

End Product Specification for Asphalt Concrete - 4112

Section	Topic
1	General
2	Materials
3	Asphalt Mix Design and Job Mix Formula
4	Construction
5	Sampling and Testing
6	Acceptance, Rejection and Repairs
7	Warranty
8	Measurement
9	Payment

1 GENERAL

1.1 Description

- 1.1.1 The Work shall consist of mixing aggregates and asphalt cement in a hot mix plant, and spreading and compacting the mixture on a prepared surface to produce an end product complying with the requirements of this Specification.

1.2 Definitions

- 1.2.1 The following definitions shall apply for this Specification:

- 1.2.1.1 Acceptance Limits are the limiting values by which a Block, Sublot or Lot will be accepted, and shall include the following:

- 1.2.1.1.1 Compaction – Acceptance Limit is the limiting value of the Lot Mean within which the Lot will be accepted at full, increased, or reduced payment, as shown in Table 4112.9.T5.

- 1.2.1.1.2 Asphalt content, Aggregate Gradation and Marshall air voids – Acceptance Limits are the limiting values of the Mean of Deviations within which the Lot will be accepted at full or reduced payment as shown in Table 4112.9.T6 for asphalt content and Table 4112.9.T7 for gradation.
 - 1.2.1.1.2.1 Acceptance Limits for Marshall air voids are the limiting values of the Mean of Deviations within which the Lot will be accepted at full, increased or reduced payment as shown in Table 4112.9.T8 and a Lot Mean for Marshall air voids from 2.5% to 5.0%.
- 1.2.1.1.3 Smoothness – Acceptance Limits are the limiting values of the Profile Index (PrI) within which a Block will be accepted at full, increased, or reduced payment, as shown in Table 4112.9.T9.
- 1.2.1.1.4 Individual Bump and/or Dip – Acceptance Limit is the limiting value of the bump or dip that will be accepted at full or reduced payment as shown in Table 4112.9.T10.
- 1.2.1.2 Acceptance Testing is the testing performed by the Engineer to determine compliance with the Specification requirements, limits and tolerances for the quality of materials and workmanship supplied.
- 1.2.1.3 Asphalt is the asphalt cement material being added as bituminous binder.
- 1.2.1.4 Asphalt Concrete is the Asphalt Mix in place on the road, including levelling and surface courses, during and after spreading and compacting.
- 1.2.1.5 Asphalt Mix is the mix after the aggregate and Asphalt have been blended together.

- 1.2.1.6 Asphalt Mix Design is the laboratory determination of the proportions of the Asphalt Mix components to be blended together to meet the specified properties for the Asphalt Mix.
- 1.2.1.7 Block is the unit of measure for assessing Smoothness and Individual Bumps and/or Dips. A Block is a portion of the final lift of Asphalt Concrete that is one paver width wide and 100 m long. For end sections of a Project not equalling 100 m in length, the section will be considered a Block if it is at least 50 m long, or it will be combined with the adjacent 100 m long section if it is less than 50 m long. In both cases, the summation of the deviations will be prorated to be consistent with a 100 m Prl.
- 1.2.1.8 Echelon Paving is defined as the paving of adjacent mats simultaneously with separate pavers with the mats being compacted in one operation.
- 1.2.1.9 Individual Bump and/or Dip is a bump or dip measured in the vertical direction that exceeds 8.4 mm.
- 1.2.1.10 Job Mix Formula (JMF) is the field proportions of Asphalt, Reclaimed Asphalt Pavement, additives, and all virgin aggregates to be blended together to meet the specified properties for the Asphalt Mix produced at the plant and approved by the Engineer.
- 1.2.1.11 Lot is approximately 3 000 t of Asphalt Concrete which is assessed as a unit for the purpose of payment and selected to represent work produced by essentially the same process and materials. If the final unit of work being considered is less than 1 500 t, it will be combined with the previous 3 000 t and constitute the final Lot. If the final unit of work is $\geq 1\,500$ t, the work will represent the final Lot. At the discretion of the Engineer, any unit of work may be deemed a Lot for acceptance purposes.
- 1.2.1.12 Lot Mean is the arithmetic average of the test results within a Lot.
- 1.2.1.13 Maximum Theoretical Density (MTD) is the density, in kilograms per cubic metre, of a theoretical voidless asphalt mixture (i.e. air voids = 0) at a temperature of 25° C.
- 1.2.1.14 Mean of Deviations is the sum of the absolute values of the deviations from the JMF divided by the number of tests in the Lot.

1.2.1.15 Percent Manufactured Fines is the proportion of material passing the 5.0 mm sieve in the combined asphalt concrete aggregate blend that has been crusher-processed. The formula used to calculate the Percent Manufactured Fines (%MF) is as follows:

$$\% \text{ MF} = [(\% \text{ CC mix} * \% \text{ Fines CC}) + (\% \text{ CF mix} * \% \text{ Fines CF}) + ((\% \text{ RAP mix} * \% \text{ Fines RAP}) * \% \text{ MF RAP})] / (\% \text{ Fines mix})$$

Where:

% CCmix = % Crushed Coarse aggregate in the total combined aggregate blend

% Fines CC = % passing the 5 mm sieve in the Crushed Coarse aggregate stockpile

% CFmix = % Crushed Fines aggregate in the total combined aggregate blend

% Fines CF = % passing the 5 mm sieve in the Crushed Fines aggregate stockpile

% Finesmix = % passing the 5 mm sieve in the total combined aggregate blend

% RAPmix = % Reclaimed Asphalt Pavement in the total combined aggregate blend

% Fines RAP = % passing the 5 mm sieve in the RAP stockpile

% MF RAP = % Manufactured Fines passing the 5 mm sieve of the RAP

When:

- 16 mm top size materials is being reclaimed, 45% shall be used
- 12.5 mm top size materials is being reclaimed, 55% shall be used,
- If % MF of original asphalt mix is known add 7%.

- 1.2.1.16 Profile Index (Prl) is the sum of the vertical deviations outside the 5 mm null band that a roadway deviates from a perfectly flat surface over a horizontal distance of 100 m. The Prl categories are as follows:
- 1.2.1.16.1 Category I Prl applies to all Blocks not identified below as Category II Prl.
 - 1.2.1.16.2 Category II Prl applies to the following circumstances
 - 1.2.1.16.2.1 Curves with radius less than 600 m;
 - 1.2.1.16.2.2 Blocks within 50 m of a bridge or railway crossing;
 - 1.2.1.16.2.3 Single lift of Asphalt Concrete over undisturbed pre-existing surfacing structures where the total thickness of Asphalt Concrete placed is 50 mm or less;
 - 1.2.1.16.2.4 Areas where there is curb and gutter; and
 - 1.2.1.16.2.5 The Block at each construction limit.
 - 1.2.1.17 Quality Control is the testing and inspection performed by the Contractor to determine and monitor the properties of the materials produced and incorporated into the Work.
 - 1.2.1.18 Reclaimed Asphalt Pavement is Asphalt Concrete reclaimed from existing pavement.
 - 1.2.1.19 Rejection Limits are the limiting values beyond which a Block, Sublot or Lot will be rejected, and shall include the following:
 - 1.2.1.19.1 For Compaction is the limiting value of the Lot Mean beyond which the Lot will be rejected and not paid for, as shown in Table 4112.9.T5.

- 1.2.1.19.2 For Asphalt content and Aggregate Gradation is the limiting values of the Mean of Deviations beyond which the Lot will be rejected and not paid for, as shown in Table 4112.9.T6 for asphalt content and Table 4112.8.T7 for gradation.
- 1.2.1.19.3 For Marshall air voids the limiting values of the Mean of Deviations beyond which the Lot will be rejected and not paid for, as shown in Table 4112.9.T8 or a Lot Mean for Marshall air voids less than 2.5% or greater than 5.0%.
- 1.2.1.19.4 For Smoothness is the limiting value of the Profile Index (Prl) beyond which a Block will be rejected and not paid for as shown in Table 4112.9.T9.
- 1.2.1.19.5 For Individual Bumps and/or Dips is the limiting value of the bump or dip as shown in Table 4112.9.T10 beyond which the Block will be rejected and not paid for.
- 1.2.1.20 Segregation is defined as an area of the pavement where the texture differs visually from the texture of the surrounding pavement. For the purposes of classifying pavement segregation, only segregated areas greater than 0.1 m² and centre-of-paver streaks greater than 1 m in length will be considered. Moderate or severe segregated areas which do not meet these size parameters will be considered Surface Defects. Pavement segregation severity will be classified as follows:
 - 1.2.1.20.1 Slight – The matrix, asphalt cement and fine aggregate is in place between the coarse aggregate. However, there is more stone in comparison to the surrounding acceptable mix.
 - 1.2.1.20.2 Moderate – Significantly more stone than the surrounding mix; moderately segregated areas usually exhibit a lack of surrounding matrix.
 - 1.2.1.20.3 Severe – Appears as an area of very stony mix, stone against stone, with very little or no matrix.

- 1.2.1.20.4 Centre-of-Paver Streak – Appears as a continuous or semi-continuous longitudinal "streak" typically located in the middle of the paver "mat".
- 1.2.1.21 Smoothness is the surface profile of the Asphalt Concrete measured by a profilograph with the Profile Index (Prl) as the measurement output.
- 1.2.1.22 Sub-lot is a 600 t portion of Asphalt Concrete being considered for acceptance for compaction, asphalt content, aggregate gradation and Marshall air voids. The final Sub-lot on a construction section may vary in mass at the discretion of the Engineer.
- 1.2.1.23 Surface Defects:
- 1.2.1.23.1 Surface Defects that are due to the Contractor's operation shall include, but shall not be limited to the following:
- 1.2.1.23.1.1 Areas of Segregation less than 0.1 m²;
 - 1.2.1.23.1.2 Areas containing excess or insufficient Asphalt;
 - 1.2.1.23.1.3 Areas of open texture;
 - 1.2.1.23.1.4 Improper matching of longitudinal and transverse joints on final lift of Asphalt Concrete;
 - 1.2.1.23.1.5 Roller marks on final lift of Asphalt Concrete;
 - 1.2.1.23.1.6 Cracking or tearing;
 - 1.2.1.23.1.7 Contamination by diesel fuel, hydraulic fluids, detergent or other harmful products;
 - 1.2.1.23.1.8 Foreign objects or materials that are detrimental to the Asphalt Concrete;
 - 1.2.1.23.1.9 A clay ball; and

1.2.1.23.1.10 Single or multi-stone pickouts and any loss of aggregate from the surface of the asphalt concrete mat.

1.2.1.24 Trial Lot is the initial approximately 500 t of production which will be assessed for compliance with this Specification prior to further production. Should the Trial Lot be approved by the Engineer the Job Mix Formula will be established. Should the Trial Lot not be approved an additional Trial Lot will be required.

