EARTHWORKS

E.1. AUSTRALIAN STANDARDS

E.1.1 EARTHWORKS SHALL BE COMPLETED IN ACCORDANCE WITH:

DEVELOPMENTS.

° AS 3798 GUIDELINES ON EARTHWORKS FOR COMMERCIAL AND RESIDENTIAL

° 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

E3.3 THE CLASSIFICATION OF THE SITE IS STATED IN THE TENDER SUMMARY. THE CONTRACTOR SHALL FAMILIARISE THEMSELF 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

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

(C) AS OTHERWISE NOTED ON THE DRAWINGS.

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

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 REQUIREMEMENTS OF THE ACRICULTURAL 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

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

SHALL BE MADE GOOD AT THE CONTRACTOR'S EXPENSE.

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

° SUBGRADE FILL BELOW ROAD PAVEMENTS.

CHAMBERS ETC.

° BACKFILL TO WALLS AND OTHER CONSTRUCTED WORKS SUCH AS PIPES, ACCESS

° REFILL TO OVER EXCAVATED AREAS (INCLUDING ROCK REMOVAL). ° WITHIN 600mm OF ANY LOT FILLING AREAS.

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.

E11.2 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

E12.1 SURFACE STABILISATION SHALL BE CARRIED OUT BY APPLICATION OF HYDROMULCH WITH SEED, UNLESS NOTED OTHERWISE ON THE DRAWINGS, TO ANY DISTURBED AREAS.

E12.2 HYDROMULCH SHALL BE APPLIED BY A SUBCONTRACTOR SPECIALISING IN THIS WORK.

E12.3 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.

E12.4 PRIOR TO SPRAYING THE HYDROMULCH, IF SPECIFIED BY THE SUPERINTENDENT THE AREA SHALL BE FERTILISED WITH SUPERPHOSPHATE AT THE RATE OF 200KG PER HECTARE.

E12.5 SEED SHALL BE INCLUDED IN THE HYDROMULCH MIX AS FOLLOWS:

APPLICATION RATE CEREAL RYE 100KG PER HECTARE WIMMERA OR MERREDIN RYE 20KG PER HECTARE SERENA, CIRCLE VALLEY 20KG PER HECTARE

OR ROSE CLOVER

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

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 CENTIFICATE 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

E15.1 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

E15.2 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.

E15.3 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

E16.1 THE CONTRACTOR SHALL ARRANGE FOR ALL AS-CONSTRUCTED SURVEY AND PRESENTATION OF RESULTS USING A LICENCED SURVEYOR AT THE CONTRACTOR'S EXPENSE.

E16.2 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.

E16.3 THIS INFORMATION SHALL BE SUBMITTED TO THE ENGINEER PRIOR TO PRACTICAL COMPLETION AND PRIOR TO ACCEPTANCE OF THE WORKS.

E16.4 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

E16.5 SURVEY LEVELS SHALL BE RECORDED AT THE FOLLOWING LOCATIONS, AT EACH MATERIAL INTERFACE:

E16.5.1EARTHWORKS AREAS: AT ALL CADASTRAL TRUNCATIONS AND BOUNDARIES; AT THE TOP AND BOTTOM OF ALL BATTERS; AND ONE READING PER 100m².

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.

E16.6 SURVEY READINGS SHALL BE RECORDED TO THE NEAREST 10mm.

E16.7 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.

E16.8 PRACTICAL COMPLETION WILL NOT BE GRANTED UNTIL THIS INFORMATION HAS BEEN PROVIDED TO THE SATISFACTION OF THE ENGINEER.

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	AS 1141.11.1					
0.600	-	/ / / / / / / / / / / / / / / / / / / /					
0.425	11-39						
0.30	-						
0.15	-						
0.075	4-23						
0.0135	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 (P0.425) x LS	200 MAX						
OTHER TEST LIMITS AND MINIMUM DRYBAC							
MAXIMUM DRY COMPRESSIVE STRENGTH (kPa)	1700 MIN.	AS 1141.52					
CALIFORNIA BEARING RATIO (UNSOAKED) AT THE							
MAXIMUM MODIFIED DRY DENSITY SPECIFIED IN THE	80% MIN.	AS 1289.6.1.1					
PROJECT AND 100% OF OPTIMUM MOISTURE CONTENT							
CALIFORNIA BEARING RATIO (SOAKED 4 DAYS) AT THE							
MAXIMUM MODIFIED DRY DENSITY SPECIFIED IN THE	60% MIN.	AS 1289.6.1.1					
PROJECT AND 100% OF OPTIMUM MOISTURE CONTENT		7.5 1207.5.1.1					
GRADING MODULUS (SEE DEFINITION BELOW THIS TABLE)	1.5 MIN.	-					

R2.2.2 DUST RATIO IS DEFINED AS:

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

R2.2.3 GRADING MODULUS IS DEFINED AS: $300 - (P_{236} - P_{0425} - P_{0075})$

R2.2.4 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.

