SECTION 10 - ROAD PAVEMENT CONSTRUCTION

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10.1 DESCRIPTION

This section covers the requirements for the supply, delivery, spreading and compaction of crushed rock, plant mixed wet-mix crushed rock and cement treated crushed rock, for the construction of pavement courses including shoulders.

10.2 CONFORMITY WITH DRAWINGS

Pavement courses, each consisting of one or more layers, shall after compaction be finished to smooth and uniform surfaces conforming to the limits for level, line, grade, thickness and cross section shown on the drawings or as specified.

(a) Level

The top of each pavement course shall not differ from the specified level by more than 15 mm.

Where pavement is to be constructed to the lip level of kerb and channel, it shall be constructed flush with the lip of the channel or not more than 5 mm above.

(b) Thickness

The subbase course at any point shall be not less than the specified thickness by more than 15 mm and where the subbase consists of two or more layers the thickness of the top layer at any point shall be not less than that specified by more than 10 mm.

The base course at any point shall be not less than the specified thickness by more than 10 mm and where the base consists of two or more layers the thickness of the top layer at any point shall be not less than that specified by more than 5 mm. The average thickness of base over every 100 m section, for the full carriageway width shall be not less than the specified thickness.

The combined thickness of subbase and base courses at any point shall be not less than the specified thickness by more than 15 mm.

(c) Width and Alignment

The widths measured on each side from the specified centreline or design line shall not deviate by more than 50 mm from the designed offset when measured from the nearest point.

(d) Shape

No point on the surface of each layer of base or subbase shall lie more than 10 mm below a 3m straightedge laid parallel to the centreline of the pavement or below a template placed at right angles to the centreline.

10.3 MATERIALS

Unless otherwise specified, the Contractor shall be responsible for the procurement of sufficient specified material to complete the work.

HP Prior to the commencement of work, the Contractor shall confirm the quarry from which the crushed rock material will be obtained.

10.3.1 Description

This section covers the requirements of crushed rock and plant mixed wet-mix crushed rock for Class 1 and 2 base of 20 mm and 40 mm nominal sized produced from igneous or metamorphic source rock, Class 3 sub-base of 20 mm and 40 mm nominal size, Class 4 crushed rock sub-base and cement treated Class 2 crushed rock of 20 mm and 40 mm nominal size.

The classes and nominal sizes shall be as specified in the special clauses, drawings and/or the schedule.

10.3.2 Definitions

Rock Type

Rock is classified as igneous, metamorphic or sedimentary on the basis of the classification scheme detailed in Code of Practice RC/MTD 500.00, Code of Practice for Quarry Investigations.

Material Type

Material from a particular quarry and which is distinguishable on the basis of colour, texture, hardness, the degree of weathering and test properties.

Rock Durability Classification

The classification of a material in terms of the durability requirements of Clause 10.3.3

Source Rock

The insitu rock mass located in a quarry which is used or proposed to be used in the production of crushed rock or aggregate.

Sedimentary rock shall not be used for the production of crushed rock base material.

Crushed Rock

Crushed Rock is composed of crushed rock fragments with or without sands and with or without filler, produced in a controlled manner to close tolerances of grading.

Plant Mixed Wet-Mix Crushed Rock (PMWMCR)

Plant Mixed Wet-Mix Crushed Rock is a mixture of crushed rock and water, produced at a controlled mixing plant to close tolerances of grading and moisture content based on the modified optimum moisture content of the material.

Cement Treated Crushed Rock

Cement treated crushed rock is a mixture of crushed rock fragments, cement and water or crushed rock fragments, sand, cement and water produced at a controlled mixing plant to tolerances of grading, moisture content and cement content.

Unsound Rock

Unsound Rock is that material, whether in the source or as spalls or as crushed particles, which:

(a) is soft, friable, or composed of clay or weathered rock, or which contains matter which breaks up when alternately wetted and dried;
(b) in the case of igneous and metamorphic source rock, has a Degradation Factor – Source Rock less than the minimum value for marginal rock specified in Table 10.3.3.2; or
(c) in addition, in the case of basic igneous rock, has a Secondary Mineral Content greater than the meximum value for marginal rock specified in Table 10.3.3.2; or
(d) in the case of sedimentary rock, has a Texas Ball Mill value greater than the maximum value for marginal rock specified in Table 103.3.2.