2 MATERIALS

2.1 General

2.1.1 The Contractor shall supply and pay for all materials for the Asphalt Mix.

2.1.2 All materials shall meet the requirements for the applicable Specifications for Manufactured Materials. Pay reductions for materials not meeting the requirements will be applied.

2.2 Asphalt

2.2.1 The Contractor shall use either an unmodified, straight run penetration viscosity graded asphalt, or a Performance Graded, Polymer Modified Asphalt (PMA) as the asphalt cement, as specified in the Special Provisions, or as otherwise approved by the Engineer.

2.3 Aggregate

2.3.1 Virgin aggregate shall be composed of sound, hard and durable particles of sand, gravel and rock, free from injurious quantities of elongated, soft or flaky particles, shale, clay, loam, ironstone, coal and organic or other deleterious material.

2.3.2 The following shall apply to Ministry-owned or controlled aggregate sources shown on the Plans or as described in the Special Provisions:

2.3.2.1 Overburden shall be removed in accordance with Specification 2260 For Removal Of Overburden; and

2.3.2.2 Rock passing a 610 mm square opening screen and larger than the maximum specified aggregate size shall be crushed.

- 2.3.3 If the Contractor uses the designated Ministry-owned or controlled aggregate source(s), a charge will be applied as indicated in the Special Provisions.
- 2.3.4 The Contractor shall split aggregates into coarse and fine fractions prior to crushing of the coarse fraction. The crushed coarse and the fine fractions shall be stockpiled separately.
- 2.3.5 The Contractor shall select a screen size at which splitting will take place. Splitting of aggregates shall be controlled such that the coarse aggregate fraction, before crushing, shall contain no more than 5% passing the 5 mm sieve.
- 2.3.6 Further splitting of the crushed coarse aggregate into separate stockpiles may be performed at the Contractor's option. No additional payment will be made for this work.

2.4 Reclaimed Asphalt Pavement

- 2.4.1 Reclaimed Asphalt Pavement shall conform to Specification 4105 For Reclaiming Asphalt Concrete.

2.5 Hydrated Lime

- 2.5.1 The Asphalt Mix shall contain 1% hydrated lime as measured by mass of the total dry aggregate except when Polymer Modified Asphalt is used and good adhesion is demonstrated as follows:
 - 2.5.1.1 The Polymer Modified Asphalt shall be tested in accordance with AASHTO T283 for Resistance of Compacted Asphalt Mixtures to Moisture-Induced Damage.
 - 2.5.1.1.1 The minimum tensile strength ratio (TSR) that must be achieved is 70%.

3 ASPHALT MIX DESIGN AND JOB MIX FORMULA

3.1 General

- 3.1.1 The Contractor shall prepare and submit an Asphalt Mix Design for approval by the Engineer.

- 3.1.2 The Asphalt Mix Design shall follow the Marshall method of Mix Design and the Ministry's design procedure. The Contractor shall prepare the Asphalt Mix Design in accordance with the requirements for Marshall Mix Design (STP 204-10). The Asphalt Mix Design type(s) shall be as designated in the Special Provisions. The Asphalt Mix Design shall meet the properties as shown in Table 4112.3.T1.
- 3.1.3 The Asphalt Mix Design shall be submitted on forms supplied by the Ministry. The Contractor's submission shall include the following information:
- 3.1.3.1 The aggregate source(s) and the asphalt cement source;
 - 3.1.3.2 The gradation of each aggregate to be used in the Asphalt Mix;
 - 3.1.3.3 The percent by mass of each aggregate and Reclaimed Asphalt Pavement to be used in the Asphalt Mix;
 - 3.1.3.4 The design mix gradation of the asphalt mix aggregate;
 - 3.1.3.5 Sand equivalent, the percentages of lightweight pieces and other deleterious materials for the virgin aggregate;
 - 3.1.3.6 Percent fractured faces for each aggregate stockpile and bulk specific gravity for the asphalt mix aggregate;
 - 3.1.3.7 The design asphalt content as a percent of dry mass of aggregate (virgin aggregate and reclaimed asphalt pavement aggregate);
 - 3.1.3.8 For mixes incorporating Reclaimed Asphalt Pavement, the percent addition, the percent binder contribution of the Reclaimed Asphalt Pavement by mass of aggregate, and the percent virgin binder by mass of aggregate;
 - 3.1.3.9 All Marshall mix design properties, including graphs used in arriving at the Asphalt Mix Design;
 - 3.1.3.10 The maximum theoretical density of the Asphalt Mix at the design asphalt content and at each asphalt content considered above and below the design asphalt content;
 - 3.1.3.11 The source of the hydrated lime;
 - 3.1.3.12 All test data to show compliance with the requirements of Table 4112.3.T1;

TABLE 4112.3.T1**ASPHALT CONCRETE MIX DESIGN TYPES AND PROPERTIES**

Mix Design Type / Design Factors - Mix Properties	1	2	3	4	5
Marshall Blows	75	75	50	50	50
Aggregate Type/Sieve Designation*	71	72	71	72	73
18.0 mm					
16.0 mm	100.0		100.0		
12.5 mm	78.0 – 98.0	100.0	78.0 – 98.0	100.0	100.0
9.0 mm	66.0 – 90.0	76.0 – 92.0	66.0 – 90.0	76.0 – 92.0	90.0 – 98.0
5.0 mm	46.0 – 72.0	56.0 – 78.0	46.0 – 72.0	56.0 – 78.0	60.0 – 78.0
2.0 mm	23.0 – 51.0	28.0 – 58.0	23.0 – 51.0	28.0 – 58.0	30.0 – 58.0
900 µm	15.0 – 37.0	15.0 – 40.0	15.0 – 37.0	15.0 – 40.0	17.0 – 42.0
400 µm	9.0 – 27.0	9.0 – 30.0	9.0 – 27.0	9.0 – 30.0	14.0 – 32.0
160 µm	3.0 – 14.0	5.0 – 15.0	3.0 – 14.0	5.0 – 15.0	5.0 – 18.0
75 µm	2.0 – 9.0	2.0 – 10.0	2.0 – 9.0	2.0 – 10.0	2.0 – 10.0
Lightweight Aggregate, Maximum %	1.0				
Sand Equivalent, Minimum	45.0				
Deleterious Material, Maximum % **	2.0				
Fine Aggregate Angularity, Minimum %	42	43	42	42	42
Fracture, Minimum % 2 or more faces ***	85	85	75	75	75
Percent Manufactured Fines, Minimum % - 5 mm	70	60	60	50	50
Marshall Air Voids, % (Design)	3.5 – 4.5				
V. M. A., %	13.5 – 16.0	14.0 – 16.0	13.5 – 16.0	14.0 – 16.0	15.0 – 17.0
Voids Filled, %	70 – 80	70 – 80	65 – 75	65 – 78	65 – 80
Stability, Minimum N	10,000	10,000	8,000	8,000	6,000
Flow, mm	2.0 – 4.0				
Film Thickness, Minimum µm	7.5				
Retained Stability, Minimum %	80.0	85.0	70.0	70.0	70.0
Percent Reclaimed Asphalt Pavement, Maximum Binder Contribution ****	20	20	20	20	20

* A tolerance of 3.0% in the percent by mass retained on the maximum size sieve will be permitted providing 100.0% of the oversize passes the next larger sieve size specified.

** Deleterious material includes all other injurious material other than lightweight pieces.

*** The Fractured Face percentage will be calculated on the aggregate after combining all virgin aggregates and Reclaimed Asphalt Pavement.

**** Percent reclaim binder contribution, as a percentage of the total binder content.

- 3.1.3.13 The temperature-viscosity chart for the asphalt cement being used and the recommended mixing and compaction temperature;
 - 3.1.3.14 Tensile Strength Ratio (TSR) and stripping potential of the asphalt cement from the aggregate in the Asphalt Mix determined in accordance with AASHTO Standard Test Method of Test T 283 for Resistance of Compacted Asphalt Mixtures to Moisture-Induced Damage;
 - 3.1.3.15 The fine aggregate angularity (ASTM C1252 - Method A Un-compacted Void Content); and
 - 3.1.3.16 Tensile Strength Ratio (TSR) and stripping potential of the asphalt cement from the aggregate in the Asphalt Mix determined in accordance with STP 204-15.
- 3.1.4 The Contractor shall submit the following with the Asphalt Mix Design for verification purposes:
- 3.1.4.1 For Marshall Density verification: 3 - 1.2 kg samples of representative virgin aggregate, hydrated lime, and Reclaimed Asphalt Pavement (RAP) where applicable, blended to the mix design gradation;
 - 3.1.4.2 For Bulk Specific Gravity of aggregate verification: separate, 8.0 kg samples of each aggregate component used in the Asphalt Mix, excluding hydrated lime. Samples for Bulk Specific Gravity of aggregate verification shall not be blended to the mix design gradation.
 - 3.1.4.2.1 If the Contractor utilizes more than one Crushed Fines Aggregate stockpile from the same aggregate source, only one sample from either of the uncleaned Crushed Fines Aggregate or cleaned Crushed Fines Aggregate is required.
 - 3.1.4.3 For MTD and ignition oven correction factor verification (3 tests each): 12 - 1.5 kg samples of representative virgin aggregate, hydrated lime, and Reclaimed Asphalt Pavement (RAP) where applicable, blended to the mix design gradation;

- 3.1.4.4 For gradation verification: 3 - 1.5 kg samples of representative virgin aggregate and hydrated lime, blended to meet the mix design gradation; and
- 3.1.4.5 3 - one litre cans of asphalt cement.
- 3.1.5 The Ministry laboratory will require 7 days from the time of receipt of the Asphalt Mix Design and samples, to evaluate the Asphalt Mix Design.
- 3.1.6 As a part of the Asphalt Mix Design verification, the Ministry laboratory will determine the following properties:
 - 3.1.6.1 Bulk specific gravity for the asphalt mix aggregate;
 - 3.1.6.2 Marshall Density; and
 - 3.1.6.3 Maximum theoretical density of the Asphalt Mix at the design asphalt content.
- 3.1.7 The Ministry will use a mechanical mixer in the Asphalt Mix Design verification.
- 3.1.8 The difference between the property values submitted by the Contractor and the property values as determined by the Ministry laboratory shall not exceed the maximum permissible variations shown in the following table:

TABLE 4112.3.T2**MAXIMUM PERMISSIBLE SIEVE AND PROPERTY VARIATIONS**

Sieve Designation	Maximum Permissible Variation (Percent Passing)
18.0 mm	± 2.5
16.0 mm	± 2.5
12.5 mm	± 2.5
9.0 mm	± 2.0
5.0 mm	± 2.0
2.0 mm	± 2.0
900 µm	± 1.5
400 µm	± 1.5
160 µm	± 1.5
75 µm	± 1.0
Property	Maximum Permissible Variation
Bulk Specific Gravity	± 0.015
Marshall Density	± 10 kg per cubic metre
Maximum Theoretical Density	± 10 kg per cubic metre
Air Voids	± 0.5%

3.1.9 The Asphalt Mix Design will be rejected if the maximum permissible variations are exceeded.

3.1.10 If the Asphalt Mix Design is within the maximum permissible variations the Contractor will receive tentative approval of the Asphalt Mix Design and may proceed to a Trial Lot.

