

**PAVING GUIDELINES**

**AND**

**SEGREGATION RATING MANUAL**



**2002**



## **PAVING GUIDELINES AND SEGREGATION RATING MANUAL**

### **Introduction**

The guidelines here presented are revisions of earlier editions prepared by the Department. These guidelines are meant to deal with questions commonly raised by Department staff, Contractors and Consultants in regards to technical issues involving the Standard Specification 3.50, Asphalt Concrete Pavement -EPS. The guidelines here presented are based on Edition 10 of the specifications, with change from Edition 9 noted in this document by shading of the new text.

These documents are intended to promote uniform specification interpretation leading to fair and consistent application. It is not the intend of these guidelines to override specification requirements.

This Segregation Rating Manual has been prepared to help the user recognize the type and the severity of segregated areas on asphalt concrete pavement projects. The photographs in Appendix A can be used as the standard reference to identify the type of segregation and to evaluate the severity of segregated areas.

The segregation part of this specification has remained unchanged in Edition 10, since significant changes to Edition 9 were undertaken. Based on recommendations resulting from a Segregation Tri-party Task Group significant changes to the segregation specification were undertaken. They are as follows:

1. Identify segregation immediately for corrective action so that the Contractor is able to modify his operations to prevent any further occurrence of segregation.
2. Move the full inspection of segregation from Warranty time back to the 2 week inspection.
3. Eliminate mandatory repair of all slight segregation.
4. Repairs to moderate or severe segregation during construction only, allowing Contractors expedite repairs while their asphalt plant is still on site.
5. Re-instate substantial bonus.
6. Increased penalties for moderate and severe segregation.
7. Introduction of penalties for slight segregation and Centre-of-Paver segregation.

One of the significant issues is the emphasis on the Contractor to “perform a daily inspection of the paving operations on all lifts of pavement to identify any instances of pavement segregation. If segregation is evident, the Contractor shall take immediate corrective action to his operations to prevent any further occurrence of segregation”.

Should segregation be identified at the start of a project, it is expected that the Contractor provide written documentation of the daily changes or modifications to his equipment and operations to eliminate or reduce significantly the occurrence of the segregation. The Consultant should also be proactive in inspecting the pavement as the work progresses, so that “bench marks” can be established and concerns regarding the segregation ratings can be addressed early in the project.

Further questions on issues related to these guidelines may be directed to Jim Gavin @ 415-1008 or Dave Heath @ 415-1010. Suggestions or comments for items to be included in future editions may be faxed to 422-2846.

Highway Engineering Section  
Technical Standards Branch  
May, 2002

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**3.50.1 GENERAL**

**3.50.1.2 Description**

Asphalt Concrete Pavement (ACP) shall consist of crushed aggregates, or a combination of crushed aggregates and Reclaimed Asphalt Pavement (RAP), blend sand material as required and asphalt cement, combined in a hot mix plant, placed and compacted on a prepared surface in conformity to the lines, grades, dimensions and cross-sections as shown on the drawings or as directed by the Consultant.

**3.50.1.2 Definitions**

For purposes of this specification, the following definitions will apply:

**3.50.1.2.1 Acceptance Limits**

- (i) Density and Actual Asphalt Content - Acceptance Limits for density and Actual Asphalt Content are the limiting values of the Lot Mean within which the Lot will be accepted at full, increased, or reduced payment for density, as shown in Table 3.50 A, or full or reduced payment for Actual Asphalt Content as shown in Table 3.50 B.
- (ii) Smoothness - Acceptance Limit for smoothness is the limiting value of the Profile Index within which a Sublot will be accepted with or without penalty assessment as shown in Table 3.50 C.
- (iii) Gradation - Acceptance Limit for gradation is the limiting value of the Lot Mean within which the Lot will be accepted as shown in Table 3.50 E.

**3.50.1.2.2 Asphalt Content**

- (i) Design Asphalt Content - The Asphalt Content established by the approved mix design.
- (ii) Approved Asphalt Content - The Design Asphalt Content or subsequent adjustments to it. Such adjustments must be approved in writing by the Consultant.
- (iii) Actual Asphalt Content - The amount of asphalt binder in the mix as determined by ATT-12 or ATT-74, and includes an amount to correct for the asphalt binder lost due to absorption by the aggregate or aggregate loss.

This correction may be determined for each change in aggregate or asphalt binder.

**Any changes to the Job Mix Formula asphalt content are evaluated to determine if minimum film thickness specifications are met for the applicable Design Air Voids (Table 3.50.3.2).**

### 3.50.1.2.3 End Product Specification (EPS)

A specification whereby the Department does not define the methods of construction. Under EPS, the Department will monitor the Contractor's control of the process that produces the items of construction and will accept or reject the end product according to a specified acceptance plan. The Contractor is entirely responsible for quality control. End product acceptance is the responsibility of the Department and includes a statistically oriented program of acceptance testing.

### 3.50.1.2.4 Job Mix Formula

The Job Mix Formula establishes the aggregate proportioning, target aggregate gradation and approved asphalt content to be used for production of asphalt mix and requires the approval of the Consultant on the basis of a mix design.

### 3.50.1.2.5 Lot

A Lot is a portion of the Work being considered for acceptance and is defined as the following:

- (i) One day's plant production of more than 4 hours where approved changes to the following criteria have not occurred:

- (a) Job Mix Formula
- (b) Pavement Density Requirement
- (c) Project

A change in any one of the above may require a new Lot designation.

- (ii) One day's plant production of less than 4 hours will be dealt with at the Consultants option, as follows:

- (a) The material will be added to the previous day's Lot if the criteria specified in (i) remains the same or,
- (b) The material will be added to the next day's Lot with the same criteria specified in (i) or,
- (c) If it is the last time the mix is produced with these criteria then the production will be designated as a Lot.

- (iii) If the Consultant suspects a portion of a Lot is substandard, he may order extra testing to define the area and severity of the deficiency. A new Lot will be designated for this portion if this extra testing indicates the mix is subject to unit price adjustment or rejection.

**Even though this is EPS, the Contractor still must follow industry accepted construction practices. EPS does not absolve the Consultant of the responsibility to inspect all of the work to ensure acceptable products are being supplied and paid for.**

- (a) **A new mix design or mix type, a target asphalt content change or aggregate gradation change during a days production should be evaluated by the Consultant to determine if a new Lot be designated. Normally these changes should be done at the start of a days production so that a new Lot does not have to be considered.**
- (b) **A change in density requirement, eg. from 94%(less than 35 mm and greater than 20 mm design lifts) to 97%(35 mm or greater design lifts) requires that a new Lot be designated.**

**At least five samples are required for asphalt content, gradation and density determination in each Lot(density only on QC Lots). The exception to this may be in the situation when a density requirement change occurs within a days production requiring two Lots. Five cores for asphalt content and gradation may be used for the entire two Lots and separate cores(5) taken for density in each of the two Lots. Each QA Lot will have the same reported asphalt contents and gradations.**

**This allows the Consultant to break a Lot up into a number of smaller Lots if part of the original Lot is suspected to be deficient. All Lots must have a minimum of 5 tests. The original Lot must be redefined and tests taken at random within the segments(s) which do not have one test sample. The new Lot on the suspect area in question is re-stratified using the random sampling procedure. New cores are taken in the segments which do not have test results. Tests are done for density, asphalt content and gradation on the newly cored segments(density only on QC Lots). These result(s) are combined and reported with the previous results from the suspect area.**

#### 3.50.1.2.6 Rejection Limit

- (i) Density and Actual Asphalt Content - Rejection Limit for Density and Actual Asphalt Content is the limiting value of the Lot Mean beyond which a Lot is rejected and not paid for as shown in Tables 3.50 A, and 3.50 B.
- (ii) Smoothness - Rejection Limit for smoothness is the limiting value of the Profile Index (PrI) beyond which a Sublot is rejected and not paid for as shown in Table 3.50 C.
- (iii) Gradation - Rejection limit for gradation is the limiting value of the Lot Mean beyond which a Lot is rejected and not paid for as shown in Table 3.50 E.

#### 3.50.1.2.7 Lot Mean and Range

The Lot Mean is the arithmetic mean of a set of 5 or more test results constituting the sample for the Lot. The Range represents the difference between the highest and lowest values within a set of test results.

