.9. FILLING TO DESIGN LEVELS (COHESIVE SOILS)

E.9.1 THE CONTRACTOR SHALL HAVE ANY MATERIAL WHICH IS PROPOSED TO BE RE-UTILISED IN TRENCHES OR EARTHWORKED AREAS, TESTED TO DETERMINE CHARACTERISTICS TO ALLOW COMPACTION TO ACHIEVE A MINIMUM DENSITY RATIO OF 95% AS OBTAINED IN TEST AS 1289.5.4.1 WITH THE MMDD DETERMINED IN ACCORDANCE WITH AS 1289.5.2.1 (MODIFIED COMPACTIVE EFFORT).

E.9.2 THE CONTRACTOR SHALL ENSURE THAT THESE MATERIALS ARE PLACED IN LAYERS AND AT A MOISTURE CONTENT AS DIRECTED BY THE GEOTECHNICAL CONSULTANT TO ACHIEVE THE DESIRED COMPACTION. TESTING TO BE PERFORMED ON LAYERS USING NUCLEAR DENSITY METHODS.

E.10. EXCESS SPOIL

E.10.1 IF, AFTER THE COMPLETION OF EARTHWORKS, THERE IS EXCESS SPOIL, IT SHALL BE PLACED ON SITE IF SHOWN ON THE DRAWINGS OR OTHERWISE REMOVED FROM THE SITE AT THE CONTRACTOR'S EXPENSE.

E.11. RE-SPREADING OF TOPSOIL

E.11.1 THE TOPSOIL SHALL BE FREE OF VEGETATION PIECES LARGER THAN 200mm IN ANY ONE DIRECTION AND BE SPREAD UNIFORMLY TO A THICKNESS NOT LESS THAN 50mm AND NOT MORE THAN 100mm.

E.11.2 IF, AFTER THE COMPLETION OF TOPSOIL RESPREADING, THERE IS EXCESS TOPSOIL, IT SHALL BE PLACED ON SITE IF SHOWN ON THE DRAWINGS OR OTHERWISE REMOVED FROM THE SITE AT THE CONTRACTOR'S EXPENSE.

E.12. HYDROMULCH

E.12.1 SURFACE STABILISATION SHALL BE CARRIED OUT BY APPLICATION OF HYDROMULCH WITH SEED, UNLESS NOTED OTHERWISE ON THE DRAWINGS, TO ANY DISTURBED AREAS.

E.12.2 HYDROMULCH SHALL BE APPLIED BY A SUBCONTRACTOR SPECIALISING IN THIS WORK.

E.12.3 HYDROMULCH SHALL CONSIST OF A MIXTURE OF 1,200KG TO 1,400KG NEWSPAPER, 200 LITRES OF STABILISER (E.G. GLUON 240) AND 10,000 LITRES OF WATER. THE HYDROMULCH SHALL BE THOROUGHLY MIXED AND APPLIED BY PRESSURISED SPRAY AT THE RATE OF 40KL TO 50KL PER HECTARE.

E.12.4 PRIOR TO SPRAYING THE HYDROMULCH, IF SPECIFIED BY THE SUPERINTENDENT THE AREA SHALL BE FERTILISED WITH SUPERPHOSPHATE AT THE RATE OF 200KG PER HECTARE.

E.12.5 SEED SHALL BE INCLUDED IN THE HYDROMULCH MIX AS FOLLOWS:

	SEED TYPE	APPLICATION RATE
-	CEREAL RYE	100KG PER HECTARE
-	WIMMERA OR MERRREDIN RYE	20KG PER HECTARE
-	SERENA, CIRCLE VALLEY OR ROSE CLOVER	20KG PER HECTARE

E.13. TOLERANCES

E.13.1 THE COMPLETED EARTHWORKS LEVELS SHALL BE WITHIN PLUS 100mm OR MINUS 0mm OF THE DESIGN LEVELS WITHOUT RETAINING WALLS SHOWN ON THE DRAWINGS.