3.1.10.1 The Contractor may request that a Trial Lot not be utilized on the Project.

3.1.10.1.1 Requests for the non-utilization of a Trial Lot on the Project must be submitted in writing by the Contractor.

3.1.10.1.1.1 Upon receipt of the request, the Engineer will approve the Asphalt Mix Design as the original Job Mix Formula and the Contractor may commence hauling to the road.

- 3.1.11 A new Asphalt Mix Design will be required if any change occurs in the nature or source of the aggregate or in the supplier or source of the Asphalt.

3.2 Job Mix Formula – Trial Lot

- 3.2.1 The Contractor shall provide the Engineer with at least 3 days advance notice of when they plan to do the Trial Lot.
- 3.2.2 The Trial Lot shall consist of approximately 500 tonnes of Asphalt Concrete placed on the road in accordance with Section 4112.4. During the Trial Lot a loose mix sample will be acquired by the Contractor in the presence of the Engineer and tested for verification of the Asphalt Mix Design by the Engineer. The Engineer will provide the Contractor with a copy of the results from Ministry testing within 24 hours of sampling.
 - 3.2.2.1 The Contractor shall not proceed with further paving operations until the Job Mix formula is approved.
- 3.2.3 If the Trial Lot Asphalt Mix meets the properties as shown in Table 4112.3.T3, the Engineer will approve the Asphalt Mix Design as the original Job Mix Formula, and the Contractor may continue hauling to the road.
- 3.2.4 If the Trial Lot Asphalt Mix does not meet the properties as shown in Table 4112.3.T3, an additional Trial Lot will be required. Only three Trial Lots will be permitted. A new Asphalt Mix Design will be required if the third Trial Lot does not meet the properties as shown in Table 4112.3.T3.

TABLE 4112.3.T3
MAXIMUM PERMISSIBLE VARIATION
OF THE TRIAL LOT ASPHALT MIX FROM THE APPROVED ASPHALT MIX DESIGN

Sieve Designation	Maximum Permissible Variation Percent from Approved Asphalt Mix Design (by Mass)
5.0 mm and larger	± 5.0 and within the tolerances of Table 4112.3.T1
2.0 mm	± 4.0 and within the tolerances of Table 4112.3.T1
900 µm	± 3.0 and within the tolerances of Table 4112.3.T1
400 µm	± 3.0 and within the tolerances of Table 4112.3.T1
160 µm	± 2.0 and within the tolerances of Table 4112.3.T1
75 µm	± 1.5 and within the tolerances of Table 4112.3.T1
Other Properties	
Air Voids	± 0.5% Maximum Permissible Variation from Approved Asphalt Mix Design
Asphalt Content %	± 0.3 Maximum Permissible Variation from Approved Asphalt Mix Design
Density, kg/m ³	± 20 Maximum Permissible Variation from Approved Asphalt Mix Design

- 3.2.5 Payment will not be made for Trial Lots not meeting the properties listed in Table 4112.3.T1 with the exception of Marshall Air Voids where payment will not be made if Marshall Air Voids are outside the range of 2.5% to 5.0%.

3.3 Variation from Approved Job Mix Formula

- 3.3.1 Once the Job Mix Formula has been established and approved, no alteration will be permitted unless approved by the Engineer.
- 3.3.2 Requests for Job Mix Formula revisions must be submitted in writing by the Contractor and identify the Lot for which the revision is to commence. Requests for revisions to completed Lots will not be permitted.
- 3.3.3 If the revisions to the approved Job Mix Formula are not within the tolerances of Table 4112.3.T1, or exceed any one of the following limits away from the approved Asphalt Mix Design, a new mix design will be required:
- 3.3.3.1 ± 5% passing the 5.0 mm sieve
- 3.3.3.2 ± 1.0 % passing the 75 µm sieve

3.3.3.3 $\pm 0.3\%$ asphalt content

3.3.3.4 $\pm 5\%$ in target proportion of RAP

3.3.4 Unless otherwise approved by the Engineer, the Contractor may not request more than four revisions to the Job Mix Formula without the provision of a new mix design.

3.3.4.1 A Job Mix Formula revision which reverts to the approved Asphalt Mix Design will not be considered as one of the four revisions that may be made to the Job Mix Formula without the provision of a new Asphalt Mix Design.

4 CONSTRUCTION

4.1 Hydrated Lime

4.1.1 The Contractor shall supply the equipment necessary to add the hydrated lime.

4.1.2 The amount of hydrated lime added shall be 1% of the total dry aggregate by mass.

4.1.3 The Contractor shall ensure the procedures and equipment used for the addition of hydrated lime are adequate to ensure that the hydrated lime is added at a uniform consistent rate.

4.1.4 The Contractor shall maintain records containing bills of lading, estimated quantities on hand, estimated quantities used, and at the completion of the Project, the estimated unused quantity. The record of estimated usage shall be provided to the Engineer on a daily basis.

4.1.5 At the end of each day the bulk measurement of the hydrated lime used on the Project shall not deviate by more than 25% from the specified percentage designated by the Job Mix Formula. If the amount of hydrated lime used in a day is less than 75% of the specified percentage designated by the Job Mix Formula, the day's production shall be subject to reject.

4.2 Plant Requirements and Operation

- 4.2.1 A uniform mixture shall be produced in which all particles are thoroughly coated. Aggregate particles shall not be coated with residue from fuel combustion. The Asphalt Mix shall contain no more than 0.5% moisture by mass.
- 4.2.2 A maximum mixing temperature tolerance of 15°C above the mixing temperature provided in the mix design shall not be exceeded.
- 4.2.3 If Reclaimed Asphalt Pavement is added, the following shall apply:
 - 4.2.3.1 The plant shall contain equipment that will prevent the Reclaimed Asphalt Pavement from coming into direct contact with the flame, thus minimizing oxidation of the Asphalt in the Reclaimed Asphalt Pavement.
 - 4.2.3.2 The Contractor shall undertake all the necessary adjustments to ensure proper heat transfer and breakdown of the Reclaimed Asphalt Pavement to form a homogeneous end product. The plant shall be capable of heating the Reclaimed Asphalt Pavement particles and blending them with virgin aggregate and any required Asphalt to create a homogeneous mix at the plant discharge.
- 4.2.4 The Contractor shall dispose of any rejected Asphalt Mix or Asphalt Concrete in a manner acceptable to the Engineer.

4.3 Delivering to the Road

- 4.3.1 Truck boxes shall be clean, free from accumulations of Asphalt Mix and foreign materials. Excess truck box lubricants such as light oil, detergent, lime solutions, gasoline, kerosene, diesel or other similar products shall not be allowed to contaminate the Asphalt Mix, and shall be disposed of in an environmentally acceptable manner.

4.4 Spreading

- 4.4.1 A tack coat shall be applied in accordance with Specification 4000 For Asphalt Prime, Tack And Flush Coat, unless otherwise approved by the Engineer.
- 4.4.2 Asphalt Mix shall be spread on dry, clean, and unfrozen surfaces.

- 4.4.3 Asphalt Concrete shall be placed in accordance with the following temperature limitations:
 - 4.4.3.1 Paving may begin, for other than the final lift in the Lanes, when the temperature is 0°C or greater provided the temperature is forecast, by Environment Canada for the closest location to the Project, to reach at least 5°C that day.
 - 4.4.3.2 The final lift of Asphalt Concrete in the Lanes shall not be placed if:
 - 4.4.3.2.1 The atmospheric temperature is less than 2°C; or
 - 4.4.3.2.2 The surface temperature is less than 7°C.
- 4.4.4 If the Contractor elects to opt into modified temperature requirements for the placement and compaction of the Asphalt Concrete, the following temperature limitations and additional requirements shall apply:
 - 4.4.4.1 Paving may begin, for lifts other than final lift in the Lanes, when the temperature is 0°C or greater provided the temperature is forecast, by Environment Canada for the closest location to the Project, to reach at least 2°C that day.
 - 4.4.4.2 Paving for the final lift of Asphalt Concrete in the Lanes shall not be placed if:
 - 4.4.4.2.1 The atmospheric temperature is less than 2°C; or
 - 4.4.4.2.2 The surface temperature is less than 4°C.
 - 4.4.4.3 The Contractor shall use an approved warm mix additive (WMA) as a compaction aid. WMA approved for use on the Contract shall be as specified in the Special Provisions.
 - 4.4.4.4 The Asphalt Mix Design shall be prepared and submitted to the Engineer without the use of WMA additives.
 - 4.4.4.5 The Contractor shall demonstrate that longitudinal joints can be constructed to a longitudinal joint density Lot average 90% or greater.