#### 3.50.1.2.8 Stratified Random Sample

A Stratified Random Sample is a set of test measurements taken one each from 5 or more separate (stratified) areas or segments within a Lot in an unbiased way.

#### 3.50.1.2.9 Sublot

A Sublot is a portion of a Lot that is one paver width wide and 100 metres long on which the calculation for Smoothness and assessment of Workmanship and Obvious Defects are based.

#### 3.50.1.2.10 Alberta Transportation Test Procedures

Test methods designated in these specifications as "ATT" or "TLT" refer to Alberta Transportation Tests.

#### 3.50.1.2.11 Managed Quality Assurance (MQA)

Within this specification, acceptance testing shall be applied using Managed Quality Assurance (MQA) practises. With MQA, certain quality control test results provided by the Contractor may be used in place of corresponding quality assurance test results, as a basis for acceptance and payment. The Lots for which test results are used for acceptance and payment will be at the discretion of the Consultant.

**ATT test procedures, TLT test procedures, data sheets and report forms are available to the Contractor and Consultant on the Alberta Transportation website ([www.trans.gov.ab.ca](http://www.trans.gov.ab.ca)). Procedures are also available for purchase in hard copy, Manual of Test Procedures (most current edition is 1997) or Transportation Laboratory Test (TLT) Manual, through Business Management Branch.**

**Managed Quality Assurance (MQA) is now incorporated into this Specification 3.50 Asphalt Content Pavement EPS, Edition 10.**

**Using MQA Specifications there is less duplication in testing between the Contractor (QC) and Consultant (QA). Full QA testing for asphalt content and gradation is not normally carried out on all Lots, rather they are done at the frequencies listed in 3.50.1.2.13.**

3.50.1.2.12 QC Acceptance Lot

A Lot chosen by the Consultant in which acceptance testing for asphalt content and gradation is based upon the Contractor's quality control test results and for which no corresponding quality assurance test results are available. All other quality assurance testing as outlined in this specification will remain the responsibility of the Consultant.

Quality assurance test results, when available, shall replace any quality control test results used for material acceptance.

3.50.1.2.13 QA Acceptance Lot

A Lot in which all acceptance testing is conducted by the Consultant using quality assurance test procedures as outlined in these specifications. The number and selection of QA Acceptance Lots shall be determined as follows:

- (i) First two Lots of production for each Mix Type used, except for Mix Type 8 in which case the first Lot shall be used, and;
- (ii) Minimum of one additional Lot per 60 000 tonnes, or portion thereof, of total ACP contract tender tonnage and;
- (iii) One additional Lot of top lift production, for each Mix Type, if two or more lifts are specified and;
- (iv) Any additional Lot(s) chosen by the Consultant.

3.50.2 MATERIALS

3.50.2.1 **Asphalt**

The Contractor shall supply asphalt material in accordance with Specification 5.7, Supply of Asphalt. The types and grades of asphalt shall be as specified in Table 3.50.3.2.

For ACP mixtures containing RAP and specified to use penetration grade asphalts, the procedures outlined in TLT-300, Recycling of Asphalt Concrete Pavement, shall be used to determine the rheology of the RAP and the grade of virgin asphalt to be used. For ACP mixtures containing RAP and specified to use Performance Graded (PG) asphalts, the RAP rheology and the grade of virgin asphalt to be used shall be determined according to Appendix X1 of AASHTO MP2.

Rheological testing of the RAP is not required for mixtures using a maximum RAP to virgin aggregate ratio of 10/90.

**MQA projects have minimum Quality Control Test frequencies for asphalt content and gradation specified. The Quality Control test procedures in Table 3.50.4.3 must be followed.**

**QC Acceptance Lots are NOT subject to gradation penalties or bonuses and asphalt penalties.**

**These are the minimum number and selection of full QA Acceptance Lot testing for asphalt content, and gradation testing. Marshall Densities and core densities are done on all Lots.**

**End Product requirements for smoothness and segregation on Managed Quality Assurance projects are the same as specified in the regularly tested EPS projects.**

**The Consultant can direct additional full Lot testing on selected Lot/Sublots based on suspected deficiencies for asphalt content or gradation that may be identified through Marshall density variations from design or previous values, percent compaction deficiencies, visual appearance of mix characteristics, full QA acceptance Lot results not meeting specification requirements on previous Lots, evaluation of QC and QA test results and project specific knowledge of plant problems, stockpile depletion problems etc. The Project Sponsor shall be notified for approval, if additional QA acceptance Lots are required.**

**The requirements for shipping Asphalt cement samples to the Department's designated Lab for the Quality Assurance Testing Program is outlined in Appendix C. Appendix C also provides guidance on Quality Control Plans for the supply of PG asphalts.**

**TLT 300 replaces TLT-RACP. Key changes include allowing up to 10% RAP with no rheological testing (previous editions of RACP allowed up to 7.5%) and clarification on rheological testing using PG asphalts.**

### 3.50.2.2 Aggregate

The Contractor shall produce crushed aggregates in accordance with Specification 3.2, Aggregate Production and Stockpiling for the designation and class of material specified. The Contractor shall supply aggregate materials in accordance with Specification 5.2, Supply of Aggregate and haul materials in accordance with Specification 4.5, Hauling.

### 3.50.2.3 Interim Lane Markings

The Contractor shall supply interim lane marking paint and glass beads. Paint shall be yellow 505-308 or white alkyd traffic paint conforming to the latest edition of Alberta Transportation TPC Specification for Traffic Paint.

**The Contractor has the option of supplying Davidson Temporary Pavement Markers (or equivalent) or self-adhesive reflectorized pavement marking tape.**

### 3.50.2.4 Reclaimed Asphalt Pavement

**Unless specified otherwise, the Contractor may elect to use RAP in the ACP mixture to a maximum RAP to virgin aggregate ratio of 30/70. The handling, stockpiling, storage and hauling of all RAP shall be in accordance with Specification 3.16, Cold Milling Asphalt Pavement, and shall prevent the contamination and consolidation of the material.**

### 3.50.3 ASPHALT MIX DESIGN AND JOB MIX FORMULA

#### 3.50.3.1 Responsibility for Mix Design

Preparation and submission of asphalt mix designs for Consultant verification and approval are the responsibility of the Contractor. The Contractor shall use professional engineering services and a qualified testing laboratory licensed to practice in the Province of Alberta, to assess the aggregate materials proposed for use and to carry out the design of the asphalt mixture.

All costs incurred in mix design formulation are the responsibility of the Contractor. Shipping costs for samples sent to the Consultant for verification and approval are the responsibility of the Contractor.

#### 3.50.3.2 Requirements for Mix Design

The asphalt mix design shall follow the Marshall method of Mix Design as outlined in design procedure TLT-301. The mix design, at the Design Asphalt Content, shall meet the requirements in Table 3.50.3.2 for the Asphalt Concrete Mix Type specified.

**During aggregate production, the Contractors Quality Control tests should be reviewed daily for compliance with the specifications and that specified minimum frequencies are done. Consultant QA "shadow testing" is normally not necessary. If shadow testing is required the Project Sponsor should be notified for authorization of these additional testing requirements.**

**The requirements for shipping Paints and Glass Beads to the Department's designated Lab for the Quality Assurance Testing Program is outlined in Appendix C. These samples are obtained during Roadway line Painting after construction according to Specifications 5.20 Supply of Line Painting Materials.**

**Some of the KEY TLT procedures that are referenced in TLT 301, that are to be reviewed as part of the mix design submission are:**

**TLT- 314, Percent Manufactured Fines  
TLT -107, Determination of Detrimental Matter Content  
TLT -311, Asphalt Film Thickness in Bituminous Mixtures**

**Asphalt Institute design procedure MS-2, has been removed from this edition of the specification, all designs must follow TLT-301.**

**TABLE 3.50.3.2  
ASPHALT CONCRETE MIX TYPES AND CHARACTERISTICS**

Asphalt Concrete Mix Type	Class for Des 1 Aggregate	% MF, -5000 (Min) (Note 1)	% Fractures +5000 (2 faces)* (Min)	Asphalt Cement Grade	Marshall Stability N (Min)	No. of Blows	Air Voids %	VMA % (Min.) by % Air Voids		Voids Filled with Asphalt %	Flow mm	Retained Stability % (Min.)
								3.5	4			
1	16	75	98 (one face) 90 *	150-200A	12 000	75	Note 5	13	13.5	65 to 75	2 to 3.5	70
2	16	70	70 *	150-200A	12 000	75	Note 5	13	13.5	65 to 75	2 to 3.5	70
3	16	40	60 *	150-200A	8 000	75	Note 5	13	13.5	65 to 75	2 to 3.5	70
4	12.5	50	60 *	150-200A	8 000	75	Note 5	13.5	14	65 to 75	2 to 3.5	70
5	12.5	Note 2	60 *	200-300A	8 000	75	Note 5	13.5	14	65 to 75	2 to 3.5	70
6	12.5	Note 2	60 *	200-300A	5 300	50	Note 5	13.5	14	65 to 78	2 to 4	70
7	12.5	Note 2	60 *	300-400A	5 300	50	Note 5,6	13.5	14	65 to 78	2 to 4	70
8	10	Note 2	60 *	Note 3	5 300	Note 4	Note 5	14.5	15	65 to 78	2 to 4	70

Note 1 - The Percentage of Manufactured Fines in the -5000 Portion of the Combined Aggregate.