E.13.2 WHERE RETAINING WALLS EXIST OR WILL EXIST IN THE FUTURE, THE EARTHWORKS TOLERANCE SHALL BE WITHIN PLUS 50mm OR MINUS 0mm OF THE DESIGN LEVELS SHOWN ON THE DRAWINGS.

E.13.3 THE DESIGN LEVELS ARE THE LEVELS ON THE COMPLETED EARTHWORKS INCLUDING RESPREAD TOPSOIL.

E.14. TESTING OF EARTHWORKS

E.14.1 EARTHWORKS SHALL BE PROGRESSIVELY TESTED TO DEMONSTRATE THAT THE SPECIFIED COMPACTION HAS BEEN ACHIEVED.

E.14.2 FIELD DENSITY TESTING SHALL BE COMPLETED AND CERTIFIED BY AN INDEPENDENT NATA REGISTERED LABORATORY. THE LABORATORY SHALL CALIBRATE FIELD DENSITY TESTING APPARATUS AGAINST LABORATORY TESTS.

E.14.3 GENERAL FILL SHALL BE TESTED BY MEANS OF SAND REPLACEMENT OR NUCLEAR DENSITY TESTS.

E.14.4 STRUCTURAL FILL MAY BE TESTED BY MEANS OF PERTH SAND PENETROMETER. A MINIMUM OF 7 BLOWS/300mm LAYER MUST BE ACHIEVED. THE CONTRACTOR MUST SUPPLY A CALIBRATION CERTIFICATE FOR EACH STRUCTURAL FILL MATERIAL USED ON SITE.

E.14.5 UNLESS SPECIFIED IN A GEOTECHNICAL REPORT, THE FREQUENCY OF TESTING SHALL BE 1 PER 100m² PER LAYER OF FILL.

E.14.6 ALL COSTS FOR THIS TESTING SHALL BE INCORPORATED IN THE LUMP SUM CONTRACT.

E.14.7 THE RESULTS OF ALL TESTS SHALL BE RECORDED AND SUBMITTED ON APPROPRIATE FORMS.

E.15. QUALITY ASSURANCE

E.15.1 THE CONTRACTOR SHALL PRODUCE, AND SUBMIT TO THE SUPERINTENDENT, VERIFIED EARTHWORKS RECORDS AS FOLLOWS:

- TOPSOIL STRIPPING CERTIFICATE CONFIRMING TOPSOIL STRIPPING MEETS THE REQUIREMENTS OF THE EARTHWORKS SPECIFICATION. CERTIFICATE FREQUENCY TO BE 1 PER PROJECT OR 1 PER 5 Ha (WHICHEVER IS MORE FREQUENT).

- PROOF COMPACTION CERTIFICATE CONFIRMING VERIFICATION BY GEOTECHNICAL ENGINEER THAT PROOF COMPACTION MEETS THE REQUIREMENTS OF THE EARTHWORKS SPECIFICATION. CERTIFICATE FREQUENCY TO BE 1 PER PROJECT.

- AS-CONSTRUCTED SURVEY SHOWING FINISHED LEVELS AND LEVELS AT MATERIALS INTERFACES CONFIRMING EARTHWORKS LEVELS MEET THE REQUIREMENTS OF THE EARTHWORKS SPECIFICATION. 1 PER PROJECT.

- SUPPLIER'S MATERIALS CERTIFICATES INCLUDING DIEBACK CERTIFICATION AND PERMEABILITY TESTING CONFIRMING MATERIALS MEET THE REQUIREMENTS OF THE EARTHWORKS SPECIFICATION. CERTIFICATE FREQUENCY TO BE 1 PER PROJECT PER IMPORTED FILL SOURCE.

- COMPACTION CERTIFICATES CONFIRMING COMPACTION OF FILL MATERIAL MEETS THE REQUIREMENTS OF THE EARTHWORKS SPECIFICATION. COMPACTION FREQUENCY TO BE AS STATED IN SECTION E.12.