- 4.4.4.5.1 One longitudinal joint density core shall be taken per Sub-lot. The core may be located near to the location where the standard compaction core is taken, and immediately adjacent to the longitudinal joint.
- 4.4.4.6 The Contractor shall take one 100 mm bond strength core in the outer wheel path per Sub-lot.
- 4.4.4.7 All joint density and bond strength cores shall be taken by the Contractor in the presence of the Engineer.
- 4.4.4.8 The Ministry will rebate the Contractor the cost of supply of the warm mix additives for each Lot where the Contractor demonstrates that the average longitudinal joint density for the Lot is 90% of the Maximum Theoretical Density, or greater.
 - 4.4.4.8.1 Rebates will be based on copies of invoices from the supplier showing the amount used and total costs or, when warm mix additives are added to the asphalt cement by the supplier, based on the incremental cost per tonne for the asphalt cement with the warm mix added as determined from supplier invoices.
- 4.4.4.9 The Contractor shall be responsible for all costs for the use of warm mix additives, including supply of the warm mix additive, for any Lot with an average longitudinal joint density less than 90% of the Maximum Theoretical Density.
- 4.4.5 The minimum thickness of a compacted lift of Asphalt Concrete shall meet the following requirements:

TABLE 4112.4.T4
MINIMUM LIFT THICKNESS

Lift	Type 71	Type 72	Type 73
	Minimum Thickness	Minimum Thickness	Minimum Thickness
Top	50 mm	40 mm	30 mm
Lower	40 mm	30 mm	20 mm

- 4.4.6 The Contractor shall shim and level any pavement depressions designated by the Engineer.
- 4.4.6.1 The use of a motor grader and hand raking will be permitted.
- 4.4.6.2 All additional Work involved with the shimming and levelling shall be included as a subsidiary obligation at the contract unit price(s).
- 4.4.6.3 The Contractor shall complete all shimming and levelling operations such that the material has cooled sufficiently before the placement of Asphalt Concrete.
- 4.4.7 Longitudinal joints will not be permitted in the Lane. Longitudinal joints shall be vertical butt-type, well bonded, and finished to provide a continuous, smooth profile across the joint.
- 4.4.8 Longitudinal joints for successive lifts shall be offset a minimum of 100 mm.
- 4.4.9 Transverse construction joints from one lift to the next shall be separated by at least 2 m.
- 4.4.10 When paving is discontinued on the roadway, the Asphalt Concrete shall be temporarily feathered to a slope of 10 horizontal to 1 vertical. When paving is resumed, the transverse joint shall be straight and have a vertical face when the taper is removed.
- 4.4.11 The maximum distance that the screed and end gate of the trailing paver during Echelon Paving may extend over the uncompacted mat behind the first paver is 150 mm.
- 4.4.12 Contact faces of curbs, gutters, manholes, and sidewalks shall be coated with asphalt using a hand applicator before placing the Asphalt Mix.

- 4.4.13 Designated road intersections and approaches shall be paved in accordance with the Special Provisions and Plans, or as directed by the Engineer.
- 4.4.14 If designated by the Engineer, a flush coat shall be applied in accordance with Specification 4000 for Asphalt Prime, Tack and Flush Coat.

4.5 Compaction

- 4.5.1 All Asphalt Mix shall be thoroughly compacted, and after final rolling, the finished surface of the mat shall be free from Segregation, waves, hairline cracks, and other obvious defects.
- 4.5.2 Traffic shall not be allowed to travel on the finished surface until the surface has cooled to a temperature as to ensure that no deformation or other defects to the surface will occur.
- 4.5.3 Within 300 mm of the longitudinal joint, the Asphalt Concrete shall be compacted to a minimum of 90% of the Maximum Theoretical Density established for the Lot.

4.6 Shoulder Rumble Strips

- 4.6.1 If specified in the Special Provisions, the Contractor shall install grooved rumble strips on the outside shoulder in accordance with the requirements for Standard Plan No. 21021, Sheet 1 of 2.
- 4.6.2 The grooved rumble strips shall be installed by cold milling.

4.7 Asphalt Mix for Pick Up

- 4.7.1 Asphalt mix shall be made available to the Ministry for pick up at the plant during the Contractor's normal period of operation.
- 4.7.2 Asphalt mix shall comply with the requirements of this Specification and the Special Provisions for Asphalt Concrete In Place.

5 SAMPLING AND TESTING

5.1 General

- 5.1.1 Unless otherwise specified, test procedures will be in accordance with the Ministry's Standard Test Procedures Manual.
- 5.1.2 The test procedures in effect on the closing date of the Bids will apply.

- 5.1.3 The failure of the Engineer to provide test results within the time provided in this Specification shall not relieve the Contractor of their obligation to remedy any defect.

5.2 Quality Control

- 5.2.1 Quality control testing and inspection is the responsibility of the Contractor throughout every stage of the Work from aggregate production to inspection of the final product. A Quality Control Plan prepared in accordance with the requirements for Quality Control Plans (STP 400) shall be submitted at least 2 days prior to the Pre-Construction Meeting. As part of the Quality Control Plan, the Contractor shall indicate the effort they have placed on quality control testing, such as exchange testing with the Canadian Asphalt Materials Exchange Program (CAMEP) and/or the Canadian Council of Independent Laboratories (CCIL) and/or the AASHTO Materials Reference Laboratory (AMRL) Proficiency Sample Program.
- 5.2.2 The Contractor shall provide equipment and qualified personnel to perform all field testing and inspection necessary to determine and monitor the properties of the materials produced and incorporated into the Work, and the workmanship of the final product.
- 5.2.3 The cost of quality control testing and inspection will be considered incidental to the cost of the material sampled, and no separate payment will be made.
- 5.2.4 Correlation Exchange Testing with the Ministry
- 5.2.4.1 The Contractor, prior to commencement of road operations, and each season, shall participate in correlation testing with the Ministry designated laboratories for a minimum of 3 tests on the properties in Section 4112.5.2.4.2. The Ministry will supply a standard material similar to that used for the Ministry's mix exchange. Sufficient materials will be provided to enable extraction correction tests.
- 5.2.4.2 The results for the compaction, asphalt content, aggregate gradation and Maximum Theoretical Density shall be compared.

- 5.2.4.3 The test results from the Contractor's Quality Control, acceptance and appeal laboratories for aggregate gradation and compaction shall be compared and the tolerances in Table 4112.3.T3 shall apply. The allowable tolerance variation for asphalt content shall be no greater than $\pm 0.3\%$.
- 5.2.4.4 If the tolerances are not met, the Contractor's and the Ministry's laboratories shall perform additional testing until the differences have been resolved to the satisfaction of the Engineer.

5.2.5 Quality Control Testing

- 5.2.5.1 For each day of production, a minimum of 1 asphalt mix sample representing each 3 hours of production, or portion thereof, shall be obtained and tested for the purpose of Quality Control.
- 5.2.5.2 The results from quality control testing shall be available to the Ministry during the progress of the Work, within 24 hours of sampling.
- 5.2.5.3 Test results shall be reported on forms and charts provided by the Ministry, or in a format acceptable to the Engineer.
- 5.2.5.4 The Contractor shall provide the following to the Ministry prior to final acceptance of the Work:
 - 5.2.5.4.1 A summary of all aggregate Quality Control tests;
 - 5.2.5.4.2 Originals of all test results for Quality Control of mix properties; and
 - 5.2.5.4.3 Originals of the quality control charts.
- 5.2.5.5 For each sample, information on Marshall Density, asphalt content, aggregate gradation, air voids, maximum theoretical density, voids filled and voids in mineral aggregate shall be reported and plotted on charts.
- 5.2.5.6 For each Lot, Marshall stability information shall be reported and plotted on charts.
- 5.2.5.7 For each day's production, information on coarse aggregate fracture shall be reported and plotted on charts.

5.2.5.8 Additional properties contained in Table 4112.3.T1, do not have to be reported by the Contractor, but may be tested by the Ministry.

5.2.6 Additional Coring

5.2.6.1 The Contractor shall complete the following additional coring when the modified temperature requirements are not applicable:

5.2.6.1.1 The Contractor shall take two 100 mm longitudinal joint density cores per Lot.

5.2.6.1.1.1 The cores may be taken near to the location where the standard compaction cores are taken, and immediately adjacent to the longitudinal joint.

5.2.6.1.1.2 Cores shall be taken from either the supported side or the unsupported side of the longitudinal joint. An equal number of cores should be taken from both the supported and unsupported sides of the longitudinal joint during the project.

5.2.6.1.2 The Contractor shall take one 100 mm bond strength core in the outer wheel path per Lot.

5.2.6.1.2.1 Coring for bond strength shall be completed on Lots where asphalt concrete is placed on an existing, milled or new asphalt concrete surface.

5.2.6.1.2.2 When coring for bond strength the underlying asphalt concrete layers below the bond interface shall remain intact to allow for bond strength testing.

5.2.6.1.3 All joint density and bond strength cores shall be taken by the Contractor in the presence of the Engineer.

- 5.2.6.1.3.1 Core samples shall be obtained within one working day after a Lot has been completed.

5.3 Acceptance Testing

- 5.3.1 Within this Specification, certain requirements, limits and tolerances are specified regarding the quality of materials and workmanship to be supplied. Compliance with these requirements, where so specified, will be judged by testing as described in this section.
- 5.3.2 The results of Acceptance Testing for compaction, asphalt content, aggregate gradation, Marshall air voids, Smoothness, Individual Bumps and/or Dips, Segregation, and Surface Defects will be used for acceptance, rejection and/or pay adjustments for the Block, Sub-lot or Lot.
- 5.3.3 The Engineer may test any property outlined in Table 4112.3.T1 for compliance. The Engineer may rescind the Asphalt Mix Design approval if it cannot be demonstrated that the material is compliant with the requirements of Table 4112.3.T1.
- 5.3.4 The Contractor shall deliver all acceptance and appeal samples to the Engineer on site immediately after sampling is completed.
- 5.3.5 The Contractor shall supply the necessary sample bags.
- 5.3.6 The Engineer will provide the Contractor with a copy of the results of acceptance tests within 72 hours of delivery of the samples. When all the acceptance tests for a Block, Sub-lot or Lot are completed, the Engineer will advise the Contractor as to the acceptability of the Block, Sub-lot or Lot.
- 5.3.7 The cost of obtaining, preparing, identifying, and delivering samples will be considered incidental to the cost of the material sampled and no separate payment will be made.
- 5.3.8 Acceptance testing will be performed at no cost to the Contractor.
- 5.3.9 The following shall apply to Asphalt Concrete used for shimming and levelling where the thickness is 30 mm or less.
- 5.3.9.1 There will be no compaction tests done, but compaction equipment and procedures are subject to the approval of the Engineer.

5.3.9.2 Acceptance testing for asphalt content, aggregate gradation and Marshall air voids will be based on the Ministry's acceptance testing.