Assigned Los Angeles Abrasion Loss

The assigned Los Angeles Abrasion Loss in a hardness rating derived from Los Angles Abrasion test results and is assigned to each source by VicRoads on the basis of past test data obtained from testing products.

10.3.3 Source Rock

Source rock shall be considered sound or marginal in accordance with the provision of Tables 10.3.3.1 and 10.3.3.2.

The hardness of the source rock shall be measured by a Los Angeles Value test on the product and the assigned Los Angeles Value shall comply with the test values shown Table 10.3.3.3.

Table 10.3.3.1 - Sound Rock

Rock Type	Test Value			
	Degradation Factor Source Rock (min)	Secondary Mineral Content (%) (max)	Accelerated Soundness Index (min)	Texas Ball Mill Value (max)
ACID IGNEOUS				
Granitic Rocks	50	-	-	-
Other Acid Igneous	45	-	-	-
INTERMEDIATE IGNEOUS				
Trachyte	50	-	-	-
Other Intermediate Igneous	45	-	-	-
BASIC IGNEOUS Basaltic Rocks	50	25	94	-
METAMORPHIC				
Hornfels	40	-	-	-
Other metamorphic	45	-	-	-
SEDIMENTARY				
Argillaceous Sediments	-	-	-	30
Arenaceous Sediments	-	-	-	45

Table 10.3.3.2 - Marginal Rock

Rock Type	Test Value			
	Degradation Factor Source Rock (range)	Secondary Mineral Content (%) (range)	Accelerated Soundness Index (range)	Texas Ball Mill Value (range)
ACID IGNEOUS				
Granitic Rocks	35-49	-	-	-
Other Acid Igneous	35-44	-	-	-
INTERMEDIATE IGNEOUS				
Trachyte	30-49	-	-	-
Other Intermediate Igneous	35-44	-	-	-
BASIC IGNEOUS	30-49	26-30	90-93	-
METAMORPHIC				
Hornfels	20-39	-	-	-
Other metamorphic	30-44	-	-	-
SEDIMENTARY				
Argillaceous Sediments	-	-	-	31-35

Arenaceous Sediments	-	-	-	46-55

Table 10.3.3.3 Los Angeles Abrasion Loss

Rock Type	Los Angeles Value (max)			
	Base		Sub-Base	
	Class 1	Class 2	Class 3	Class 4
ACID IGNEOUS				
Granitic Rocks	40	40	45	-
Other Acid Igneous	25	25	30	-
INTERMEDIATE IGNEOUS				
Trachyte	30	30	35	-
Other Intermediate Igneous	25	25	30	-
BASIC IGNEOUS	30	30	35	-
METAMORPHIC				
Hornfels	25	25	25	-
Other Metamorphic	30	30	35	-
SEDIMENTARY				
Argillaceous Sediments	-	-	25	-
Arenaceous Sediments	-	-	45	-

If the Contractor proposes to use a source rock type other than those listed in Tables 10.3.1 and 10.3.2 the Superintendent will determine whether the rock type is acceptable and will set appropriate test values.

The Superintendent's approval shall be obtained prior to changing the source of material. If at any time the Contractor proposes to obtain material from a source other than the confirmed source, the Superintendent shall be notified in sufficient time so that investigations, as may be required, can be carried out before approval is given.

Source rock which does not comply with the specified durability and hardness requirements but from which crushed rock and aggregates of proven satisfactory performance have been produced may be accepted for use subject to the written approval of the Superintendent.

10.3.4 Components

(a) Crushed rock fragments shall consist of clean, hard, durable, angular fragments of rock.

The use of crusher fines produced from a quarry, or a location within a quarry, different from that used for production of that fraction of the crushed rock retained on a 4.7 mm AS sieve shall be subject to approval in writing by the Superintendent to the proposed source and nature of these materials and the proposed amounts to be added.

(b) Crusher fines produced from any igneous or metamorphic rock shall have a Degradation Factor – Crusher Fines not less than 60.

The use of sands and/or filler shall be subject to approval in writing by the Superintendent to the proposed sources and nature of such materials, the proposed amounts to be added and the proposed method of incorporation of such materials into the product.

10.3.5 Product

(a) The crushed rock shall be free from vegetable matter and lumps or balls of clay and shall comply with the relevant requirements of Table 10.3.5.1.