E.15.2 THE CONTRACTOR SHALL PRODUCE, AND SUBMIT TO THE SUPERINTENDENT, VERIFIED ROCK-PITCHING RECORDS AS FOLLOWS:

COMPACTION CERTIFICATES CONFIRMING FOUNDATION COMPACTION MEETS THE REQUIREMENTS OF THE EARTHWORKS SPECIFICATION. COMPACTION FREQUENCY TO BE 1 TEST PER ROCK-PITCHING LOCATION OR 10m LENGTH OF ROCK-PITCHING, WHICHEVER IS MORE FREQUENT.

COMPACTION CERTIFICATES CONFIRMING BACKFILL COMPACTION MEETS THE REQUIREMENTS OF THE EARTHWORKS SPECIFICATION. COMPACTION FREQUENCY TO BE 1 TEST PER LAYER PER 50m². CONTRACTOR'S CERTIFICATES CONFIRMING MORTAR SAND:CEMENT RATIO (3:1), AND SAND : LIME : CEMENT (3:1:1) FOR LIMESTONE ROCK PITCHING, MEETS THE REQUIREMENTS OF THE EARTHWORKS SPECIFICATION - 1 PER PROJECT.

E.15.3 QUALITY ASSURANCE INFORMATION SHALL BE SUBMITTED TO THE ENGINEER PRIOR TO PRACTICAL COMPLETION AND PRIOR TO ACCEPTANCE OF THE WORKS.

EARTHWORKS (CONTINUE)

E.16. AS-CONSTRUCTED REQUIREMENTS

E.16.1 THE CONTRACTOR SHALL ARRANGE FOR ALL AS-CONSTRUCTED SURVEY AND PRESENTATION OF RESULTS USING A LICENCED SURVEYOR AT THE CONTRACTOR'S EXPENSE.

E.16.2 THE AS-CONSTRUCTED INFORMATION SHALL BE SIGNED AND CERTIFIED AS ACCURATE AND CORRECT BY THE CONTRACTOR AND THE LICENCED SURVEYOR BEFORE BEING SUBMITTED TO THE ENGINEER FOR APPROVAL.

E.16.3 THIS INFORMATION SHALL BE SUBMITTED TO THE ENGINEER PRIOR TO PRACTICAL COMPLETION AND PRIOR TO ACCEPTANCE OF THE WORKS.

E.16.4 SURVEYED AS-CONSTRUCTED EARTHWORKS PLANS SHALL INCLUDE LEVELS RECORDED AT THE FOLLOWING MATERIAL INTERFACES, WHERE APPLICABLE:
AT OVEREXCAVATION LEVELS (TOP OF ROCK OR LIMESTONE) PRIOR TO THE PLACEMENT OF OTHER FILL TYPES;
AT THE INTERFACE OF ANY TWO OTHER FILL TYPES;
AT THE BASE OF TOPSOIL; AND
AT THE FINISHED SURFACE LEVEL.

E.16.5 SURVEY LEVELS SHALL BE RECORDED AT THE FOLLOWING LOCATIONS, AT EACH MATERIAL INTERFACE:

E.16.5.1 EARTHWORKS AREAS:
AT ALL CADASTRAL TRUNCATIONS AND BOUNDARIES;
AT THE TOP AND BOTTOM OF ALL BATTERS; AND
ONE READING PER 100m.

E.16.5.2 ROADWORKS AREAS:
AT TOP OF KERB;
AT ROAD RESERVE BOUNDARY;
AT EACH ROAD GUTTER; AND
IN THE CENTRE OF ROAD PAVEMENTS;
AT ALL ROAD HIGHPOINTS, LOW POINTS, CHANGES OF GRADE, INTERSECTION POINTS, TANGENT POINTS, AND OTHERWISE AT 25m INTERVALS FOR EACH ROAD.