5.3.10 Modified Quality Assurance

5.3.10.1 The Contractor may request to modify Quality Control and Quality Assurance testing requirements to allow a portion of the Quality Control Test results to be used in the determination of acceptance, rejection and/or pay adjustments for Asphalt Concrete in Place (EPS).

5.3.10.2 Requests to modify Quality Control and Quality Assurance testing requirements must be submitted in writing by the Contractor.

5.3.10.2.1 The Ministry may approve or deny requests for the use of modified Quality Control and Quality Assurance testing requirements at its sole discretion.

5.3.10.2.2 The Ministry may rescind its approval for the use of modified Quality Control and Quality Assurance testing requirements at any time.

5.3.10.2.3 Upon receipt of the request from the Contractor by the Ministry to modify Quality Control and Quality Assurance testing requirements, the Contractor will be unable to rescind the request for using modified Quality Control and Quality Assurance testing requirements.

5.3.10.3 The following clauses shall apply only to modified Quality Control and Quality Assurance testing requirements:

5.3.10.3.1 An Asphalt Mix sample shall be obtained from each Sub-lot and tested for the purpose of Quality Control.

5.3.10.3.2 The results from Quality Control testing including the Quality Control test results for asphalt content and aggregate gradation shall be provided to the Ministry no later than 12:00 noon of the day following placement of the Asphalt Concrete.

- 5.3.10.3.3 In addition to Specification 4112.5.3.1.2, certain Quality Control test results provided by the Contractor for asphalt content and aggregate gradation may be used in place of corresponding Quality Assurance test results for the determination of acceptance, rejection and/or pay adjustments for the Lot.
- 5.3.10.3.4 The determination of Quality Control test or Quality Assurance test results used for acceptance, rejection and/or pay adjustments will be randomly generated once the request to modify Quality Control and Quality Assurance testing requirements has been received.
- 5.3.10.3.5 The Contractor will be notified at the start of the Lot if Quality Control will be used for the determination of acceptance, rejection, and/or pay adjustments.
- 5.3.10.3.6 The Quality Control test results used in place of corresponding Quality Assurance test results will be at the discretion of the Engineer.
- 5.3.10.3.7 Appeal of acceptance test results for asphalt content and aggregate gradation for Lots where Quality Control test results provided by the Contractor for asphalt content and aggregate gradation have been used in place of corresponding Quality Assurance test results for the determination of acceptance, rejection and/or pay adjustments for the Lot, shall be in accordance with the following:
 - 5.3.10.3.7.1 Appeal of acceptance test results for asphalt content and/or aggregate gradation shall be on a sub-lot basis. The Contractor cannot appeal acceptance test results which are in the full payment range as shown in Tables 4112.9.T6 and 4112.9.T7.

- 5.3.10.3.7.2 The Contractor shall serve written notice of which acceptance test results for asphalt content and/or aggregate gradation are being appealed.
- 5.3.10.3.7.3 The Contractor may appeal the acceptance test results for asphalt content and/or aggregate gradation for each lot once.
- 5.3.10.3.7.4 The companion sample(s) corresponding to the appealed lot(s) will be tested for asphalt content, aggregate gradation and Marshall air voids by the third-party laboratory.
- 5.3.10.3.7.5 The original test values for the appealed lot(s) will be eliminated and the new test values for asphalt content, aggregate gradation and Marshall air voids will be averaged with the remaining values from the initial testing to provide the new Mean of Deviations and the new Lot Mean for aggregate gradation and Marshall air voids.

5.3.11 Sampling and acceptance testing shall be in accordance with the following:

5.3.11.1 For **Asphalt content, Aggregate Gradation and Marshall air voids:**

- 5.3.11.1.1 Acceptance testing for asphalt content, aggregate gradation and Marshall air voids will be done by the Ministry on each Sub-lot.
- 5.3.11.1.2 Loose mix samples shall be acquired by the Contractor as directed by, and in the presence of the Engineer. Loose mix samples will be of sufficient quantity to enable splitting of the sample for potential appeal testing.

5.3.11.1.3 Loose mix samples shall be acquired and tested in accordance with the requirements for Sampling Asphalt Mixes (STP 103).

5.3.11.2 For **Compaction:**

5.3.11.2.1 When a Lot has been completed and is ready for acceptance testing, the Engineer will locate one test site in each Sub-lot in accordance with the requirements for Sampling Location By Random Method (STP 107).

5.3.11.2.1.1 If the shoulder is laid with the main lane, the one test site within the Sub-lot will be located within the main lane. The compactive effort on the shoulder shall be similar to that on the main lane unless otherwise directed by the Engineer.

5.3.11.2.2 Core samples shall be obtained within one working day after a Lot has been completed.

5.3.11.2.2.1 Core samples for acceptance testing may be obtained after a Sub-lot has been completed.

5.3.11.2.3 At each test site the Contractor shall obtain one core sample in the presence of the Engineer in accordance with the requirements for Asphalt Concrete Samples Obtained by Coring (STP 204-5).

5.3.11.2.4 Each core will be used for determination of compaction and thickness.

5.3.11.2.5 Core samples shall consist only of material from the lift of Asphalt Concrete being tested.

5.3.11.2.6 Samples shall be taken prior to the placement of the next lift of Asphalt Concrete.

5.3.11.3 For **Smoothness and Individual Bumps and/or Dips:**

- 5.3.11.3.1 The surface of each Block will be profiled by the Engineer in accordance with the requirements for Roughness Profile with High Speed Profilograph (STP 222-5).
- 5.3.11.3.2 If a Block is located within a rejected Lot, the surface of the Block will not be profiled until the Lot has been remedied.
- 5.3.11.3.3 The Engineer will provide the Contractor with a copy of the results of acceptance tests for Smoothness and Individual Bumps and/or Dips within 12 days of the placement of the Asphalt Concrete.
 - 5.3.11.3.3.1 If work is carried over from one construction season to the next, acceptance testing for Smoothness and Individual Bumps and/or Dips will be carried out at the time seasonal operations cease on all completed final lifts of Asphalt Concrete.
 - 5.3.11.3.3.2 The Engineer will provide the Contractor with a copy of the results of acceptance tests for Smoothness and Individual Bumps and/or Dips within 12 days from the time seasonal operations cease.
- 5.3.11.3.4 The Contractor may request acceptance testing for Smoothness and Individual Bumps and Dips on completed final lifts of asphalt concrete prior to the completion of the placement of all asphalt concrete on the Project and prior to seasonal operations ceasing on work carried over from one construction season to the next.

5.3.11.3.4.1 The Engineer will provide the Contractor with a copy of the results of acceptance tests for Smoothness and Individual Bumps and Dips within one working day of receipt of the test results.

5.3.11.3.4.2 Contrary to Specification 4112.5.3.1.8, all costs for the interim acceptance testing shall be paid for by the Contractor. The rate for Ministry interim acceptance testing will be as specified in the Special Provisions.

5.3.11.3.5 When all the acceptance tests for a Block are completed, the Engineer will advise the Contractor as to the acceptability of the Block with respect to Smoothness and Individual Bumps and/or Dips.

5.3.11.4 For **Segregation**:

5.3.11.4.1 Each lane-km, including the shoulder, will be inspected for areas of Segregation.

5.3.11.4.2 The Engineer will provide the Contractor with the locations of the visually identified segregation within 2 days after receiving notification from the Contractor that the Asphalt Concrete is ready for acceptance testing.

5.3.11.5 For **Surface Defects**:

5.3.11.5.1 Each lane-km, including the shoulder, will be inspected for Surface Defects.

5.3.11.5.2 The Engineer will provide the Contractor with the locations of the visually identified Surface Defects within 2 days after receiving notification from the Contractor that the Asphalt Concrete is ready for acceptance testing.

5.3.11.6 For discretionary Lots:

5.3.11.6.1 Acceptance testing of discretionary Lots for asphalt content, aggregate gradation and Marshall air voids will be done by the Ministry in accordance with the following:

5.3.11.6.1.1 The Engineer will locate five test sites in each discretionary Lot in accordance with the requirements for Sampling Location By Random Method (STP 107).

5.3.11.6.1.2 At each test site the Contractor shall obtain core sample(s) in the presence of the Engineer in accordance with the requirements for Asphalt Concrete Samples Obtained By Coring (STP 204-5).

5.3.11.6.1.3 Core samples will be used for determination of asphalt content, aggregate gradation and Marshall air voids.

5.3.11.6.1.4 Core samples shall consist only of material from the lift of Asphalt Concrete being tested.

5.3.11.6.1.5 Samples shall be taken prior to the placement of the next lift of Asphalt Concrete.

5.3.11.6.2 Acceptance testing of discretionary Lots for compaction will be done by the Ministry in accordance with the following:

5.3.11.6.2.1 The Engineer will locate five test sites in each discretionary Lot in accordance with the requirements for Sampling Location By Random Method (STP 107).

- 5.3.11.6.2.2 Core samples shall be obtained within one working day after a Lot has been completed.
- 5.3.11.6.2.3 At each test site the Contractor shall obtain core samples in the presence of the Engineer in accordance with the requirements for Asphalt Concrete Samples Obtained by Coring (STP 204-5).
- 5.3.11.6.2.4 Each core will be used for determination of compaction and thickness.
- 5.3.11.6.2.5 Core samples shall consist only of material from the lift of Asphalt Concrete being tested.
- 5.3.11.6.2.6 Samples shall be taken prior to the placement of the next lift of Asphalt Concrete.

5.4 **Appeal of Acceptance Test Results and Appeal Testing**

- 5.4.1 The Contractor shall serve written notice of appeal for asphalt content, aggregate gradation, Marshall air voids or compaction to the Engineer within 48 hours of receipt of the acceptance test results.
- 5.4.2 If any property is appealed for testing all other properties will be tested.
- 5.4.3 The new results, based on appeal testing will replace the original test results and are binding on both the Contractor and the Ministry.
- 5.4.4 The Contractor cannot appeal test results that are within the full payment or bonus payment range.
- 5.4.5 The Engineer will provide the Contractor with a copy of the results of appeal tests within one working day of receipt of the test results.
- 5.4.6 Appeal testing will be performed by a third party laboratory, pre-qualified by the Ministry, and the new results will be binding on the Contractor and the Ministry.