Note 2 - All fines manufactured by the process of crushing shall be incorporated into the mix for Asphalt Mix Types 5, 6, 7 and 8.

Note 3 - Use the same asphalt grade as for the lift above.

Note 4 - Use the same number of blows as for the surface course.

Note 5 - The Design Air Voids shall be chosen as the lowest value, within the range of 3.5 to 4.0% inclusive, such that all other mix design criteria are met.

Note 6 - Air Void limits listed in Note 5 shall be reduced by 0.5% for community airports. VMA at 3.0 % Air Voids shall be a minimum of 13 %.

Note 7 - Theoretical Film Thickness requirements shall be as follows depending upon the specified Mix Type and Design Air Voids. The Theoretical Film Thickness value shall be established in accordance with TLT-311.

**Minimum Theoretical Film Thickness Requirements (Fm)**

Design Air Voids (%)	Mix Types 1, 2, 3, 4, and 5	Mix Types 6 and 7
4.0 and 3.9	6.0	6.5
3.7 and 3.8	6.1	6.6
3.5 and 3.6	6.2	6.7
3.3 and 3.4	Community Airports only Mix	6.8
3.0, 3.1 & 3.2	Type 7	6.9

**The following table outlines the process for the Design Air Voids to be chosen as the lowest value, within the range of 3.5 to 4.0% inclusive, such that all other mix design criteria are met.**

For example, the following is an example of a Mix Type 1 design.					
AC	Air Voids	VMA %	Voids Filled	Film thickness	
5.3	4.0		14.5	72.4	6.2
<b>5.4</b>	<b>3.7</b>		<b>14.5</b>	<b>74.3</b>	<b>6.3</b>
5.5	3.5		14.4	75.7(out of Spec)	6.4
The Asphalt Content with the lowest value, within the range of 3.5 to 4.0% inclusive, such that all other mix design criteria are met in this example is <b>5.4 % at 3.7 % air voids</b> . (Other criteria such as Retained Stability, Flow and Marshall Stability also must be met as well at this asphalt content).					

### 3.50.3.3 Approval of Mix Design

Mix designs shall be subject to the approval of the Consultant. The Contractor shall submit the mix design to the Consultant for verification and approval. The Contractor's submission shall include the following information:

- (i) Aggregate source name(s) and location(s).
- (ii) The gradation of each aggregate to be used in the mixture.
- (iii) The percentage by mass of each aggregate to be used in the mixture.
- (iv) The mix design gradation of the combined aggregate.
- (v) Other characteristics of the combined aggregate specified in Specification 3.2, Aggregate Production and Stockpiling.
- (vi) All Marshall Mix Design characteristics, including graphs used in arriving at the final mix design, the bulk specific gravity of the combined aggregates, **theoretical maximum specific gravities**, and the asphalt absorption of the combined aggregates.
- (vii) Identification of each asphalt supplier by name, location and types and grades of asphalt to be supplied.
- (viii) Percent uncompact voids (Fine Aggregate Angularity) of loosely compacted minus 2500 portion of the combined aggregate in accordance with TLT-125 or Method A of AASHTO T304. No minimum value specified.
- (ix) For each asphalt supplied, asphalt specific gravity and recommended mixing and compaction temperatures for the preparation of design specimens.
- (x) Voids chart to include Air Voids, VMA and Voids Filled with Asphalt for various asphalt contents (0.1 % increments) and bulk densities (increments of 5 kg/m<sup>3</sup>).
- (xi) **Mix design submissions using RAP shall include the RAP source name(s) and location(s), all RAP asphalt content and gradation test results, the bulk specific gravity of the RAP aggregate, the percentage by weight of RAP to be used in the mixture, and, when required, all RAP rheological test results, the design rheology and all blending charts used.**

**The Consultant verifies that all mix design characteristics are reported and meets specified criteria. The Consultant also evaluates the reasonableness of all reported mix characteristics and material properties. Comparison to previous mix designs within the same pit or geographic area is also useful.**

**For most projects, and unless otherwise specifically indicated by the Consultant, the Contractor is to submit aggregate for possible laboratory verification testing. Full scale mix design verification is rarely required. Limited verification testing should focus on mixture characteristics and material properties not regularly tested within the field QA testing program, i.e. Detrimental Matter, Bulk Specific Gravity of aggregates, Maximum Specific Gravities, etc. Other mixture characteristics such as Stability and Flow, while not checked in the field, are not usually considered to be an issue. Verification testing is usually done if the Consultant questions the reasonableness of certain reported values. Verification testing should also be considered for instances where the mix designer is providing a "first time AT design submission".**

**While this verification testing may take up to 5 working days, the Consultant should strive to complete such work in as short a time as possible. Simple reviews without verification testing should be completed within one working day.**

**The Consultant is to advise the Project Sponsor and Contractor of the status of mix design submissions at all times. Significant discrepancies identified during verification testing should be dealt directly with the Contractor, but also brought to the attention of the Project Sponsor.**

**All approvals or requests for mix design submissions and approved changes to the Job Mix Formula are to be provided by the Consultant in writing to the Contractor. Also for each approved mix design and change to Job Mix Formula the Consultant is to promptly complete the ASPHALT MIX DESIGN AND JOB MIX FORMULA SHEET. This form is to be faxed(or E-mailed) to the Highway Engineering Section of the Technical Standards Branch and the Project Sponsor. A copy of this form is contained in Appendix B.**

Where required by the Consultant for any change in the nature or sources of the aggregates or RAP, or where a new mix design is desired by the Contractor, the Contractor shall provide a separate and complete mix design. This new mix design shall be subject to the approval of the Consultant.

The Consultant may, at any time, require the Contractor to provide representative samples of each of the aggregate components and RAP for verification purposes. A sufficient quantity of each component shall be provided to result in a 100 kg sample of combined aggregate at design proportions. The Consultant will require up to 5 working days from the time of receipt of the sample to verify the mix design. The cost of such mix design verification will be borne by the Department.

Asphalt mix produced prior to the Contractor receiving the Consultant's written approval of the mix design, will not be accepted.

The aggregate proportioning, target gradation and asphalt content for the approved mix design will then be the Design Mix Formula and will become the Job Mix Formula for the start in production of asphalt mix.

The Contractor is responsible for producing mixes which conform with the specifications.

#### **3.50.3.4 Variation from Approved Job Mix Formula**

Once the Job Mix Formula has been established and approved, no alteration will be permitted unless reviewed and approved by the Consultant.

The Lot Mean Marshall Air Voids, as determined by the Consultant, shall not vary from the air voids in the approved mix design by more than 0.5%.

If the sum of any approved alterations to the Job Mix Formula are in excess of any one of the following limits away from the Design Mix Formula, a new mix design is required.

- $\pm 5\%$  passing the 5 000 Fm sieve.
- $\pm 1.0\%$  passing the 80 Fm sieve.
- $\pm 0.3\%$  asphalt content.

Any change to the approved Job Mix Formula shall not result in a Theoretical Film Thickness value less than that specified in Table 3.50.3.2 Asphalt Concrete Mix types and Characteristics for the applicable Design Air Voids.