Table 10.3.5.1

Test	Test Value			
	Base		Sub-Base	
	Class 1	Class 2	Class 3	Class 4
Liquid Limit % (max)	25	30	35	40
Plasticity Index (max)	3	6	10	20
California Bearing Ratio % (min)*	-	-	-	15
PI x % passing 0.425 As Sieve (max)	-	-	-	600
Sand Equivalent (min) **	55	50	-	-

* Value applicable to material 19.0 mm sieve: initially at Modified optimum moisture content and dry density equal to 95% of max dry density obtained in using Modified compactive effort, but then soaked for 4 days prior to the CBR test.
** The Superintendent may specify other values of sand equivalent on the basis of tests carried out on crushed rock which complies with the specified requirements fro grading and plasticity.

(b) Unsound and marginal rock in that fraction of the product retained on a 4.75 mm AS sieve shall not exceed the percentages specified in Table 10.3.5.2. Where two or more aggregates are combined to produce the crushed rock and no facilities exist in the mixing plant to sample the mixture, unsound and marginal rock in that fraction of each aggregate retained on a 4.75 mm AS sieve shall not exceed the percentages specified in Table 10.3.5.2.

Table 10.3.5.2

Class	Total of Marginal and Unsound Rock % (max)	Unsound Rock % (max)
1	10	5
2	10	5
3	20	10
4	-	-

(c) For Plant Mixed Wet-Mixed Crushed Rock, the aggregates and water shall be mixed at a mixing plant by continuous or batch plant.

(d) For Cement Treated Crushed Rock, the aggregates shall conform to the material gradings and physical properties as specified for crushed rock of 20 mm and 40 mm nominal size.

Cement content shall be added and mixed into the crushed rock at a mixing plant to produce a uniform cement content. After mixing, the cement content, expressed as a percentage by mass of the dry crushed rock, shall be within ± 0.3 of the value as specified on the drawings or the schedule.

10.4 ADDITION OF WATER

Where it is specified that water shall be added to the crushed rock prior to delivery, such water shall be clear, clean and substantially free from detrimental impurities such as oils, salts, and, alkalis and vegetable substances.

10.5 GRADING OF UNCOMPACTED CRUSHED ROCK AND PMWMCR BASE

After completion of production, but before compaction, crushed rock and PMWMCR base shall comply with the relevant grading requirements of Tables 10.5.1 to 10.5.6 corresponding to the assigned Los Angeles Abrasion Loss and the nominal size of the material.

The Contractor shall aim to produce the crushed rock and PMWMCR in such a way that the grading coincides with the relevant target grading specified in Tables 10.5.1 to 10.5.6. The permitted ranges of grading in these tables provide for random fluctuations in the production process.

Grading Requirements for 20 mm Base (by Mass)

Table 10.5.1
Assigned Los Angeles Abrasion Loss: **25 or less**. Igneous (other than granite) and metamorphic source rock.

Sieve Size AS (mm)	Target Grading (% Passing)	Test Value before Compaction	
		Limits of Grading (% Passing)	% Retained between Sieves
26.5	100	100	
19.0	100	95 – 100	0 – 5
13.2	85	78 – 92	7 – 18
9.5	73	63 – 83	10 – 16
4.75	54	44 – 64	14 – 24
2.36	39	30 – 48	10 –20
0.425	18	14 – 22	14 – 28
0.075	8	6 –10	6 – 13

Table 10.5.2
Assigned Los Angeles Abrasion Loss: **26 or more**. Igneous (other than granite) and metamorphic source rock.

Sieve Size AS (mm)	Target Grading (% Passing)	Test Value before Compaction	
		Limits of Grading (% Passing)	% Retained between Sieves
26.5	100	100	
19.0	100	95 – 100	0 – 5
13.2	85	78 – 92	7 – 18
9.5	73	63 – 83	10 – 16
4.75	54	44 – 64	14 – 24
2.36	38	29 – 47	10 –21
0.425	16	12 – 20	15 – 29
0.075	4	2 – 6	9 – 15

Table 10.5.3
Granitic Source Rock.

Sieve Size AS (mm)	Target Grading (% Passing)	Test Value before Compaction	
		Limits of Grading (% Passing)	% Retained between Sieves
26.5	100	100	
19.0	100	95 – 100	0 – 5
13.2	85	78 – 92	7 – 18
9.5	73	63 – 83	10 – 16
4.75	54	44 – 64	14 – 24
2.36	39	30 – 48	10 –20
0.425	17	13 – 21	15 – 29
0.075	7	5 – 9	7 – 14

Grading Requirements for 40 mm Base (by Mass)

Table 10.5.4
Assigned Los Angeles Abrasion Loss: **25 or less**. Igneous (other than granite) and metamorphic source rock.