- 5.4.7 If the new results show that any unit price reduction or rejection applies to any property not just to the one being disputed, all testing costs incurred during the appeal procedures shall be paid by the Contractor. The rates for the appeal testing will be as designated in the Special Provisions.
- 5.4.8 If the new results show that a penalty no longer applies, then the Ministry will be responsible for the expense of the appeal testing.
- 5.4.9 In the case of an appeal, the Ministry will not be responsible for any delays including but not limited to Contractor's downtime, or other costs as a result of awaiting the receipt of the appeal test results, or due to the nature and values of the appeal test results.
- 5.4.10 Appeal of acceptance test results shall be in accordance with the following:
- 5.4.10.1 For **Asphalt content and Marshall air voids**:
- 5.4.10.1.1 For pay adjustment appeals, the following procedures shall apply:
- 5.4.10.1.1.1 The Engineer will determine the sum of the absolute values of the deviations of the acceptance test values from the JMF for each Sub-lot.
- 5.4.10.1.1.2 The companion samples corresponding to the high and low values will be tested for asphalt content, aggregate gradation and Marshall air voids by the third-party laboratory.
- 5.4.10.1.1.3 The new test values for asphalt content, aggregate gradation and Marshall air voids will be averaged with the remaining values from the acceptance testing, to provide the new Mean of Deviations for asphalt content, aggregate gradation and Marshall air voids and the new Lot Mean for aggregate gradation and Marshall air voids.

5.4.10.1.2 For rejection appeals, the following procedures shall apply:

5.4.10.1.2.1 The Engineer will determine the sum of the absolute values of the deviations of the acceptance test values from the JMF for each Sub-lot.

5.4.10.1.2.2 The companion samples corresponding to all five acceptance values will be tested for asphalt content, aggregate gradation and Marshall air voids by the third-party laboratory.

5.4.10.1.2.3 The original acceptance test values of the two Sub-lots whose sum of the absolute values of the deviations of the acceptance test values from the JMF are the greatest will be eliminated and the remaining values from the acceptance testing and the five appeal test values will be averaged to provide the new Mean of Deviations for asphalt content, aggregate gradation and Marshall air voids and the new Lot Mean for Marshall air voids and aggregate gradation.

5.4.10.2 For **Aggregate Gradation**:

5.4.10.2.1 For pay adjustment appeals, the following procedures shall apply:

5.4.10.2.1.1 The Engineer will determine the sum of the absolute values of the deviations of the acceptance test values from the JMF for each Sub-lot.

- 5.4.10.2.1.2 The original acceptance test values of the two Sub-lots whose sum of the absolute value of the deviations of the acceptance test values from the JMF are the greatest will be eliminated and the companion samples corresponding to these two Sub-lots will be tested for asphalt content, aggregate gradation and Marshall air voids by the third-party laboratory.
- 5.4.10.2.1.3 The new test values for asphalt content, aggregate gradation and Marshall air voids will be averaged with the remaining values from the acceptance testing, to provide the new Mean of Deviations, and the new Lot Mean for aggregate gradation and Marshall air voids.
- 5.4.10.2.2 For rejection appeals, the following procedures shall apply:
 - 5.4.10.2.2.1 The Engineer will determine the sum of the absolute values of the deviations of the acceptance test values from the JMF for each Sub-lot.
 - 5.4.10.2.2.2 The companion samples corresponding to all five acceptance values will be tested for asphalt content, aggregate gradation and Marshall air voids by the third-party laboratory.

5.4.10.2.2.3 The original acceptance test values of the two Sub-lots whose sum of the absolute values of the deviations of the acceptance test values from the JMF are the greatest will be eliminated and the remaining values from the acceptance testing and the five appeal test values will be averaged to provide the new Mean of Deviations, and the new Lot Mean for Marshall air voids and aggregate gradation.

5.4.10.3 For **Compaction**:

5.4.10.3.1 The Engineer will locate one random appeal test site within each of the 5 Sub-lots in accordance with the requirements for Sampling Location by Random Method (STP 107).

5.4.10.3.1.1 If the shoulder is laid with the main lane, the one random appeal test site within each of the 5 Sub-lots will be located within the main lane.

5.4.10.3.2 The Contractor shall obtain one core sample at each appeal test site in the presence of the Engineer and in accordance with the requirements for Asphalt Concrete Samples Obtained by Coring (STP 204-5).

5.4.10.3.3 The samples shall be delivered to the Engineer on site immediately after the sampling is completed.

5.4.10.3.4 The core density will be determined by the third-party laboratory.

5.4.10.3.5 The high and the low of the original acceptance test values will be eliminated and the remaining three values from the acceptance testing and the five appeal test values will be averaged to provide the new Lot Mean.

5.4.10.4 For **Smoothness and Individual Bumps and/or Dips:**

- 5.4.10.4.1 Within seven (7) calendar days of receipt of the acceptance test results for a Block, the Contractor may appeal the acceptance test results by requesting appeal tests.
- 5.4.10.4.2 The Engineer will re-test the entire Block for Smoothness and Individual Bumps and/or Dips, if either is under appeal.

5.4.10.5 For **Segregation:**

- 5.4.10.5.1 Within seven (7) calendar days of receipt of the acceptance test results for a Block, the Contractor may appeal the acceptance test results by requesting appeal tests.
- 5.4.10.5.2 The Engineer will locate a test site that is representative of the segregated area being considered. At the test site and in the presence of the Engineer, the Contractor shall obtain one core sample in accordance with the requirements for Asphalt Concrete Samples Obtained by Coring (STP 204-5). The Engineer will provide the sample to the third-party laboratory for determination of aggregate gradation.
 - 5.4.10.5.2.1 The area will be considered Slight Segregation if the test results indicate no price adjustment under the limits of Payment Adjustments for Aggregate Gradation in Table 4112.9.T7.
 - 5.4.10.5.2.2 The area will be considered Moderate Segregation if the test results indicate price adjustment but not reject under the limits of Payment Adjustments for Aggregate Gradation in Table 4112.9.T7.

- 5.4.10.5.2.3 The area will be considered Severe Segregation if the test results indicate reject under the limits of Payment Adjustments for Aggregate Gradation in Table 4112.9.T7.

6 ACCEPTANCE, REJECTION AND REPAIRS

6.1 Acceptance

- 6.1.1** The Contractor shall provide an end product conforming in quality and accuracy of detail to the dimensional and tolerance requirements of the Specifications and Plans. Where no tolerances are specified, the standard of workmanship shall be in accordance with normally accepted good practice.

6.2 Rejection

- 6.2.1** If the compaction, asphalt content, aggregate gradation, Marshall air voids, Smoothness, Individual Bumps and/or Dips, Segregation and Surface Defects for any Block, Sub-lot or Lot are outside the Acceptance Limits, or if Segregation or Surface Defects have not been repaired and accepted by the Engineer, the Block or Lot will be rejected as unacceptable Work.

6.3 Repairs

- 6.3.1** The Contractor shall not undertake any repair on any defective Work prior to notifying the Engineer. Any areas repaired prior to obtaining the Engineer's approval will not be considered for payment.
- 6.3.2** Work in any Block, Sub-lot or Lot which has been rejected shall be remedied within 30 days of receipt of the acceptance test results.
- 6.3.3** All remedial Work shall be performed at the Contractor's expense, including the cost of materials.
- 6.3.4** The Contractor shall pay the cost of all re-testing performed following the remedying of Work in any Block, Sub-lot or Lot that has been rejected. The rate for Ministry testing will be as designated in the Special Provisions.
- 6.3.5** Repairs shall be subject to the approval of the Engineer.

- 6.3.6 Alternative repair methods proposed by the Contractor shall be subject to the approval of the Engineer. The nature of the deficiencies will be taken into account in the consideration of the method of repair.
- 6.3.7 All repairs are to be neat, uniform, and rectangular in appearance and provide a smooth riding surface.
- 6.3.8 Acceptable remedial measures to a rejected Block or Lot, or areas within a Block, Sub-lot or Lot are as follows:
 - 6.3.8.1 A **Class I repair** either overlays or removes and replaces the Asphalt Concrete.
 - 6.3.8.1.1 If an overlay is used as the remedial measure, the following shall apply:
 - 6.3.8.1.1.1 A tack coat shall be applied in accordance with Specification 4000 For Asphalt Prime, Tack and Flush Coat unless otherwise directed by the Engineer.
 - 6.3.8.1.1.2 The minimum overlay thickness shall be 40 mm.
 - 6.3.8.1.1.3 Adjacent lanes and shoulders shall be overlaid to the same thickness and length.
 - 6.3.8.1.1.4 On all lifts of Asphalt Concrete below the final lift, the overlay shall be completed prior to the next lift being placed.
 - 6.3.8.1.2 If a removal and replace operation is used as the remedial measure, the following shall apply:
 - 6.3.8.1.2.1 The Asphalt Concrete shall be removed by cold milling the entire lift thickness for the full width of the lane or shoulder where applicable.

6.3.8.1.2.2 A tack coat in accordance with Specification 4000 For Asphalt Prime, Tack and Flush Coat, unless otherwise directed by the Engineer, shall be applied to the milled surface.

6.3.8.1.2.3 The Asphalt Concrete removed by the milling operation will be the property of the Contractor.

6.3.8.1.2.4 The Asphalt Mix used for back-filling the milled area shall be subject to the same Specifications as the original pavement.

6.3.8.2 A **Class II repair** is typically either the placing of a slurry seal on the entire Block, Sub-lot or Lot, or the placing of a spot slurry seal patch or patches within the Block, Sub-lot or Lot.

6.3.8.2.1 The seal shall be a mixture of a dry, non- plastic sand, an emulsified asphalt SS-1 (slurry), potable water, and, if needed, acceptable additives such as Portland Cement, and Carbon Black, for colour.