E.16.6 SURVEY READINGS SHALL BE RECORDED TO THE NEAREST 10mm.

E.16.7 SURVEY DATA FOR EACH MATERIAL INTERFACE SHALL BE SUBMITTED TO THE ENGINEER IN BOTH PDF AND DWG/DGN FORMAT WITH THE PRE-CALCULATION PLAN OVERLAIN.

E.16.8 PRACTICAL COMPLETION WILL NOT BE GRANTED UNTIL THIS INFORMATION HAS BEEN PROVIDED TO THE SATISFACTION OF THE ENGINEER.

ROAD WORKS

R.1. GENERAL

R.1.1 ALL THE WORKS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE DRAWINGS AND THIS SPECIFICATION AND WILL BE SUBJECT TO INSPECTIONS AND THE APPROVAL OF THE RELEVANT LOCAL AUTHORITY (AND ENGINEER WHERE APPLICABLE).

R.1.2 ANY INSTRUCTIONS FROM THE AUTHORITY PERTAINING TO THE WORKS SHALL BE REQUESTED BY THE CONTRACTOR TO BE IN WRITING AND KEPT FOR FUTURE RECORD. A RECORD OF THIS SHALL BE SUBMITTED TO THE ENGINEER.

R.2. MATERIALS

R.2.1 ALL WORKMANSHIP AND MATERIALS USED IN THE WORKS SHALL CONFORM TO THE CURRENT AUTHORITY'S STANDARD WHERE SUCH STANDARD EXISTS. WHERE SUCH STANDARD DOES NOT EXIST THE CURRENT AUSTRALIAN STANDARD SHALL APPLY.

R.2.2 LATERITE GRAVEL

R.2.2.1 LATERITE GRAVEL SHALL COMPLY WITH THE FOLLOWING REQUIREMENTS
THE GRAVEL SHALL
CONSIST OF A CLEAN, DURABLE LATERITE PEBBLE AND SOIL MORTAR; AND
BE FREE FROM ROOTS, HUMUS, OTHER VEGETABLE MATTER AND OTHER DELETERIOUS MATERIALS.
SELECTION CRITERIA FOR LATERITE GRAVELS IS SUMMARISED IN THE TABLE BELOW:

BASECOURSE OR SUBBASE	TEST METHOD		
PARTICLE SIZE DISTRIBUTION			
AS SIEVE SIZE (mm)	% PASSING BY MASS		
37.5	100		
19.0	95-100		
9.5	50-100		
4.75	36-81		
2.36	25-66		
1.18	18-53		
0.600	-	AS 1164.11.1	
0.425	11-39		
0.30	-		
0.15	-		
0.075	4-23		
0.075	2-11		
CLASSIFICATION LIMITS			
DUST RATIO (SEE DEFINITION BELOW THIS TABLE)	0.3 - 0.7		
LIQUID LIMIT (%)	35% MAX	AS 1289.3.9.1	
PLASTICITY INDEX (%)	10% MAX	AS 1289.3.4.1	
LINEAR SHRINKAGE (%)	5.0% MAX	AS 1289.3.3.2	
PERCENTAGE PASSING 0.425mm SIEVE (P _{0.425}) x L _S	200 MAX		
OTHER TEST LIMITS AND MINIMUM DRYBACK REQUIREMENTS			
MAXIMUM DRY COMPRESSIVE STRENGTH (kPa)	1700 MIN	AS 1164.15.2	
(CALIFORNIA BEARING RATIO (UNSOAKED) AT THE MAXIMUM MODIFIED DRY DENSITY SPECIFIED IN THE PROJECT AND 100% OF OPTIMUM MOISTURE CONTENT	80% MIN.	AS 1289.6.1.1	
(CALIFORNIA BEARING RATIO (SOAKED 4 DAYS) AT THE MAXIMUM MODIFIED DRY DENSITY SPECIFIED IN THE PROJECT AND 100% OF OPTIMUM MOISTURE CONTENT	60% MIN.	AS 1289.6.1.1	
GRADING MODULUS (SEE DEFINITION BELOW THIS TABLE)	15 MIN.	-	