Sieve Size AS (mm)	Target Grading (% Passing)	Test Value before Compaction	
		Limits of Grading (% Passing)	% Retained between Sieves
53.0	100	100	
37.5	100	95 – 100	0 – 5
26.5	85	80 – 90	9 – 15
19.0	74	66 – 82	7 - 15
9.5	54	44 – 64	17 - 23
4.75	39	29 – 49	10 –20
2.36	29	21 – 37	4 - 16
0.425	13	10 –17	10 – 22
0.075	6	5 – 8	3 - 10

Table 10.5.5
Assigned Los Angeles Abrasion Loss: **26 or more**. Igneous (other than granite) and metamorphic source rock.

Sieve Size AS (mm)	Target Grading (% Passing)	Test Value before Compaction	
		Limits of Grading (% Passing)	% Retained between Sieves
53.0	100	100	
37.5	100	95 – 100	0 – 5
26.5	85	80 – 90	9 – 16
19.0	74	66 – 82	7 – 15
9.5	54	44 – 64	17 – 23
4.75	39	29 – 49	10 –20
2.36	29	22 – 35	5 – 17
0.425	11	8 – 13	13 – 22
0.075	3	2 – 5	5 – 10

Table 10.5.6
Granitic Source Rock.

Sieve Size AS (mm)	Target Grading (% Passing)	Test Value before Compaction	
		Limits of Grading (% Passing)	% Retained between Sieves
53.0	100	100	
37.5	100	95 – 100	0 – 5
26.5	85	80 – 90	9 – 15
19.0	74	66 – 82	7 – 15
9.5	54	44 – 64	17 – 23
4.75	39	29 – 49	10 –20
2.36	29	21 – 37	4 – 16
0.425	11	9 – 15	11 – 22
0.075	3	4 – 7	4 – 10

The Superintendent may change the target grading requirements pertaining to the 2.36 mm, 0.425 mm and 0.075 mm sieves specified in Tables 10.5.1 to 10.5.6. Notwithstanding any change made to the target grading, the magnitude of the range of limits of grading will remain unchanged and the range will remain centred on the target grading. No additional payment will be made unless the change from the specified requirements exceeds two (2) percentage units above the 2.36 mm and 0.425 mm sieves or one percentage unit for the 0.075 mm sieve.

10.6 GRADING OF UNCOMPACTED CRUSHED ROCK AND PMWMCR SUB-BASE

(a) Class 3 Sub-base

After completion of production, but before compaction, Class 3 crushed rock and PMWMCR sub-base shall comply with the relevant grading requirements of Tables 10.6.1 to 10.6.4 corresponding to the assigned Los Angeles Abrasion Loss and the nominal size of the material.

The Contractor shall aim to produce the crushed rock and PMWMCR in such a way that the grading coincides with the relevant target grading specified in Tables 10.6.1 to 10.6.4. The permitted ranges of grading in these tables provide for random fluctuations in the production process.

The crushed rock shall not be graded from near the coarse limit on one sieve to near the fine limit on the following sieve or vice versa.

Grading Requirements for Class 3, 20 mm Sub-Base (by Mass)

Table 10.6.1
Assigned Los Angeles Abrasion Loss: **25 or less**. Igneous (other than granite) and metamorphic source rock.

Sieve Size AS (mm)	Target Grading (% Passing)	Test Value before Compaction
		Limits of Grading (% Passing)
26.5	100	100
19.0	100	95 – 100
13.2	85	75 – 95
9.5	75	60 – 90
4.75	59	42 – 76
2.36	44	28 – 60
0.425	21	14 – 28
0.075	10	6 –13

Table 10.6.2
Assigned Los Angeles Abrasion Loss: **26 or more**. Igneous and metamorphic source rock, and all sedimentary and granitic source rock.

Sieve Size AS (mm)	Target Grading (% Passing)	Test Value before Compaction
		Limits of Grading (% Passing)
26.5	100	100
19.0	100	95 – 100
13.2	85	75 – 95
9.5	75	60 – 90
4.75	59	42 – 76
2.36	44	28 – 60
0.425	21	10 – 28
0.075	10	2 –10

Grading Requirements for Class 3, 40 mm Sub-Base (by Mass)

Table 10.6.3
Assigned Los Angeles Abrasion Loss: **25 or less**. Igneous (other than granite) and metamorphic source rock.