**The Consultant may provide verbal approval to accommodate field schedules which will be followed up by written approval. Contractors may only start mixing following approval from the Consultant.**

**The Consultant is to closely monitor the Lot Mean Air Voids. Target asphalt contents should be used to calculate Marshall air voids if QA values are not available. The Consultant is to assure that the Contractor takes appropriate action in ensuring Lot Mean Air Voids are within  $\pm 0.5\%$  of the Design Air Void value (Note: Design Air Void value to be within range of 3.5% to 4.0%). More immediate attention is required when the Lot Mean Air Voids is outside the upper tolerance limit.**

**New mix design submissions are now automatically required if the sum of the Job Mix Formula aggregate gradation changes on two key sieve sizes (5 000 Fm and 80 Fm ) is greater than the limits shown. (For example, the Contractor may request a gradation change on the 80 of 0.5% on Lot 5, than an additional 0.6 % on Lot 8, since this totals more than 1.0% a new mix design would be required). If the sum of the changes to the target asphalt content is greater than  $\pm 0.3\%$  , a new mix design is also required.**

**Any JMF changes (both AC and Gradation target changes) are evaluated to determine if minimum film thickness specifications are met for the applicable Design Air Voids.**

### **3.50.4 SAMPLING AND TESTING**

#### **3.50.4.1 General**

During the progress of the Work, tests will be carried out on materials and workmanship in order to ensure compliance with the requirements of the specifications.

Where it is required in these specifications that the Contractor submit samples of materials or mixtures to the Consultant for approval, these samples shall be submitted in sufficient time for proper testing.

The Engineer's approval of any materials or mixture shall in no way relieve the Contractor from his obligation to provide materials, mixtures and workmanship in accordance with the specifications.

Where specified, random sampling procedures shall be followed, and where no specific random sampling procedure is specified the sampling procedure shall be as identified by the Consultant in the case of acceptance testing and by the Contractor in the case of quality control testing.

The Consultant shall have access to the work at all times for taking samples. The Contractor shall provide any assistance necessary for taking samples and shall reinstate pavement layers or other structures to the satisfaction of the Consultant at the positions where samples have been taken. Compensation for providing assistance with sampling and for reinstatement where samples are taken shall be included in the unit price bid for the various items of Work tested and no separate payment will be made.

The Contractor shall provide, at his own expense, sampling stands, sampling devices and other facilities which the Consultant may require to safely obtain representative samples of the item being produced.

When required, the Contractor shall provide and prepare, to the satisfaction of the Consultant, a suitable site for the parking of a mobile laboratory trailer. The Contractor shall provide power to the mobile laboratory trailer, at his own expense.

#### **3.50.4.2 Methods of Testing For Acceptance and Appeal Testing**

Unless otherwise specified, the latest edition of the following standard Alberta Transportation test methods (ATT) shown in Table 3.50.4.2 will be used to determine material characteristics.

**TABLE 3.50.4.2**  
**TEST METHODS ON MANAGED QA PROJECTS**

TEST DESCRIPTION		TEST METHOD
1.	Sampling Mixes	ATT-37
2.	Coring	ATT-5
3.	Extraction	ATT-12
4.	Correction Factor, Extracted Asphalt Content	ATT-12 Part III
5.	Percent Fracture	ATT-50
6.	Sieve Analysis, 20 000 Fm minus	ATT-26
7.	Density, Immersion Method, Waxed Asphalt Concrete Specimens	ATT-6
8.	Density, Immersion Method, Saturated Surface Dry Asphalt Concrete Specimens	ATT-7
9.	Voids Calculations, Asphalt Concrete Specimens	ATT-36
10.	Percent Compaction, Asphalt Concrete Pavement	ATT-67
11.	Forming Marshall Specimens, Field Method	ATT-13
12.	Moisture Content, Oven Method Asphalt Concrete Mixes	ATT-15
13.	Smoothness of Pavements, Profilograph Method	ATT-59
14.	Stratified Random Test Sites for A.C.P. Projects	ATT-56
15.	Appeal Testing, Asphalt Content, Density and Gradation	ATT-68
16.	Asphalt Content, Ignition Method	ATT-74
17.	Correction Factor, Ignition Asphalt Content	ATT-74 Part II
<b>ADDITIONAL TEST METHODS FOR QC ACCEPTANCE LOTS ONLY</b>		
18	Asphalt Content	AASHTO T164 , T287 or ATT-12 or ATT-74

**NOTES:**

- (1) In all test methods used as reference in this specification, metric sieves as specified in Canadian General Standards Board Specification 8-GP-2M shall be substituted for any other specified wire cloth sieves in accordance with Specification 3.2, Aggregate Production and Stockpiling.
- (2) In all cases the latest amendment or revision current at the closing date of the tender is implied when reference is made to one of the above standards in the specification.

### 3.50.4.3 Quality Control Testing

Quality control testing is the responsibility of the Contractor throughout every stage of the Work from the crushing and production of aggregates to the final accepted product. Tests performed by the Consultant will not be considered to be quality control tests. The Contractor shall provide and pay for equipment and qualified personnel to **obtain all quality assurance core samples** and perform all quality control testing necessary to determine and monitor the characteristics of the materials produced and incorporated into the work, and the final product produced.

**If the Contractor elects to use RAP, the asphalt content and gradation of the RAP shall be determined according to and at the frequencies specified in Specification 3.16. When required, the RAP rheology shall be determined at a minimum frequency of one per 5 000 t of RAP and a minimum of two samples shall be tested for each RAP source.**

Test methods, sampling and minimum frequency of testing are described in Section 3.50.4.2, Methods of Testing For Acceptance and Appeal Testing and Table 3.50.4.3, Quality Control Testing Requirements. The Consultant may require an increase in the frequency of any quality control test which has a specified minimum frequency. The Contractor shall arrange and pay for any additional tests required by the Consultant.

Results of all quality control tests shall be submitted to the Consultant as they become available. **In addition, the quality control test results for mix asphalt content and aggregate gradation shall be provided to the Consultant no later than 12:00 noon of the day following placement.**

The Contractor shall bear the cost of all consulting services retained by him.

The Contractor shall be totally responsible for production of aggregate and mixes that meet all the specified requirements.

**The timing and method of reporting any Quality Control Tests to the Consultant should be established at the start of the Project. If it is decided to use the Quality Assurance Field Laboratory as the drop off for the test results it should be made clear to the Contractor that he does not have access to Quality Assurance test data until it has been completed and reviewed by the Consultant.**

**Exceptions to this are Field Marshall Briquette densities at the start of the project. This allows the Contractor to evaluate changes in asphalt content to meet the 0.5% air voids criteria and resolve discrepancies between Quality Assurance and Quality Control Marshall densities.**

**When the Consultant has received all Quality Assurance Test results and they are checked for accuracy and completeness and it has been established that further testing is not required, the results can then be reported to the Contractor.**

**The method of reporting Quality Assurance Tests and transferring Random Core site locations to the Contractor should be established at the start of the Project.**

**Discrepancies between Quality Assurance Tests and the Contractor's Quality Control Tests should be investigated. Generally sampling or sampling location has been found to be the cause of most differences. Comparison testing using split samples is often helpful in this regard.**

**Unresolved differences should be brought to the attention of the Project Sponsor and Highway Engineering Section. In any case the Quality Assurance Test results will be binding on the Contractor unless the Appeal process is followed.**

**Results of all quality control tests including plant checks and plant calibration data are to be provided to the Consultant for evaluation.**

**Table 3.50.4.3**  
**QUALITY CONTROL TESTING REQUIREMENTS - MANAGED QA TESTING PROJECTS**

TEST	STANDARD	MINIMUM FREQUENCY
AGGREGATE PRODUCTION		See Specification 3.2
ASPHALT MIX PLANT		
1. Calibration	ATT-17	Once per project or as required (2)
2. Inspection	ATT-16	
SAMPLES		
1 Asphalt Cement	ATT-42	See Specification 5.7
2 Tack, Prime and Fog Materials	ATT-42	See Specification 5.7
3 Cold Feed Aggregate	ATT-38	(2)
4 Mix	ATT-37	(2)
5 QA Cores - Stratified Random Test Sites Chosen By The Engineer	ATT-56	
i) QA Cores for Pavement Density	ATT-5	One per segment for each Lot.
ii) QA Cores for Asphalt Content and Gradation	ATT-5	One per segment for selected Lots as directed by the Consultant.
TESTS WITH SPECIFIED MINIMUM FREQUENCIES		
1 Mix Asphalt Content	AASHTO T-164, T287 or ATT-12 or ATT-74	(2)
2 Correction Factors	ATT-12, Part III or ATT-74, Part II	As Required
3. Mix Moisture Content	ATT-15	(2)
4. Aggregate Sieve Analysis	ATT-26	(2)
TESTS WITH NO SPECIFIED MINIMUM FREQUENCIES		
1 Field Formed Marshall Briquettes	ATT-13	(1)
2 Density Immersion Method, Saturated Surface Dry	ATT-7	(1)
3 Void Calculations, Cores or Formed Specimens	ATT-36	(1)
4 Temperatures	ATT-30	(1)
5 Percent Compaction, Cores or Nuclear Density	ATT-67, ATT-5 or ATT-11	(1)
6 Random Test Site Locations	ATT-56	(1)
7 Correction Factors, Nuclear Moisture-Density Measurement	ATT-48	(1)

- Notes:
- (1) Minimum Frequency not Specified.
  - (2) When a Lot has eight hours of plant production or more, a minimum of four plant checks plus four asphalt contents and four sieve analysis of the combined aggregate (any combination of cold feed, extraction or ignition) are required. When a Lot has less than eight hours of plant production, these tests shall be performed once for every two full hours of plant production.