R.2.2.2 DUST RATIO IS DEFINED AS:

PERCENTAGE PASSING THE AS 75 MICRON SIEVE
PERCENTAGE PASSING THE AS 600 MICRON SIEVE

R.2.2.3 GRADING MODULUS IS DEFINED AS:

$$\frac{300 \cdot (P_{200} - P_{600})}{100}$$

R.2.2.4 A SAMPLE SHALL BE TAKEN AND TESTED BY THE TESTING AUTHORITY FOR GRADING, DUST RATIO, LIQUID LIMIT, PLASTIC LIMIT, LINEAR SHRINKAGE, DRY COMPRESSIVE STRENGTH AND MAXIMUM DRY DENSITY OF THE MATERIAL. IF THE MATERIAL VARIES IN QUALITY OR IS OBTAINED FROM VARIOUS QUARRIES, EACH VARIATION IN QUALITY, OR, MATERIAL FROM EACH QUARRY USED SHALL HAVE THIS TEST PERFORMED BY THE TESTING AUTHORITY AND A RECORD SHALL BE MAINTAINED BY THE CONTRACTOR AS TO WHERE THE VARIOUS MATERIALS HAVE BEEN PLACED.

R.2.2.5 NOTWITHSTANDING THIS SPECIFICATION, ANY SAMPLE WHICH, IN THE OPINION OF THE ENGINEER, IS COMPOSED OF UNSUITABLE MATERIAL, OR IS COMPOSED OF MATERIAL WHICH WOULD BREAK DOWN WITH AGING OR WEATHERING TO SUCH AN EXTENT THAT IT WOULD THEN FALL OUTSIDE THE LIMITS OF THIS SPECIFICATION, SHALL BE REJECTED.

ROAD WORKS (CONTINUE)

R.2.3 BITUMEN

R.2.3.1 THE BITUMEN USED SHALL BE A STRAIGHT RUN SLIGHTLY BLOWN BITUMEN DISTILLED FROM AN ASPHALTIC BASE PETROLEUM. THE GRADE SHALL BE CLASS 170 (140-200 PASCAL SECOND VISCOSITY AT 60 DEGREE CELSIUS). THE BITUMEN SHALL CONFORM TO AS 2008 AND THE CURRENT N.A.S.A.R.A. SPECIFICATION. THE MINIMUM DENSITY AT 25 DEGREES CELSIUS SHALL BE 1.0 KG PER LITRE.

R.2.4 BITUMEN EMULSION

R.2.4.1 BITUMEN EMULSION SHALL CONFORM IN REGARDS TO PHYSICAL QUALITIES, SAMPLE AND TESTING WITH AS 1160, WITH THE FOLLOWING AMENDMENTS:

*WATER CONTENT - THE EMULSION SHALL NOT CONTAIN MORE THAN 40% BY WEIGHT OF WATER.

*SPECIFIC GRAVITY - THE SPECIFIC GRAVITY AT 16 DEGREES CELSIUS SHALL NOT BE LESS THAN 1.00.

*THE BITUMEN USED SHALL BE CLASS 170.

R.2.4.2 ALTERNATIVE SPECIFICATION CAN BE SUBMITTED BY THE CONTRACTOR PROVIDED THAT:

(a) BITUMEN CONTENT - THE RESIDUAL BITUMEN CONTENT OF THE EMULSION MUST BE STATED.

(b) ADDITIVES - THE ADDITION OF UP TO 2% BY VOLUME OF ADDITIVES MAY BE REQUIRED BY THE LOCAL AUTHORITY (OR ENGINEER WHERE APPLICABLE).

(c) PATENTS - THE EMULSION TO BE USED SHALL BE MANUFACTURED UNDER AN APPROVED PATENT.