Sieve Size AS (mm)	Target Grading (% Passing)	Test Value before Compaction
		Limits of Grading (% Passing)
53.0	100	100
37.5	100	95 – 100
26.5	85	75 – 95
19.0	77	64 – 90
9.5	60	42 – 78
4.75	46	27 – 64
2.36	35	20 – 50
0.425	17	10 –23
0.075	9	6 – 12

Table 10.6.4
Assigned Los Angeles Abrasion Loss: **26 or more**. Igneous and metamorphic source rock, and all sedimentary and granitic source rock.

Sieve Size AS (mm)	Target Grading (% Passing)	Target Grading (% Passing)
		Limits of Grading (% Passing)
53.0	100	100
37.5	100	95 – 100
26.5	85	75 – 95
19.0	77	64 – 90
9.5	60	42 – 78
4.75	46	28 – 64
2.36	35	20 – 50
0.425	15	7 – 23
0.075	6	2 – 9

The Superintendent may change the target grading requirements pertaining to the 2.36 mm, 0.425 mm and 0.075 mm sieves specified in Tables 10.6.1 to 10.6.4. Notwithstanding any change made to the target grading, the magnitude of the range of limits of grading will remain unchanged and the range will remain centred on the target grading. No additional payment will be made unless the change from the specified requirements exceeds two (2) percentage units above the 2.36 mm and 0.425 mm sieves or one percentage unit for the 0.075 mm sieve.

(b) Class 4 Sub-base

After completion of production, but before compaction, Class 4 crushed rock sub-base shall comply with the relevant grading requirements of Tables 10.6.5. The crushed rock shall not be graded from near the coarse limit on one sieve to near the fine limit on the following sieve or vice versa.

Class 4 crushed rock of nominal size differing from that specified may be accepted by the Superintendent provided it meets the grading requirements of Table 10.6.5. corresponding to a nominal size adjacent to that specified.

Grading Requirements for Class 4 Crushed Rock Sub-base (by mass)

Table 10.6.5

Sieve Size AS (mm)	Test Value before Compaction – Limits of Grading (% Passing)							
	Nominal Size (mm)							
	50	40	30	25	20	14	10	5
75.0	100							
53.0		100						
37.5			100	100				
26.5					100			
19.0	54-75	64-90				100	100	
9.5			48-70	54-75				100
4.75					42-76	54-75	64-84	
2.36								65-84
0.425	7-21	7-23	9-24	10-26	10-28	15-32	18-35	26-45
0.075	2-10	2-12	2-12	2-13	2-14	6-17	7-18	10-23

10.7 MOISTURE CONTENT

(a) Crushed Rock

Where payment is to be made on a mass basis, the average moisture content of crushed rock at the plant shall not exceed 3.5% by mass unless otherwise specified or unless the Contractor has, at the time of tendering, nominated an upper limit of average moisture content greater than 3.5%. In the latter case the difference between the nominated value and the specified value will be taken into account when tenders are being considered. The average moisture content of crushed rock supplied on any one day will be determined from three samples taken at random from that day's supply. If the average moisture content is greater than that specified or nominated, the material may be rejected. If at the discretion of the Superintendent the material is accepted, payment will be made for the mass determined by deducting the calculated mass of excess moisture from the net mass shown on the delivery dockets.

(b) PMWMCR

Where the work of the Contract includes supply and delivery only, the moisture content of the mixture at the point of delivery, expressed as a percentage by mass, shall be within ± 10% of the target nominated from time to time by the Superintendent.

(c) Cement Treated Crushed Rock

The moisture content of the materials at the time of spreading, expressed as a percentage by mass, shall not differ from the modified optimum moisture content, as appropriate by ± 10%.

10.8 STOCKPILING PRIOR TO DELIVERY

Material may be stockpiled prior to delivery provided the following requirements are fulfilled:

(a) the product, after recovery from the stockpile, complies with this specification;
(b) the stockpile site is clean, adequately paved, and well drained;
(c) if a stockpile is constructed in more than one layer, each layer is fully contained within the area occupied by the upper surface of the preceding layer; and
(d) no cementitious filler is used.

10.9 HANDLING OF MATERIALS

Handling of materials, including the loading of trucks and stockpiling, shall be effected in such a manner as to minimise segregation.