### 3.50.4.4 Acceptance Sampling and Testing

#### 3.50.4.4.1 General

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, shall be determined by statistical testing as described in this section.

Acceptance testing is the responsibility of the Consultant except for Lots designated by the Consultant as QC Acceptance Lots in which case the Contractor's quality control test results for asphalt content and aggregate gradation only, may be used towards determining conditional material acceptance.

The Contractor shall provide to the Consultant all quality assurance density cores and any additional cores requested by the Consultant for quality assurance testing for asphalt content and gradation, within 24 hours of receiving the stratified random sample locations. Prior to the Contractor obtaining the cores, the Consultant may provide the Contractor with new or different random sample locations. The Consultant may have the Contractor obtain cores for quality assurance testing at any time throughout the project for any Lot. All cores provided to the Consultant shall be in their original condition. Core preparation or sawing shall be done by the Consultant.

All costs associated with pavement coring for both quality control and quality assurance testing shall be the responsibility of the Contractor.

Initial acceptance testing will be performed free of cost to the Contractor. The Contractor shall be responsible for the cost of all Quality Assurance testing performed on material that is used to replace or overlay material that has been previously rejected.

The Contractor shall be responsible for the cost of all Quality Assurance retesting performed following attempts to improve smoothness or to remove bumps or dips.

After all quality control tests for the Lot are reported to the Consultant, the Consultant will provide the Contractor with a copy of the results of acceptance tests within one working day of their availability.

If the Consultant determines that certain test results are faulty due to testing equipment malfunction, improper testing procedures or calculations, he will replace the faulty tests with new tests.

If the testing equipment malfunction, improper testing procedures or calculations were on the part of the Consultant, the Contractor shall be reimbursed \$50 per locations for obtaining cores.

**Quality Assurance coring by the Contractor will normally take place the morning after the placement, the 24 hour period is to allow for coring equipment problems. Coring can be carried out earlier if the Contractor agrees in writing. On highly trafficked roads where safety is a concern, coring could be done behind the final roller in the construction zone using dry ice to cool the pavement.**

**If the Contractor would like to place another lift on top before QA cores are normally taken the Contractor should inform the Consultant in writing so that arrangements can be made to core prior to another lift being placed.**

**QA Consultant has to coordinate with the Contractor the transfer of site selection data and should monitor the coring locations periodically to prevent abuses. Using various paint colour marks or matching of actual cores to location markings is a method of ensuring cores are taken as indicated on the random test site sheet.**

**Sawing of the cores is done by the Consultant to ensure proper core lift thicknesses are obtained.**

**Faulty tests must be retested prior to reporting the original tests to the Contractor. No retesting is done after the results are reported.**

**The Contractor shall be reimbursed for any re-coring when the faulty testing is on the part of the Consultant.**

**3.50.4.4.2 Acceptance Sampling and Testing Procedures**

**3.50.4.4.2.1 Pavement Sampling for Density, Asphalt Content and Gradation**

Pavement sampling will be done using stratified random sampling procedures. A minimum of 5 tests per Lot will be selected as follows:

- (i) The Lot will be divided into 5 or more segments of approximately equal quantity.
- (ii) In each segment a test site will be located by using random numbers to determine the longitudinal distance from the end of the segment and the lateral distance from the edge of the segment. In no case will a lateral distance be less than 0.5 m from the shoulder or 0.3 m from any other edge of a mat except when matching mats, in which case the test site may be within 0.3 m of the joint.

For lifts of 20 mm or less, samples for asphalt content and gradation may be obtained by the Engineer using the Sampling Mix Behind Paver method described in ATT-37. If sufficient numbers of mix samples cannot be obtained in this manner, stratified random core samples shall be taken by the Contractor as determined by the Consultant in order to perform the minimum five tests per Lot.

On Lots designated by the Consultant as QC Acceptance Lots, material sampling for quality control testing of asphalt content and gradation may consist of cold feed aggregate or loose mix or core samples as outlined in ATT-37, ATT-38 or ATT-56.

**3.50.4.4.2.2 Pavement Sampling for Smoothness**

The surface of the Sublots in the final lift of asphalt concrete pavement will be profiled by the Consultant in accordance with ATT-59 using a California Cox Model Profilograph. Other makes of Profilograph machines may be used if they have been individually approved by the Department. Profiles will be made approximately at the traffic wheel paths.

**3.50.4.4.2.3 Asphalt Mix Sampling**

Sampling of the asphalt mixture for Marshall compaction comparison will be done by the Consultant using the procedures identified in ATT-37.

**Sampling mix behind the paver for asphalt content and gradation can only be done for 20 mm design lifts. ATT- 37, outlines the random selection method for obtaining additional cores, to meet the minimum five test requirement on Lots designated as QA Acceptance Lots.**

**Pavement smoothness will be determined using either the Cox manual, Cox CS 8200 Profilograph or pre-approved Pavaset models. All other “new” types of profilographs will have to be pre-approved by the Department after meeting qualification requirements. The inside wheelpath is only tested when PrI specifications are not met. Bumps or Dips located in the IWP will have to manually reviewed to determine if they are separate and subject to additional assessments from those located in the OWP. Bumps or Dips located at the same station in both wheelpaths shall be consider one bump/dip for payment assessments. A Profilograph Index Report form and example is contained in Appendix B.**

**Samples of mix are to be taken off the road behind the Paver when paving the main alignment. Other locations, such as windrows should only be used when it is not practical or possible to sample behind the paver. Do not sample from truck boxes.**

**3.50.4.4.2.4 Exclusions to Random Sampling**

Random sampling methods will not be applied when the Consultant samples mix behind the paver on lifts of 20 mm or less; nor to small areas such as tapers, approaches, areas of handwork, gores; nor for asphalt mix used for isolated levelling and repair of failed areas; nor for aggregate or asphalt mix chosen for QC Acceptance Lot testing.

**3.50.4.5 Retesting Following Attempts to Improve Smoothness**

When the test results on a Sublot of ACP indicate a penalty or rejection because of smoothness, the Contractor, at his option, may make one attempt to improve the smoothness on the Sublot by additional work in which case the following shall apply:

- (i) the Contractor shall notify the Consultant in writing that he will make one attempt to improve smoothness.
- (ii) additional work on a Sublot to improve smoothness shall be completed within 10 calendar days from the time the Contractor receives written notification from the Consultant indicating the smoothness test results for that Sublot.
- (iii) additional work to improve smoothness will not be allowed on Sublots with:
  - a PrI of 10 or less for multilift applications,
  - a PrI of 15 or less for single lift applications and
  - a PrI of 22 or less for applications through areas of curb and gutter,except for removal of bumps and dips over 8 mm.

The Contractor shall not undertake any method of repair that is detrimental to the quality of the pavement. Any method of heating that has a detrimental effect on the pavement in the opinion of the Consultant, will not be allowed.

**3.50.4.6 Aggregate Gradation Requirements**

The following requirements apply to asphalt concrete pavement material in all lifts except preliminary levelling and those Lots designated as QC Acceptance Lots.

Price adjustments for aggregate gradation variation will be based on the variation of the Lot Mean Gradation from the Job Mix Formula tolerance, for each sieve size, as shown in Tables 3.50 D and 3.50 E and the corresponding adjustment points as shown in Table 3.50 F.