6.3.8.2.2 The gradation of the sand shall be as follows:

TABLE 4112.6.T1

SLURRY SEAL SAND GRADATION

Sieve Designation	Percent by Weight Passing Canadian Metric Sieve Series
900 um	100.0
400 um	70.0 – 95.0
160 um	60.0 – 80.0
71 um	20.0 – 42.0
Plasticity Index	Non Plastic

6.3.8.2.3 The mix proportions for a 1 000 litre batch of seal shall be as follows:

- 360 litres of SS-1 (slurry);
- 270 litres of potable water; and

- 850 kg of dry, non-plastic sand.
- 6.3.8.2.4 The Contractor shall add the water to the emulsified asphalt followed by the addition of the sand.
- 6.3.8.2.5 The Contractor shall thoroughly mix the seal. If a mineral filler is used, it shall be blended into the mixture. A minimum amount of additional water may be added to obtain a fluid, homogeneous mixture.
- 6.3.8.2.6 If a tack coat is required, the same asphalt chosen for the seal binder shall be used. The tack coat shall be applied in accordance with Specification 4000 For Asphalt Prime, Tack And Flush Coat, unless otherwise directed by the Engineer.
- 6.3.8.2.7 The seal shall be neat and square, and uniform and homogeneous with no uncovered areas, ridges or loose aggregate.
- 6.3.8.2.8 Hand or mechanical squeegees may be used to spread the seal.
- 6.3.8.2.9 The completed seal shall be kept free of all traffic until it has cured sufficiently to prevent pickup of aggregate particles.
- 6.3.8.2.10 Any tests performed by the Engineer on the seal will be quality assurance tests and will not be considered as quality control tests.
- 6.3.8.3 A **Class III repair** is typically a flush coat on the entire Block, Sub-lot or Lot, or the placing of a spot flush coat(s) within the Block, Sub-lot or Lot.
 - 6.3.8.3.1 A flush coat or spot flush coat shall be applied in accordance with Specification 4000 For Asphalt Prime, And Flush Coat, unless otherwise directed by the Engineer.

6.3.8.4 A **Class IV repair** is typically either a re-rolling operation to remove or reduce the bump(s) or a shim operation to remove or reduce dip(s). Other methods of Class IV repairs proposed by the Contractor shall be subject to the approval of the Engineer.

6.3.8.4.1 For repairs to a bump(s), the following shall apply:

6.3.8.4.2 The repair procedure shall not cause damage to the Asphalt Concrete such as, but not limited to, excessive crushing, pulverizing, or displacing the Asphalt Concrete or its surface.

6.3.8.4.3 The area repaired shall have a smooth transition to the surrounding Asphalt Concrete without impairing the functionality and/or structural properties of the area.

6.3.8.4.4 For repairs to a dip(s), the following shall apply:

6.3.8.4.5 If shimming is used, the area shimmed shall have a smooth transition to the surrounding pavement. The shim shall have sufficient thickness and be thoroughly compacted to prevent ravel of the shimmed area.

6.3.8.4.6 If a tack coat is required, the tack coat shall be applied in accordance with Specification 4000 For Asphalt Prime, Tack and Flush Coat, unless otherwise directed by the Engineer.

6.3.9 Repairs shall be in accordance with the following:

6.3.9.1 For **Compaction**:

6.3.9.1.1 If the acceptance test results on a Lot indicate a pay adjustment for density, additional Work to improve the density will not be allowed.

6.3.9.1.2 If the compaction of a Lot is outside the Acceptance Limits outlined in Table 4112.9.T5, the Lot will be rejected and subject to a Class I repair for the entire Lot.

6.3.9.2 For **Asphalt content:**

6.3.9.2.1 If the asphalt content of a Lot is outside the Acceptance Limits outlined in Table 4112.9.T6, the Lot will be rejected and subject to a Class I repair for the entire Lot.

6.3.9.3 For **Aggregate Gradation:**

6.3.9.3.1 If the aggregate gradation is beyond the Acceptance Limits shown in Table 4112.9.T7, the Lot will be rejected and subject to a Class I repair.

6.3.9.4 For **Marshall air voids:**

6.3.9.4.1 If the Marshall air voids of a Lot are outside the Acceptance Limits outlined in Table 4112.9.T8, the Lot will be rejected and subject to a Class I repair for the entire Lot.

6.3.9.5 For **Smoothness:**

6.3.9.5.1 If the Smoothness of the final lift of Asphalt Concrete of a Block is outside the acceptance limits outlined in Table 4112.9.T9. The Contractor will be allowed to perform a Class I or Class IV repair on Individual Bumps and/or Dips that exceed 12 mm.

6.3.9.5.1.1 If the Smoothness of the final lift of Asphalt Concrete of a Block remains outside the acceptance limits outlined in Table 4112.9.T9 following the performance of a Class I or Class IV repair on Individual Bumps and/or Dips that exceed 12 mm, the Block shall be repaired by a Class I repair.

6.3.9.5.2 If the acceptance test results on a Block indicate a pay adjustment for Smoothness, additional Work to improve the Smoothness will not be allowed except the Contractor will be allowed to perform a Class I or Class IV repair on Individual Bumps and/or Dips that exceed 12 mm.

6.3.9.6 For Individual Bumps and/or Dips:

- 6.3.9.6.1 Individual Bumps and/or Dips equal to or exceeding 18.5 mm in the vertical direction shall be repaired by a Class I or Class IV repair.
- 6.3.9.6.2 Work to repair Individual Bumps and/or Dips ≤ 12 mm will not be permitted.

6.3.9.7 For Segregation:**6.3.9.7.1 For lower lifts:**

- 6.3.9.7.1.1 Slight, Moderate and Centre-of-Paver Streak Segregation on lower lifts will not require repair.
- 6.3.9.7.1.2 Severe Segregation on lower lifts shall require a Class I remove and replace repair unless otherwise approved by the Engineer.

6.3.9.7.2 For top lift:

- 6.3.9.7.2.1 Slight Segregation on top lift will not require repair.
- 6.3.9.7.2.2 Moderate Segregation on top lift will require a Class II repair.
- 6.3.9.7.2.3 Severe Segregation on top lift shall require a Class I remove and replace repair unless otherwise approved by the Engineer.
- 6.3.9.7.2.4 Repair for Centre-of-Paver Streak Segregation on top lift shall be at the direction of the Engineer.

6.3.9.8 For Surface Defects:

- 6.3.9.8.1 On all lifts of Asphalt Concrete, Surface Defects shall be repaired with a Class I to Class IV repair, in a manner that is acceptable to the Engineer.

7 WARRANTY

7.1 General

7.1.1 The Contractor shall warrant the Asphalt Concrete to be free from any defect in materials and workmanship for a period of one year commencing on the date that the Asphalt Concrete is accepted by the Engineer.

7.1.1.1 The Engineer will give the Contractor written notice of the commencement date of the warranty period.

7.1.2 The Contractor shall repair any defects or deficiencies in the Asphalt Concrete at no direct expense to the Ministry. This includes repairing any defects or deficiencies that appear in areas that were previously repaired before the warranty period and arise during the warranty period.

7.1.2.1 Repairs shall be subject to the approval of the Engineer.

7.1.3 The Engineer will provide written notification to the Contractor of defects or deficiencies requiring repair. The written notice shall be provided to the Contractor prior to the end of the warranty period.

7.1.4 The Contractor shall repair defects and deficiencies identified in the written notice in accordance with the following timeframes:

7.1.4.1 For defects or deficiencies that may impact the safety of road users, the Contractor shall complete the repairs within 30 days of receiving the written notice.

7.1.4.1.1 The Ministry may make interim repairs at its discretion. This action does not relieve the Contractor of responsibility to repair the defects and deficiencies. Payment will not be made to the Contractor for any additional repair costs incurred due to the interim repairs made by the Ministry.

7.1.4.2 For all other defects and deficiencies, if written notice is provided on or before August 15th of the year in which the warranty period ends the Contractor shall complete the repairs by September 30th of the same year.

- 7.1.4.2.1 If notice of defects and deficiencies is provided prior to the end of the warranty period, but after August 15th of the year in which the warranty period ends, the Contractor shall complete the repairs prior to July 1st of the following calendar year.
 - 7.1.4.3 If the Contractor fails to complete repairs within the specified time frame or to the satisfaction of the Engineer, the Engineer may arrange to have the repairs completed by others, the cost of which shall be paid by the Contractor.
 - 7.1.4.3.1 The Engineer will notify the Contractor in writing if arrangements will be made to have the repairs completed by others.
 - 7.1.4.3.2 The Contractor will not be allowed to make repairs after the notice has been provided.
 - 7.1.5 The Contractor shall warrant the repairs made to fulfill warranty requirements to be free from any defect in materials and workmanship for a period of one additional year commencing on the date that the repair is accepted by the Engineer. Warranty obligations will terminate at the end of the additional year.
 - 7.1.5.1 Acceptance of a warranty repair method or a completed warranty repair by the Engineer does not relieve the Contractor of the responsibility to select and provide an adequate and durable repair.

8 MEASUREMENT

8.1 Asphalt Concrete

- 8.1.1 Asphalt Concrete In Place (EPS) will be measured in tonnes.

9 PAYMENT

9.1 General

- 9.1.1 Payment for Asphalt Concrete In Place (EPS) will be at the contract unit price per tonne, with the pay adjustments for compaction, asphalt content, aggregate gradation, Marshall air voids, Smoothness, severity of segregation, segregation frequency, Individual Bumps and/or Dips, Echelon Paving and longitudinal joint elimination.
- 9.1.2 The contract unit price will be full compensation for completing the Work except for those activities for which specific provision for payment is made in this section.
- 9.1.3 If the Contract includes a bid item for:
 - 9.1.3.1 Tack Coat, payment will be made in accordance with Specification 4000 For Asphalt Prime, Tack and Flush Coat.
 - 9.1.3.2 Reclaimed Asphalt Concrete, payment will be made in accordance with Specification 4105 For Reclaiming Asphalt Concrete.
 - 9.1.3.3 Asphalt Mix For Pick Up (EPS), payment will be made at the applicable contract unit price which will be full compensation for providing the Asphalt Mix. No pay adjustments will apply for Asphalt Mix For Pick Up.
- 9.1.4 If the shoulder is laid separately from the main lane, the pay adjustments for compaction, asphalt content, aggregate gradation and field air voids for Asphalt Concrete on the shoulder will be at 50% of the rates specified in Tables 4112.9.T5 to 4112.9.T12. No other pay adjustments will be applied.
- 9.1.5 When defects in rejected Blocks or Lots have been remedied, the pay adjustments for compaction, asphalt content, aggregate gradation, Marshall air voids, Smoothness, severity of segregation, segregation frequency, and Individual Bumps and/or Dips will be based on testing of the replacement or overlay material where applicable.
- 9.1.6 If any Block or Lot has been rejected for Smoothness, Individual Bumps and/or Dips, severity of segregation, segregation frequency or Surface Defects, payment will not be made for the Asphalt Concrete in the Block or Lot until the rejected Block or Lot has been remedied.