10.10 MINIMUM TESTING REQUIREMENTS

The Contractor shall test the crushed rock, PMWMCR and Cement Treated crushed rock at a frequency which is sufficient to ensure that each class and nominal size of material supplied under the contract complies with the specified requirements.

The frequency shall not be less than that shown in Table 10.10.1, except that the Superintendent may agree to a lower frequency where the Contractor has implemented a system of statistical process control and can demonstrate that such lower frequency is adequate to assure the quality of the product.

Table 10.10.1 – Minimum Frequency of Testing

Test	Minimum Frequency of Testing
Sand equivalent +	On each day – one per 300 tonnes or part thereof
Grading	On each day – one per 300 tonnes or part thereof
Unsound rock ++	On each day – one per 300 tonnes or part thereof
Moisture Content +++ - Crushed Rock - PMWMCR - Cement Treated Crushed Rock	 On each day – 3 no. On each day - one per 300 tonnes or part thereof On each day - one per 300 tonnes or part thereof
Plasticity Index	**Classes 1, 2 & 3** In each month – one per 20,000 tonnnes or part therof **Class 4** One per 1,000 tonnes or part thereof
California Bearing Ratio ++++	Prior to the commencement of work and when in the opinion of the Superintendent the nature of the material has changed significantly.
Degradation Factor – Crusher Fines (imported)	One per day
+ Not applicable to Class3 and Class 4 Sub-base ++ Not applicable to Class 4 Subbase +++ Applicable only when payment is to be made on a mass basis ++++ Applicable to Class 4 subbase	

10.11 DELIVERY DOCKETS

Where material is scheduled for measurement by loose volume in delivery vehicles or by mass, a delivery docket for each load shall be issued to the Superintendent at the point of delivery.

Where material is measured by other means and for Lump Sum Contracts, the Contractor shall make delivery dockets available for inspection on request by the Superintendent.

Delivery dockets shall show:

(a) name of the supplier, and location of plant;

(b) docket number;

(c) name of user;

(d) project name and location (or contract number);

(e) registered number or fleet number of the vehicle;

(f) date and time of loading;

(g) nature and source of material;

(h) empty and loaded masses of the vehicle (where material is scheduled for measurement by mass);

(i) loose volume in delivery vehicle.

10.12 SPREADNG OF FINE CRUSHED ROCK

As specified in Section 4 – Earthworks the whole of the road bed shall be compacted and approved before any pavement material is spread.

The road pavement material shall be spread in even and equal layers; each layer to be of maximum loose thickness of 150 mm.

The bottom course shall be spread and compacted before the top course is spread, and the Contractor shall keep the bottom course graded and maintained during the spreading of the top course, as herinafter specified.

Where the excavation is below the design level of the underside of any proposed kerb and channel the base course shall be spread and thoroughly compacted to a level to provide bedding for the kerb and channel as specified in Section 7 – Concrete Kerb and Channel.

Spreading shall commence at a point on the road nearest the sources of supply, and shall continue from the point, so that the spread pavement material will receive traffic and compaction by the vehicles used for cartage.

The pavement material shall be spread direct from tipping trucks in an even continuous layer. The Contractor shall be responsible for spreading the material uniformly, but will be permitted to move the material by graders to obtain this uniformity, provided that there is no segregation of fine and course material, and that complete compaction is subsequently obtained.

All material shall be spread accurately to level pegs and control of longitudinal shape and cross sections and shall be maintained by means of boning rods and/or string lines used continuously during the spreading of material.

Plant mixed wet-mixed crushed rock shall be spread with a self propelled paver unless otherwise approved by the Superintendent. Care shall be taken to minimise segregation of material. If segregation occurs in plant mixed wet-mixed crushed rock, the segregated material shall be replaced at the Contractor's expense.

If segregation occurs in crushed rock, the segregated material shall be mixed and respread using methods agreed to by the Superintendent.

Unless otherwise specified or shown on the drawings, the compacted thickness of any layer of any course shall not exceed 150 mm or be less than three (3) times the nominal size of the material.

10.13 COMPACTION

Compaction shall commence promptly after spreading and all material spread each day shall be compacted sufficiently to provide a dense surface to minimise the entry of water in the event of rain.

Compaction of the pavement shall be effected with an approved machine loaded to twelve (12) tonnes or a vibrating roller of this effective weight and by continuous grading to maintain the correct shape. Construction and ordinary traffic shall be directed to assist uniform compaction of the pavement.