**When isolated levelling, approaches and repair of failed areas are not done the same day and included in the Lot for the main alignment, then samples for asphalt content and gradation must use fresh mix instead of cores.**

**This is to confirm that the material characteristics are within the design parameters. It is not expected that a full testing program is to be done for this type of work.**

**If the main alignment is being paved at the same time as approaches, then the approach mix tonnage should be included in with the Main alignment Lot tonnage and subject to Bonus or Penalty adjustments.**

**Material used for preliminary levelling, isolated levelling and mix used for repair of failed areas, is not subject to any Unit Price Adjustments(See 3.50.7.2 & 3.50.7.5), therefore this mix tonnage has to be separated from Main alignment Lot tonnage.**

**A data sheet is available from the Highway Engineering Section, in Excel format, to calculate the gradation adjustment points on QA Lots. QC Acceptance Lots are NOT subject to gradation penalties or bonuses.**

**It is not the intention of this specification to allow continual production of material outside the limits of an approved mix design or to exceed the aggregate specification limits(Table 3.2.3.1). The Contractor shall modify his operations, materials, or design to meet specification requirements.**

For lifts greater than 20 mm in thickness, the Lot Mean Gradation will be determined using the sieve analysis of core samples. For lifts 20 mm or less, the Lot Mean Gradation will be determined using the sieve analysis of mix and/or core samples.

When the Lot Mean Gradation is outside the Job Mix Formula tolerance, the penalty assessment will be \$0.02 per tonne for each Mean Adjustment Point, up to the limits shown in Table 3.2.3.1 of Specification 3.2, Aggregate Production and Stockpiling. When the Lot Mean Gradation is outside the limits of Table 3.2.3.1, the penalty assessment will be \$0.20 per tonne for each Mean Adjustment Point outside those limits, regardless of the Job Mix Formula tolerance. If the maximum deviation shown in Table 3.50 E is exceeded, the lot is rejected.

When the Lot Mean Gradation for all sieve sizes is within the Job Mix Formula tolerance and within the limits of Table 3.2.3.1 and individual test results for each sieve size are within the allowable range shown in Table 3.50 D, a bonus of \$0.10 per tonne will be applied.

**3.50.4.7 Pavement Segregation Requirements**

**3.50.4.7.1 General**

The finished surface of the top lift of ACP shall have a uniform texture and be free of segregated areas.

**3.50.4.7.2 Classifying Pavement Segregation**

A segregated area 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 0.1m<sup>2</sup> and centre-of-paver streaks greater than 1 metre in length will be considered. Moderate or severe segregated areas which do not meet these size parameters will be considered obvious defects. Pavement segregation will be classified as follows:

- 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.
- Moderate - Significantly more stone than the surrounding mix; moderately segregated areas usually exhibit a lack of surrounding matrix.
- Severe - Appears as an area of very stony mix, stone against stone, with very little or no matrix.
- Centre-of-Paver Streak - Appears as a continuous or semi-continuous longitudinal "streak" typically located in the middle of the paver "mat".

**The are no gradation penalty assessment applied when the tolerance of three percent in the amount passing the maximum sieve size specification(oversize) in Table 3.2.3.1, Specifications for Aggregate, is exceeded.**

**Based on recommendations resulting from a Segregation Tri-party Task Group significant changes to the segregation specification were undertaken. They are as follows:**

1. Identify segregation immediately for corrective action so that the Contractor is able to modify his operations to prevent any further occurrence of segregation.
2. Move the full inspection of segregation from Warranty time back to the 2 week inspection.
3. Eliminate mandatory repair of all slight segregation.
4. Repairs to moderate or severe segregation during construction only, allowing Contractors expedite repairs while their asphalt plant is still on site.
5. Re-instate substantial bonus.
6. Increased penalties for moderate and severe segregation.
7. Introduction of penalties for slight segregation and Centre-of-Paver segregation.

**One of the significant issues is the emphasis on the Contractor to “perform a daily inspection of the paving operations on all lifts of pavement to identify any instances of pavement segregation. If segregation is evident, the Contractor shall take immediate corrective action to his operations to prevent any further occurrence of segregation”.**

**Should segregation be identified at the start of a project, it is expected that the Contractor provide written documentation of the daily changes or modifications to his equipment and operations to eliminate or reduce significantly the occurrence of the segregation. The Consultant should also be proactive in inspecting the pavement as the work progresses, so that “bench marks” can be established and concerns regarding the segregation ratings can be addressed early in the project.**

**3.50.4.7.3 Inspections for Pavement Segregation**

**3.50.4.7.3.1 Inspections by the Contractor**

The Contractor shall perform a daily inspection of the paving operations on all lifts of pavement to identify any instances of pavement segregation. If segregation is evident, the Contractor shall take immediate corrective action to his operations to prevent any further occurrence of segregation.

**3.50.4.7.3.2 Inspections by the Consultant**

**(i) Inspections During Construction**

The Consultant shall inspect the lower lifts of pavement to identify any instances of pavement segregation. If segregation is evident, the Consultant shall immediately notify the Contractor so that corrective action can be taken to prevent further occurrence of segregation.

The Consultant shall also inspect the top lift of pavement. Typically, each pavement Lot would be inspected, as soon as possible after the Lot is placed. During the inspection(s) of the top lift, the Consultant will identify and record any areas of moderate and severe segregation and any areas of center-of-paver streak. Areas requiring repair in accordance with Section 3.50.4.7.4 shall be marked. The Consultant will provide the Contractor with a written assessment (location and severity) of the segregated areas as soon as possible following each inspection.

**(ii) Inspection Following Construction**

The Consultant shall conduct a second inspection of the top lift, normally 2 weeks after the completion of paving work. During this inspection, the Consultant will identify and record any areas of slight, moderate and severe segregation and any areas of centre-of-paver streak which were not identified in the inspections during construction. The Consultant will provide the Contractor with a written assessment (location and severity) of the segregated areas as soon as possible following this inspection.

**3.50.4.7.4 Repairing Pavement Segregation**

Pavement segregation identified during the inspection performed 2 weeks after the completion of paving operations will not require repair. However, this shall not relieve the Contractor from his responsibility to repair any obvious defects, deteriorated repairs or failures which become evident within the warranty period.

Pavement segregation identified in the inspections performed during construction shall be repaired by the Contractor at his expense and in accordance with the following:

**The Consultant must use staff which have been trained in the segregation rating, process. One experienced rater is only required for during construction inspections, however the Consultant shall provide at least two experienced inspectors to walk the pavement surface during the following Construction inspections. The Consultant shall also ensure that appropriate traffic control is in place including flagpersons where necessary.**

**Moderate and severe segregated areas and obvious defects identified in the During Construction Inspections shall be marked with traffic paint.**

**All additional segregated areas identified in the following construction inspection (even though they do not require repair) shall be marked to serve as possible appeal mark references.**

**The Consultant shall mark both the limits of the segregated area and the severity of the segregation.**

**Segregation Worksheets and Segregation Summary Report (with examples) is found in Appendix B.**

**The Segregation Worksheet(individual sites reported) is used for both During Construction and Following Construction Inspections and MUST BE timely reported to the Contractor. (Copies provided to the Contractor serves as a written, dated and signed assessment ). This allows the Contractor to determine his repair requirements from the during construction inspections, determine possible appeal intentions and serves as the Projects Total Assessments).**

**The Segregation Summary Report records the lane.km total numbers of slight, moderate, severe and length of Centre-of-Paver segregation, obvious defects and adjustments for inclusion in the Final Details. The Segregation Summary Report is a summary of both inspections and is not reported to the Contractor.**

**Repairs to segregated areas including obvious defects due to poor workmanship, can be made prior to the during construction inspection under the following conditions:**

- 1. The Consultant will rate and record the location so that segregated areas classified as moderate or severe and Centre-of-Paver segregation can be used to determine pay adjustments.**
- 2. The Consultant must authorize any repairs prior to the repair. The rating for the area will determine the pre- approved repair method and any other repair method proposed by the Contractor is subject to the approval of the Consultant.**

Moderate and severe segregation in the top lift of pavement and on entrances and intersections shall require repair.

For entrances and the portion of intersections outside the through travel lanes and shoulders, areas of moderate and severe segregation shall be repaired in accordance with the methods of repair listed for moderate segregation. Intersections and entrances shall also be neatly shaped, smooth and free of surface defects and depressions.

Slight segregation on any lift of pavement will not require repair.