ARCHITECT/CLIENT

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.A.S.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

°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

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 THIN 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 A	S SIEVE	AC7		AC10		AC14		
19.0mm			-		-		100%	
13.2mm			-		100%		85-100%	
9.50mm			100%		90-1009	%	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	5-7%		5-7%		4.5-6.5	%	
MINIMUM MARSHALL	. STABILITY							
	OF COMPACTED MIX				5.5kN		6.5kN	6.5
MARSHALL FLOW VA	LUE	2-4mm		2-4mm		2-4mm		
PERCENTAGE VOIDS	S IN COMPACTED							

3-5% 3-7% 3-7%

R.3. CONSTRUCTION

MIX TO BE IN THE RANGE OF

R.3.1 SUB-GRADE

R.3.1.1 THE ENTIRE WIDTH OF THE ROAD RESERVE SHALL BE STRIPPED OF ALL ORGANIC AND DELETERIOUS MATERIAL, THEN CUT OR FILLED AS NECESSARY TO CONFORM WITH THE LEVELS GIVEN ON THE DRAWINGS.

R.3.1.2 SUB-GRADE SHALL BE COMPACTED TO NOT LESS THAN 95% OF THE MAXIMUM DRY DENSITY OBTAINED IN MODIFIED MAXIMUM DRY DENSITY COMPACTION TESTS (AS 1289.5.2.1) TO A MINIMUM DEPTH BELOW THE SURFACE OF 300mm. SUB-GRADE SHALL BE FORMED TO GRADE, CROSSFALL ETC. TO ENSURE THAT AN EVEN THICKNESS OF PAVEMENT CAN BE FINALLY ACHIEVED.

R.3.1.3 SUB-BASE OR BASECOURSE CONSTRUCTION SHALL NOT COMMENCE UNTIL SUBGRATE HAS DRIED BACK SUCH THAT THE DRYBACK CHARACTERISTIC MOISTURE CONTENT (DMC) IS EQUAL TO OR LESS TO 85% OR AS OTHERWISE SPECIFIED IN THE PROJECT.

R.3.2 BASE COURSE

R.3.2.1 THE BASE MATERIAL SHALL BE PLACED SO THAT THE SUB-GRADE OR THE SUB-BASE (WHEN A SUB-BASE HAS BEEN SPECIFIED), IS NOT DISTURBED AND BROKEN UP AND THAT AN EVEN THICKNESS IS OBTAINED.

ROAD WORKS (CONTINUE)

R.3.2.2 THE BASE SHALL BE WATERED. COMPACTED AND CUT TO GRADE AND CROSSFALL AS NOTED ON THE DRAWINGS. COMPACTION SHALL BE TO NOT LESS THAN 98% OF THE MAXIMUM DRY DENSITY OBTAINED IN MODIFIED MAXIMUM DRY DENSITY COMPACTION TESTS (AS 1289.5.2.1).

R.3.2.3 THE SURFACE OF THE BASE COURSE AFTER TRIMMING AND COMPACTION SHALL BE EVEN AND TRUE TO THE REQUIRED SHAPE, GRADE AND SURFACE CONDITION READY FOR PRIMING.

R.3.2.4 NO BINDER SHALL BE APPLIED TO A BASECOURSE UNTIL IT HAS DRIED BACK SUCH THAT THE DRYBACK CHARACTERISTIC MOISTURE CONTENT OF BOTH THE UPPER HALF AND LOWER HALF OF THE BASECOURSE LAYER IS EQUAL TO OR LESS TO 60% OR AS OTHERWISE SPECIFIED IN THE PROJECT.

R.3.3 ASPHALTIC CONCRETE SURFACING

R.3.3.1 PRIMER SEAL

R.3.3.1.1 PRIMER SEALING SHALL BE CARRIED OUT UNDER FAVOURABLE WEATHER CONDITIONS AND THE PREPARED BASECOURSE SHALL BE SUFFICIENTLY DRY TO PERMIT ADHERENCE TO AND PENETRATION OF THE BASECOURSE BY THE BITUMEN.