The crushed rock shall be compacted at a moisture content of not less than 85% or more than 115% of optimum moisture content to a dry density of not less than 95% of the maximum value obtained in the Modified Compaction Test carried out in accordance with AS 1289 – 5.2.1: 1993 except that material within 100 mm of the finished surface levels shall be compacted to a dry density of not less than 98% of this value.

After completion of compaction of a layer the moisture content of the material in the layer shall be maintained within the range specified until test rolling has been completed.

Unless otherwise directed by the Superintendent in place density and moisture content shall be measured by means of a nuclear gauge calibrated in accordance with AS 1289 – E8.4.

On completion of compaction any segregated areas shall be rectified. The method of rectification shall be reviewed by the Superintendent.

10.14 REQUIREMENTS FOR TESTING AND ACCEPTANCE OF COMPACTION

The Contractor shall submit to the Superintendent for review a programme for compaction testing. The programme shall indicate the number, spacing and location of tests.

(a) Material of nominal size 40 mm or less

Material which will have a nominal size after compaction of 40 mm or less shall be compacted to comply with the following requirements.

The calculation of density ratio shall be based on tests performed using Modified compactive effort. The work shall be assessed for compliance with requirements for testing and acceptance of compaction as specified in Clause 10.14 (c) and as provided in Table 10.14.1

A lot shall consist of a single layer of work and its size shall not exceed that given in Table 10.14.2.

All pavement layers shall be compacted to withstand rolling and shall be test rolled in accordance with Section 4.15, prior to acceptance of the layer.

Table 10.14.1 - Requirements for Lot Acceptance of Compaction

Characteristic Value of Density Ratio %		Assessment
Base	Subbase	
Not less than 98.0	Not less than 95.0	Accept lot
97.0 to 97.9	94.0 to 94.9	Re-roll as agreed with the Superintendent
Less than 97.0	Less than 94.0	Reject lot

The extent of re-rolling proposed by the Contractor to be undertaken as referred to in Table 10.14.1 shall be reviewed by the Superintendent.

Where agreement cannot be reached, the re-rolling shall be carried out as proposed by the Contractor. However, the Superintendent may direct the Contractor to carry out compaction testing to confirm acceptance of the lot.

No additional payment will be made for any requirement to carry out confirmation compaction testing so directed.

(b) Material of nominal size greater than 40 mm

Unless otherwise specified, material which will have a nominal size after compaction greater than 40 mm shall be compacted using a grading, mixing, watering and rolling procedure proposed by the Contractor and reviewed by the Superintendent.

The Superintendent may require that trial sections be constructed to verify that the proposed compaction routine is acceptable. No additional payment will be made for any such request.

The calculation of density ratio shall be based on tests performed using Modified compactive effort.

Acceptance of work as far as compaction is concerned will be based on compliance with the accepted compaction routine and test rolling carried out in accordance with Section 4.15.

Any unstable areas detected by test rolling shall be rectified by the Contractor.

If required by the Superintendent, further test rolling shall be carried out by the Contractor on the pavement layer prior to being covered by a successive layer.

No additional payment will be made for any requirement to carry out such further test rolling.

(d) Minimum Testing Requirements

The Contractor shall carry out testing at a frequency which is sufficient to ensure that work performed under the Contract complies with the specified requirements but which is not less than six tests per lot size shown in Table 10.14.2.

*** **Table 10.14.2 - Minimum Frequency of Testing for Compaction**

Material	Acceptable Lot Size * in a Single Layer of Work
Base	2400 m^2 or one day's production
Subbase	5000 m^2 or one day's production
* Where alternative acceptable lot sizes have been specified, the smaller lot size shall apply.	

The Contractor shall initially test every lot for acceptance in accordance with the requirements of the Specification. Testing of every lot shall continue until three consecutive lots of like material or work have achieved the specified standard when tested for the first time. The Contractor may reduce the frequency of testing to the minimum testing requirements specified after satisfying the above requirement.

If the Contractor has satisfied the above requirement and is testing lots at the minimum frequency and any lot fails to achieve the specified standard, the Contractor shall test all subsequent lots until three consecutive lots of like material or work have achieved the specified standard, at which time the frequency of testing may again be reduced to the minimum requirements.