Moderate segregation on lower lifts will not require repair.

Severe segregation on lower lifts will only require repair in instances where, in the opinion of the Consultant, the segregated area will affect the long term structural integrity of the pavement structure. Such repair will not be required in instances where the Consultant determines that the paver screed is "dragging" due to distortion of the existing surface.

Only moderate and severely segregated centre-of-paver streak on the top lift of pavement will require repair.

The following methods of repair are pre-approved:

Moderate Segregation - The Contractor has the option of using a slurry patch or a hot mix patch.

Severe Segregation - The Contractor has the option of removal and replacement or overlay.

Any other methods of repair proposed by the Contractor will be subject to the approval of the Consultant with the exception that the application of asphalt (by distributor, hand spraying, squeegeeing, etc.) shall not be permitted as a method of repair under any circumstances.

Repairs for segregation using an overlay shall be for the entire pavement width. Repairs for segregation using removal and replacement shall be for the full lane width, full lane width and shoulder or the shoulder only as applicable, depending on the extent of the segregated area. The full depth of the asphalt lift shall be removed and replaced with new ACP using an appropriate paver and cold milling equipment. All ACP material used for overlay and removal and replacement repairs shall have a tack coat applied prior to placement and will be subject to the requirements of Section 3.50.6.3 End Product Rejection.

**Repairs to slight segregated areas will be classified as moderate segregation and penalized accordingly.**

**Figures that are in Appendix A can be used as a guide to determine the severity and repair methods for segregation.**

**The following captures the repair mechanisms for segregation:**

**No repair required for slight segregation ON ANY LIFT.**

**No repair for moderate segregation on lower lifts.**

**Repair severe on all lifts.**

**No repair for slight Centre-of-Paver Streak segregation.**

**Repair for Moderate & Severe Centre-of Paver Segregation.**

**Repair Method for Moderates**

- slurry patch or hot mix patch
- spray patch no longer allowed

**Repair for Severes**

- remove, replace or overlay

**Any other repair method proposed by the Contractor is subject to the approval of the Consultant.**

**SPRAYING OF STRAIGHT EMULSION/TACK IS NOT PERMITTED for any repair including obvious defects.**

The Consultant will mark out the area of repair. The "marked area" shall extend a minimum of 0.5 metres beyond the segregated area. For centre-of-paver streak, the "marked area" shall extend a minimum of 100 mm laterally and 0.5 metres longitudinally beyond the streak.

All repairs shall be regular in shape and finished using good workmanship practises to provide an appearance suitable to the Consultant. Traffic shall be kept off all repairs for a sufficient period of time to ensure that tracking does not occur.

All hot mix and other repairs for which compaction is normally required shall be properly compacted.

In the event repairs cover existing roadway lines or markings, the Contractor shall reinstate the lines and markings at his expense and to the satisfaction of the Consultant.

Repairing pavement segregation will not affect the assessment of segregation payment adjustments.

Repairs shall be completed during construction or shortly after construction, except when prevented by inclement weather or seasonal shutdown. In these cases, the Contractor shall complete the repairs prior to June 15 of the following year.

### **3.50.4.8 Appeal of Acceptance Test Results and Appeal Testing**

#### **3.50.4.8.1 Density, Asphalt Content and Gradation**

Appeal testing will be done using ATT-68. The Contractor may appeal the results of acceptance testing of Density, Asphalt Content or Gradation for any rejected or penalized Lot only once. Appeals will only be considered if cause can be shown. Quality Control test results for density which are provided to the Consultant subsequent to the Contractor's receipt of the quality assurance test results for that Lot will not be considered when evaluating cause for an appeal. The appeal shall be for all tests within the Lot, and there will be no appeal allowed for single tests within a Lot.

Any attempt to improve density on the appealed Lot after the Consultant has tested the Lot for acceptance shall void the appeal and the original test results will apply.

The following procedures will apply for an appeal:

- (i) For Gradation and Asphalt Content appeals, the Contractor shall serve notice of appeal to the Consultant, in writing, within 48 hours of receipt of the test results.

For all other appeals notice shall be served to the Consultant, in writing, within 24 hours of receipt of the test results.

**The Consultant shall mark the limits of the area requiring repair, not just the segregated area, as outlined herein.**

**The Project Sponsor shall be notified of any appeals accepted by the Consultant and will determine the third party appeal testing firm.**

**The Consultant's QA field staff will determine stratified random coring sample locations. The Contractor will provide the coring and provide the uncut cores to the QA consultant. The QA Consultant saws the samples for delivery by the Consultant(Prime) to the appeal testing lab selected by the Project Sponsor.**

**The Consultant(Prime) is responsible for providing the necessary containers for the shipping of appeal cores. These containers will be returned to the Consultant by the Appeal Consultant.**

**The Contractor is expected to provide supporting QC data to demonstrate "cause" for appeal. The onus remains for the Contractor to demonstrate "cause for appeal". For asphalt content and gradation appeals the Contractor has the option of obtaining his own random cores for testing, after the QA results have been reported. Time frames to apply for any appeal for asphalt content and gradation have been increased to 48 hours to allow for this. For density appeals this option would likely not be suitable as core densities generally increase with time due to traffic compaction. In any case the Project Manager must look at the specifics of each proposed appeal to determine whether the Contractor has provided sufficient cause. In some cases the Project Manager may allow an appeal to proceed without supporting QC test data. Appeals on rejected Lots should be encouraged by all parties. This provides additional supporting information in disputes.**

(ii) The Consultant will arrange and pay for an independent testing laboratory certified to operate in the Province of Alberta, to perform the appeal testing. The personnel employed or testing laboratory retained by the Contractor for quality control testing on the project will not be used for appeal testing.

(iii) The Consultant will determine the number and location of the new tests for each segment shall be in accordance with Section 3.50.4.4.2. **The Contractor shall sample the pavement at such locations and provide the samples to the Consultant.**

(iv) For appeals other than gradation appeals, the single high and single low test results from the old Lot will be rejected and the remaining test results will be added to the results of the new tests. A new Lot Mean for the test results will be determined and used for acceptance and unit price adjustment.

For gradation appeals, all tests from the old Lot will be retained and averaged with the new appeal tests. A new Lot Mean and Range for all tests will be determined and used for acceptance and unit price adjustment.

The new values, thus determined, in all cases, will be binding on the Contractor and the Department.

#### **3.50.4.8.2 Smoothness**

The Contractor may appeal acceptance test results of smoothness of any rejected or penalized Sublot once. The appeal shall be in writing and submitted within 24 hours of receipt of the test results.

Any attempt to improve smoothness on the appealed Sublot after the Consultant has tested the Lot for acceptance shall void the appeal and the original test results will apply.

The appeal testing will be performed by the Consultant and the new results will be binding on the Contractor and the Department.

#### **3.50.4.8.3 Segregation Rating**

The Contractor may appeal the segregation rating in any portion of the Work or the entire project.

The following procedures will apply for an appeal:

**Appeal Consultants are preselected each year by the Technical Standards Branch. The Project Sponsor will be notified annually of the selected appeal consultants.**

**For Smoothness Appeals, the Project Sponsor shall be notified and an independent Profilograph Consultant will be hired.**

- (i) The Contractor must serve written notice of the appeal to the Consultant within 7 days of receipt of a written segregation assessment. The written notice shall detail the lane-km (s) and nature of the appeal.
- (ii) The Department will determine a representative sample of the portion of the Work appealed, and will reassess this area. Generally, this reassessment will be completed within 1 week of the Consultant's receipt of the written notice of appeal.

Based on the reassessment of the representative sample, the Department will determine whether or not a reassessment of the entire appealed work is necessary.