R.3.3.1.2 BEFORE PRIMER SEALING, THE PAVEMENT SHALL BE BROOMED FREE OF ALL LOOSE MATERIAL AND DUST AND ANY DEFECTS SHALL BE MADE GOOD. SHOULD CONDITIONS REQUIRE IT, THE SURFACE SHALL BE LIGHTLY WATERED IMMEDIATELY PRIOR TO THE APPLICATION OF THE

R.3.3.1.3 NO PRIMER SEALING SHALL BE APPLIED WHILST THE PAVEMENT SURFACE TEMPERATURE IS LESS THAN 15°C OR DURING WET, WINDY OR RAINY CONDITIONS, OR WHEN ADVERSE WEATHER CONDITIONS MAY PREVAIL AT ANY TIME DURING OR IMMEDIATELY FOLLOWING THE WORK.

R.3.3.1.4 THE PROPORTION OF CUTTER OIL IN CUT-BACK BITUMEN AND APPLICATION RATE SHALL BE DEPENDANT ON THE CONDITION OF THE BASE SURFACE AND TRAFFIC DENSITY. THE RESIDUAL APPLICATION RATE OF PRIMER BINDER SHOULD BE APPROXIMATELY 0.8 TO 1.0 LITRES PER SQUARE METRE (MEASURED AT 15 DEGREES CELSIUS). HOWEVER, THE CONTRACTOR IS RESPONSIBLE TO ASSESS THE CONDITIONS AND WITH APPROVAL FROM THE LOCAL AUTHORITY (OR ENGINEER WHERE APPLICABLE), ADJUST THESE APPLICATION RATES TO SUIT.

R.3.3.1.5 A BITUMEN EMULSION PRIMER SEAL MAY BE USED BY THE CONTRACTOR WITH PRIOR APPROVAL OF THE LOCAL AUTHORITY (OR ENGINEER WHERE APPLICABLE).

R.3.3.1.6 THE PRIMED SURFACE SHALL BE COVERED WITH 5mm AGGREGATE SCREENINGS AT A SUFFICIENT RATE TO ACHIEVE A UNIFORM DENSE MAT WITH NO EXCESS SURFACE BITUMEN. THE AGGREGATE SHALL BE ROLLED WITH A 6 - 8 TONNE ROLLER UNTIL SCREENINGS ARE FIRMLY EMBEDDED IN THE PRIMER. SHOULD ANY GENERAL CRUSHING OCCUR UNDER THE ROLLERS, SUCH ROLLING SHALL BE STOPPED AND DIRECTION SOUGHT FROM THE LOCAL AUTHORITY (OR ENGINEER WHERE APPLICABLE) REGARDLESS OF THE NUMBER OF ROLLS COMPLETED.

R.3.3.2 OPEN TO TRAFFIC AND PREPARATION OF SURFACE

R.3.3.2.1 IF THE ROAD IS TO BE LEFT OPEN TO TRAFFIC BEFORE FINAL SURFACING, AGGREGATE MUST BE SWEPT WHEREVER REQUIRED TO REMEDY HEAPING AND CORRUGATION AND, AS SOON AS THERE IS NO DANGER OF BITUMEN BEING PICKED UP BY TRAFFIC, THE SURPLUS MAY BE SWEPT OFF.

R.3.3.2.2 PRIOR TO ASPHALTING OCCURRING, THE EXISTING PRIMER SEAL SURFACE SHALL BE INSPECTED AND ANY REQUIRED CORRECTIONS OF DEFECTS AGREED WITH THE LOCAL AUTHORITY (AND ENGINEER WHERE APPLICABLE) SHOULD BE UNDERTAKEN.

R.3.3.2.3 EXCESS BINDER SHALL BE REMOVED FROM ANY FAULTY AREAS, POT-HOLES AND DEPRESSIONS FILLED WITH SUITABLE MATERIAL AND ANY DEVIATIONS TO THE PAVEMENT SHAPE CORRECTED PRIOR TO THE APPLICATION OF THE TACK COAT. IF DIRECTED, THE WHOLE SURFACE MUST BE GIVEN A SECOND PRIMER SEAL COAT.

R.3.3.2.4 POT HOLES SHALL BE REPAIRED BY CUTTING BACK INTO SOUND ROAD MATERIAL WITH VERTICAL FACES, FILLING AND COMPACTING IN LAYERS WITH ROAD BASE MATERIAL, AND RE-SEALED.

ISSUED FOR TENDER DESCRIPTION DRAWN APP'D DATE



LIGHTS BEACH UPGRADE SPECIFICATION SHEET - SHEET 1 OF 2



TENDER ISSUE NOT FOR CONSTRUCTION

301248187 CI-007-GE-N1 mAHD DATUM SCALE @ A1 PROJECT No

PROJECT/TITLE

MGA