10.15 PROTECTION OF COMPACTED LAYERS

The surface of any compacted layer shall be kept moist, in good order and condition and free from contamination until any subsequent pavement work under the Contract is commenced or the Superintendent accepts and takes responsibility for that part of the Works.

10.16 GRADING OF PAVEMENT MATERIAL AFTER COMPACTION

Material shall comply with the relevant grading requirements of Tables 10.16.1, 10.16.2 and 10.16.3 respectively following completion of compaction.

Table 10.16.1 - Grading Requirements for Base Crushed Rock After Compaction

Sieve Size (mm)	Permitted Grading After Compaction (% Passing)	
	Nominal Size (mm)	
	20	40
53.0		100
37.5		95 - 100
26.5	100	80 - 90
19.0	95 - 100	66 - 82
13.2	78 - 92	-

9.5	63 - 83	44 - 64
4.75	44 - 64	29 - 49
2.36	30 - 49	21 - 38
0.425	14 - 23	10 - 18
0.075	6 - 11	5 - 9

Table 10.16.2 - Grading Requirements for Class 3 Subbase Crushed Rock After Compaction

Sieve Size (mm)	Permitted Grading After Compaction (% Passing)	
	Nominal Size (mm)	
	20	40
53.0		100
37.5		95 - 100
26.5	100	75 - 95
19.0	95 - 100	64 - 90
13.2	75 - 95	-
9.5	60 - 90	42 - 78
4.75	42 - 76	27 - 64
2.36	28 - 61	20 - 51
0.425	14 - 29	10 - 24
0.075	6 - 14	6 - 13

10.17 PREPARATION FOR SPRAYED BITUMINOUS SURFACING

Where the work of the contract includes preparation of the pavement surface for sprayed bituminous surfacing, the provisions of this clause shall apply.

The pavement shall be scarified to a depth of 100 mm and the whole of the loose material thoroughly mixed by blading with a power grader. Water shall be added by approved watering plant to obtain optimum water content prior to setting down the surface.

The surface shall be graded and rolled using a 12 tonne self propelled pneumatic multi-tyred roller, tyre pressure of 600 Kpa and 12 tonne steel drum roller to obtain a true cross-section and a thoroughly compacted pavement with a tightly bonded surface. Water shall be added as required to obtain the required compaction and surface condition.

On completion of compaction, any segregated areas shall be rectified. The method of rectification shall be reviewed by the Superintendent.

In place density tests on the final prepared pavement shall be carried out by the Contractor at the frequency as set out in Clause 10.14 (d) and at locations agreed to in the "programme for compaction testing" as referred to under Clause 10.14.

HP An inspection of the shape and surface conditions shall take place prior to approval of the prepared pavement for sealing.

NO PAVEMENT WILL BE CONSIDERED SUITABLE FOR SEALING UNLESS ALL OTHER WORKS WITHIN THE ADJACENT ROAD RESERVE HAVE BEEN COMPLETED.

The Contractor shall maintain the pavement in the accepted condition until surfacing works are commenced. Should the pavement condition deteriorate before surfacing works are commenced, the Contractor shall re-prepare the pavement and re-present the pavement for approval.

10.18 PREPARATION FOR HOT ASPHALT SURFACING

Where the work of the contract includes preparation of the pavement surface for hot asphalt surfacing, the provisions of this clause shall apply.

The pavement shall be scarified to a depth of 100 mm and the whole of the loose material thoroughly mixed by blading with a power grader. Water shall be added by approved watering plant to obtain optimum water content prior to setting down the surface.

The surface shall be graded and rolled using a 12 tonne self propelled pneumatic multi-tyred roller, tyre pressure of 600 Kpa and 12 tonne steel drum roller to obtain a true cross-section and a thoroughly compacted pavement with a tightly bonded surface. Water shall be added as required to obtain the required compaction and surface condition.

On completion of compaction, any segregated areas shall be rectified. The method of rectification shall be reviewed by the Superintendent.

In place density tests on the final prepared pavement shall be carried out by the Contractor at the frequency as set out in Clause 10.14 (d) and at locations agreed to in the "programme for compaction testing" as referred to under Clause 10.14.

HP An inspection of the shape and surface conditions shall take place prior to approval of the prepared pavement for sealing.

The Contractor shall maintain the pavement in the accepted condition until surfacing works are commenced. Should the pavement condition deteriorate before surfacing works are commenced, the Contractor shall re-prepare the pavement and re-present the pavement for approval.