R.2.4.3 THE CONTRACTOR MUST SET OUT FACILITIES AND HAVE SPRAY TANKERS AVAILABLE FOR SPRAYING EMULSION DIRECT ONTO THE ROAD.

R.2.5 AGGREGATE

R.2.5.1 THE AGGREGATE USED FOR SURFACING ROADS SHALL CONSIST OF CRUSHED DIORITE (OR GRANITE) STONE WHICH SHALL CONSIST OF CLEAN, TOUGH, DURABLE FRAGMENTS, FREE FROM AN EXCESS OF FIN OR ELONGATED PIECES, FREE FROM SOFT OR DISINTEGRATED PIECES, STONE COATED WITH DIRT, OR OTHER DELETERIOUS MATTER, IN COMPLIANCE WITH AS 2758.2.

R.2.5.2 THE BULK SPECIFIC GRAVITY OF THE PARTICLES OF DIORITE SHALL NOT BE LESS THAN 2.90 (2.60 FOR GRANITE).

R.2.5.3 FLAKINESS INDEX OF GRANITE SHALL NOT EXCEED 30.FLAKINESS INDEX OF GRANITE SHALL NOT EXCEED 30.

R.2.5.4 THE LIMITS ON PERCENTAGE OF AGGREGATE PASSING AS SIEVES, BY MASS OF SAMPLE, SHALL BE AS FOLLOWS:

NOMINAL GRADING OF AS SIEVE	5mm	7mm	10mm	14mm	
19.0mm	-	-	-	-	100%
13.2mm	-	-	-	100%	95-100%
9.50mm	-	100%	-	90-100%	30-50%
6.70mm	-	80-90%	0-35%	-	-
4.75mm	100%	0-35%	0-2%	-	-
2.36mm	-	0-3%	0-2%	-	-
1.18mm	30-80%	0-2%	0-1%	-	-
600 MICRON	0-20%	-	-	-	-

R.2.6 ASPHALTIC CONCRETE

R.2.6.1 THE ASPHALTIC CONCRETE SHALL BE A MIX OF CLEAN, DRY GRADED COARSE AND FINE AGGREGATES, MINERAL FILLER AND CLASS 170 BITUMEN, IN ACCORDANCE WITH AS 2150.

R.2.6.2 THE TEMPERATURE OF THE MIX AS DELIVERED TO THE POINT OF SPREADING SHALL BE NOT LESS THAN 120 DEGREES CELSIUS.

R.2.6.3 THE BITUMEN SHALL BE AS SPECIFIED IN THIS SPECIFICATION.

R.2.6.4 THE GRADING OF THE MIX SHALL CONFORM TO THE FOLLOWING LIMITS ON PERCENTAGE PASSING AS SIEVES, BY MASS OF SAMPLE:-

NOMINAL MIX SIZE AS SIEVE	AC7	AC10	AC14	
19.0mm	-	-	-	100%
13.2mm	-	100%	-	85-100%
9.50mm	100%	90-100%	-	70-85%
6.70mm	90-100%	70-90%	62-75%	-
4.75mm	68-88%	58-76%	53-70%	-
2.36mm	49-67%	40-58%	35-52%	-
1.18mm	37-53%	27-44%	24-40%	-
600 MICRON	25-41%	17-35%	15-30%	-
300 MICRON	15-27%	11-24%	10-24%	-
150 MICRON	8-16%	7-16%	7-16%	-
75 MICRON	4-8%	4-7%	4-7%	-
BITUMEN CONTENT TO BE MINIMUM MARSHALL STABILITY	5-7%	5-7%	4.5-6.5%	-
OF COMPACTED MIX				
MARSHALL FLOW VALUE	2.4mm	2.4mm	2.4mm	6.5kN
PERCENTAGE VOIDS IN COMPACTED MIX TO BE IN THE RANGE OF		3-5%	3-7%	3-7%