9.2 Pay Adjustments

9.2.1 The dollar value of the pay adjustments will be in accordance with the following:

9.2.1.1 For **Compaction**:

9.2.1.1.1 The pay adjustment for each Lot will be determined from Table 4112.9.T5.

TABLE 4112.9.T5

PAY ADJUSTMENTS FOR COMPACTION

% of Maximum Theoretical Density (Lot	Unit Price Adjustment (\$ per tonne)	% of Maximum Theoretical Density (Lot	Unit Price Adjustment (\$ per tonne)
≥ 97.1	Reject	92.9	+ 0.20
97.0	+ 0.00	92.8	+ 0.15
96.9	+0.40	92.7	+ 0.10
96.8	+0.80	92.6	+ 0.05
96.7	+1.20	92.5	0.00
96.6	+1.60	92.4	– 0.10
96.5	+2.00	92.3	– 0.20
96.4	+2.40	92.2	– 0.30
96.3	+2.80	92.1	– 0.40
96.2	+3.20	92.0	– 0.50
96.1	+3.60	91.9	– 0.60
96.0	+ 4.00	91.8	– 0.70
95.9	+ 4.00	91.7	– 0.80
95.8	+ 4.00	91.6	– 0.90
95.7	+ 4.00	91.5	– 1.00
95.6	+ 4.00	91.4	– 1.20
95.5	+ 4.00	91.3	– 1.40
95.4	+ 4.00	91.2	– 1.60
95.3	+ 4.00	91.1	– 1.80
95.2	+ 4.00	91.0	– 2.00
95.1	+ 4.00	90.9	– 2.40

% of Maximum Theoretical Density (Lot	Unit Price Adjustment (\$ per tonne)	% of Maximum Theoretical Density (Lot	Unit Price Adjustment (\$ per tonne)
95.0	+ 4.00	90.8	– 2.80
94.9	+ 4.00	90.7	– 3.20
94.8	+ 4.00	90.6	– 3.60
94.7	+ 4.00	90.5	– 4.00
94.6	+ 4.00	90.4	– 4.40
94.5	+ 4.00	90.3	– 4.80
94.4	+ 3.65	90.2	– 5.20
94.3	+ 3.30	90.1	– 5.60
94.2	+ 2.95	90.0	– 6.00
94.1	+ 2.60	< 90.0	Reject
94.0	+ 2.25		
93.9	+ 1.90		
93.8	+ 1.55		
93.7	+ 1.20		
93.6	+ 0.85		
93.5	+ 0.50		
93.4	+ 0.45		
93.3	+ 0.40		
93.2	+ 0.35		
93.1	+ 0.30		
93.0	+ 0.25		

9.2.1.2 For **Asphalt content**:

9.2.1.2.1 The pay adjustment for each Lot will be determined in accordance with Table 4112.9.T6:

TABLE 4112.9.T6**PAY ADJUSTMENTS FOR ASPHALT CONTENT**

	Mean of Deviations of Asphalt Content from the JMF	Unit Price Adjustment for Asphalt Content (\$ per tonne)
All Mix Types	0.00 to 0.30	0.00
	0.31 to 0.35	– 4.00
	0.36 to 0.40	– 8.00
	0.41 to 0.45	– 15.00
	0.46 to 0.50	– 30.00
	> 0.50	Reject

9.2.1.3 For Aggregate Gradation:

- 9.2.1.3.1 The pay adjustment for each Lot will be determined in accordance with Table 4112.9.T7.
- 9.2.1.3.2 There will be no payment made by the Ministry for a Lot if the Lot Mean percent by mass retained on the maximum size sieve exceeds 3.0%.
- 9.2.1.3.3 The dollar value of the pay adjustment for each Lot will be the sum of the pay adjustment for each sieve.
- 9.2.1.3.4 The maximum pay adjustment for aggregate gradation as determined in accordance with Table 4112.9.T7 will be \$15.00 per tonne. A Lot will be rejected if the cumulative pay adjustment for Aggregate Gradation for the Lot exceeds \$15.00 per tonne.

TABLE 4112.9.T7**PAY ADJUSTMENTS FOR AGGREGATE GRADATION**

Sieve Size ASTM Designation	Mean of Deviations of the Gradation from the JMF	Unit Price Adjustment for Gradation (\$ per tonne)
5 mm	0.0 to 5.0	0.00
	5.1 to 5.2	– 0.50
	5.3 to 5.4	– 1.00
	5.5 to 5.6	– 1.50
	5.7 to 5.8	– 2.00
	5.9 to 6.0	– 2.50
	6.1 to 6.2	– 3.00
	6.3 to 6.4	– 3.50
	6.5 to 6.6	– 4.00
	6.7 to 6.8	– 4.50
	6.9 to 7.0	– 5.00
	7.1 to 8.0	– 10.00
	8.1 to 9.0	– 15.00
	> 9.0	Reject
900 µm	0.0 to 3.0	0.00
	3.1 to 4.0	– 2.00
	4.1 to 5.0	– 5.00
	5.1 to 6.0	– 10.00
	> 6.0	Reject
71 µm	0.00 to 0.59	0.00
	0.60 to 0.69	– 0.50
	0.70 to 0.79	– 1.50
	0.80 to 0.89	– 3.00
	0.90 to 0.99	– 5.00
	1.0 to 1.09	– 7.50
	1.10 to 1.29	– 12.00
	> 1.29	Reject

9.2.1.4 For Marshall air voids:

- 9.2.1.4.1 The pay adjustment for each Lot will be determined in accordance with Table 4112.9.T8.
- 9.2.1.4.2 When Lot Mean of the Marshall air voids is outside the Acceptance Limits the Lot will be rejected.

TABLE 4112.9.T8
PAY ADJUSTMENTS FOR MARSHALL AIR VOIDS

Mean of Deviations of Air Voids from the JMF	Unit Price Adjustment (\$ per tonne)
0.00 to 0.30	+ 2.00
0.31 to 0.70	0.00
0.71 to 1.00	– 2.00
1.01 to 1.30	– 8.00
1.31 to 1.50	– 14.00
> 1.50	Reject

9.2.1.5 For **Smoothness**:

- 9.2.1.5.1 The pay adjustment for each Block in the final lift of Asphalt Concrete will be determined in accordance with Table 4112.9.T9.
- 9.2.1.5.2 The pay adjustment for Smoothness will be prorated for Blocks with a length not equal to 100 m.

TABLE 4112.9.T9
PAY ADJUSTMENTS FOR SMOOTHNESS

Category I Pri	Category II Pri	Pay Adjustment for Smoothness of Top Lift (\$ per Block)
0	0 – 1	+ 200
1 – 2	2 – 3	+ 150
3 – 4	4 – 6	+ 100
5 – 6	7 – 9	+ 50
7 – 10	10 – 15	0
11 – 12	16 – 17	– 25
13	18	– 50
14	19	– 75
15	20	– 100
16	21	– 150
17	22	– 200
18	23	– 300
19	24	– 400
20	25	– 500
21	26	– 600
22	27	– 800
23	28	– 1000
> 23	> 28	Reject

9.2.1.6 For Individual Bumps and/or Dips

- 9.2.1.6.1 The pay adjustment for Individual Bumps and/or Dips in the final lift of Asphalt Concrete will be determined from Table 4112.9.T10.

TABLE 4112.9.T10**PAY ADJUSTMENTS FOR INDIVIDUAL BUMPS AND/OR DIPS**

Bump / Dip	Pay Adjustment (\$ per bump or dip)
8.5 to 9.4 mm	– 100
9.5 to 10.4 mm	– 200
10.5 to 11.4 mm	– 400
11.5 to 12.4 mm	– 600
12.5 to 13.4 mm	– 800
13.5 to 14.4 mm	– 1000
14.5 to 15.4 mm	– 1200
15.5 to 16.4 mm	– 1400
16.5 to 17.4 mm	– 1600
17.5 to 18.4 mm	– 1800
≥ 18.5 mm	Reject

9.2.1.7 For severity of Segregation:

9.2.1.7.1 The pay adjustment will be determined from Table 4112.9.T11.

TABLE 4112.9.T11**PAY ADJUSTMENTS FOR SEVERITY OF SEGREGATION**

Severity of Segregation	Pay Adjustment (\$ per square metre)
Slight	– 5.00
Moderate	– 10.00
Centre-of-Paver Streak	– 5.00

9.2.1.7.2 Notes to Table 4112.9.T11:

9.2.1.7.2.1 Segregation on the shoulder will be excluded from the segregation severity and segregation frequency pay adjustments.

- 9.2.1.7.2.2 Centre-of-Paver Streak Segregation will be considered 1.0 m wide for the purpose of area calculations.
- 9.2.1.7.2.3 A segregated area will be categorised by the worst condition prevalent for 50% or more of the length of the segregated area.
- 9.2.1.7.2.4 If the worst condition in a segregated area is not prevalent for 50% of the length of the area, then the area will be measured in relation to the length of Slight and Moderate Segregation.
- 9.2.1.7.2.5 For the purpose of area calculations, except for Centre-of-Paver Streak, the segregation severity will be measured across the half lane width unless the Segregation is more than one half the lane width or is across the centre of the lane, in which case the full width will be used.

9.2.1.8 For **Segregation frequency**:

- 9.2.1.8.1 The pay adjustment will be determined from Table 4112.9.T12.

TABLE 4112.9.T12

PAY ADJUSTMENTS FOR SEGREGATION FREQUENCY

Segregation Frequency per Lane Kilometre	Pay Adjustment (\$ per lane kilometre)
0 – 5	0
6 – 15	– 250
16 +	– 500

- 9.2.1.8.2 For each lane km, the Engineer will determine the following:

- 9.2.1.8.2.1 the total number of slight segregated areas;
- 9.2.1.8.2.2 the total number of moderate and severe segregated areas; and
- 9.2.1.8.2.3 the total length of centre-of-paver streak (determined by adding each instance of streak that is in excess of 1 metre in length).

9.2.1.9 For **Echelon Paving**:

- 9.2.1.9.1 A pay adjustment of \$0.50 per metre will be made for Echelon Paving if:
 - 9.2.1.9.1.1 The temperature of the joint between adjacent mats at the time of placement of the second mat is greater than 90°C; and
 - 9.2.1.9.1.2 The width of each of the adjacent mats is greater than 2.4 m.

9.2.1.10 For **longitudinal joint elimination**:

- 9.2.1.10.1 A pay adjustment of \$0.50 per metre will be made if the width of the mat placed with a single pass of the paver is greater than 6.1 m.