**3.50.4.8.4 Payment of Appeal Testing Costs for Asphalt Content, Smoothness or Gradation**

If the new results show that a penalty no longer applies, then sampling and testing costs for the appeal procedures for that Lot will be the responsibility of the Department. **Furthermore, in such cases the Contractor shall be reimbursed sampling costs at the rate of \$50 per location.**

**If the new results verify that any unit price reduction or rejection remains valid for that Lot, then the Contractor will be invoiced by the Department for the testing costs for the appeal procedures at the following rates:**

- Asphalt Content:** \$ 1,750.00 for the first appeal Lot  
\$ 750.00 for subsequent Lots if an asphalt correction factor is not required.
- Gradation:** \$ 750.00 per appeal
- Profilograph:** \$ 100.00 per hour (travel time, testing time and standby time)

**3.50.4.8.5 Payment of Appeal Testing Costs for Density**

If the new results indicate that the new Lot Mean for Density is no longer in a penalty situation and that the Lot Mean has increased by more than 0.8%, then the costs of sampling and testing for the appeal procedures shall be the responsibility of the Department. **Furthermore, in such cases the Contractor shall be reimbursed sampling costs at the rate of \$50 per location.**

If the new results indicate that the Lot Mean for Density is either in a penalty situation or has not increased by more than 0.8%, then the Contractor shall be invoiced by the Department for the sampling and testing costs for the appeal procedures at a rate of 250.00 per Lot appealed.

**The Contractor's written appeal and original assessment is forwarded by the project sponsor to Jim Gavin, Highway Engineering Section (Telephone # 415 - 1008, Fax # 422 - 2846).**

**Jim will organize the Appeal Segregation Team to visit the project and reassess representative sections (approximately 2-3 km of the work) of the appealed areas. The sections reassessed will be determined by the Segregation Team. The Contractor is not involved in this reassessment.**

**The procedure for payment of Appeals is as follows:**

**The invoice from the Appeal Consultant is provided to the Prime Consultant. The Prime Consultant verifies the invoice as work done on the project and forwards the invoice to the Project Sponsor. The Project Sponsor processes payment to the Appeal Consultant regardless of the outcome of the appeal decision.**

**If the new test results verify that a unit price reduction or rejection situation remains (for Density appeals the Lot Mean has increased by less than 0.8%), the Consultant informs the Project Sponsor who invoices the Contractor for reimbursement of the appeal testing and sampling costs as outlined these specifications.**

**Sampling and Testing costs charged to the Contractor have been reduced by \$250, as the Contractor obtains the cores and is responsible for these costs.**

**3.50.4.8.6 Payment of Appeal Testing Costs for Segregation Rating**

If a reassessment of the appealed Work results in a change in the original rating, the revised rating will apply. If the overall payment adjustment for the appealed work is reduced by an amount of \$1,000 or greater, the cost of the reassessment will be borne by the Department.

If there is no change to the overall payment adjustment or if the overall payment is decreased by an amount less than \$1,000 or if the overall payment adjustment is increased, the Contractor will be charged an amount of \$3,500.00 for the appeal.

**3.50.5 CONSTRUCTION**

**3.50.5.1 Equipment**

**3.50.5.1.1 General**

Equipment shall be designed and operated to produce an end product complying with the requirements of this specification.

**3.50.5.1.2 Mixing Plant**

Mixing plants shall be operated in accordance with the manufacturer's recommendations and shall be calibrated prior to commencing production of the specified mix. The Contractor shall provide the Consultant with a certificate of calibration which certifies that the plant has been calibrated to produce a uniform mixture in accordance with the Job Mix Formula.

When asphalt concrete pavement contains Reclaimed Asphalt Pavement, the mixing plant shall be capable of thoroughly separating and heating the RAP particles and blending the RAP with virgin aggregate and any required asphalt cement, to create a homogeneous mix at the plant discharge. The plant shall also contain specialized mixing equipment that will prevent the RAP from coming into direct contact with the flame, thus minimizing "blue smoke" and oxidation of the asphalt in the RAP.

**3.50.5.1.3 Mix Production**

Aggregate and asphalt shall be combined to produce a uniform mixture of specified gradation at an asphalt content in accordance with the approved Job Mix Formula and in which all particles of aggregate are uniformly coated.

Unless otherwise specified, the maximum mixing temperature for all grades of asphalt shall be 155E C or for Performance Grade specified asphalts, as recommended in writing by the supplier.

Plant emissions shall not exceed the limits set by Alberta Environment.

**This charge reflects the cost to the Department of mobilizing the Appeal Segregation Team, traffic control and reassessment. Invoicing procedures(to the Contractor) will be the same as outlined above for density, asphalt content and gradation appeals.**

**The Contractor shall provide the Consultant with a certificate of calibration (an example of the form is in the Engineering Consultant Guidelines Manual), which certifies that the plant has been calibrated.**

**The supplier shall specify the maximum mixing temperature for Performance Grade Asphalt Cements (PGAC).**

### 3.50.5.2 Preparation of Existing Surface

#### 3.50.5.2.1 General

Failed areas in existing surfaces shall be repaired in accordance with Specification 3.1 Subgrade Preparation, or as directed by the Consultant. Areas requiring repair will be identified by the Consultant in consultation with the Contractor.

Before the asphalt mix is placed, dirt and other objectionable material shall be removed from the surface to be paved, by brooming or other methods and a tack coat or prime coat shall be applied in accordance with Specification 3.19, Prime, Tack and Fog Coats.

Existing fillets and ramps at approaches to railway crossings and bridge structures, or adjacent to paved surfaces or other structures, shall be removed to the depths shown on the plans or as directed by the Consultant. The removed material shall be disposed of and the exposed surfaces shall be prepared as directed by the Consultant.

Contact edges of existing mats and contact faces of curbs, gutters, manholes, sidewalks and bridge structures shall be coated with a thin film of liquid asphalt material before placing the asphalt mix.

**If Davidson Temporary Pavement Markers have been applied to an existing surface for interim lane marking, such markers shall be removed prior to the placement of a subsequent lift of asphalt mix. If self-adhesive reflectorized tape has been used, it may be left in place.**

#### 3.50.5.2.2 Preliminary Levelling

Areas that require preliminary levelling will be identified by the Consultant. Generally, areas that show depressions, rutting or other deformations to a depth of 15 mm or greater will be designated by the Consultant for preliminary levelling and all the following shall apply for acceptance:

- (i) material for preliminary levelling shall be the same designation and class as specified for the subsequent lift of asphalt concrete pavement;
- (ii) asphalt mix for preliminary levelling shall be spread by means of a motor grader or other methods approved by the Consultant;
- (iii) only pneumatic tired rollers will be allowed for compaction, and a minimum density of 91.0% of the Marshall density, as determined by the Consultant, is required;

**A motor grader is specified so that excess material will not be placed and only the ruts and dips are filled. When the slope of the pavement requires improvement prior to placement of the first lift, then a paver may be used.**

**Pneumatic tired rollers are specified because the ruts and dips can be compacted more effectively than when steel rollers are used. If only the rut or dips is filled, a steel roller may only bridge the rut or dip. See Section 3.50.7.5 for measurement and payment.**

**If the preliminary levelling is paved over the same day it is placed then a tack coat may not be necessary. If the levelling material will not be covered until the next day, a tack coat is required.**

**Tests for asphalt content, gradation and Marshalls are sampled from fresh mix on the road. Non-random testing is used for testing the material.**

**It is not necessary to test the preliminary levelling course for density if by visual inspection the Contractor's effort is adequate but if it is suspected that a minimum density of 91.0% is not achieved then 5 cores must be taken to determine the % compaction. The material is only subject to full payment or rejection.**

- (iv) preliminary levelling is intended to be a separate operation and shall not be done as part of the construction of the subsequent lift of asphalt concrete pavement

### **3.50.5.2.3 Transverse Pavement Joints**

Transverse joints between existing pavement and ACP placed under this Contract shall be of a vertical butt type, well bonded, sealed and finished to provide a continuous, smooth profile across the joint. This shall include tie-ins to all paved road allowances and approaches to bridges and railway crossings. Tie-ins to streets, parking lots and other urban approaches shall be as specified in the special provisions. To accomplish this, the existing pavement shall be cold-milled to expose a vertical surface, of a depth equal to the thickness of the final lift, against which new ACP may be placed. In longitudinal section the minimum slope of the milled area shall be 200 horizontal to 1 vertical, all in general conformance with Drawing CB6-3.50 M16. In plan, the Contractor shall have the option of cutting the joint in any of the three ways following:

- (i) The joint shall be cut at 45E to the centreline of the roadway across the full width of each mat; or
- (ii) The joint shall be cut at 45E to the roadway centreline across the travel lanes and contiguously at 90E to the roadway centreline elsewhere; or
- (iii) For bridges and railway crossings the joint shall be cut parallel to the crossing.

When the existing pavement has been removed in advance of paving the joint area, the Contractor shall construct a smooth taper at the joint area to a slope of at least 50 horizontal to 1 vertical. The taper may be placed on tar paper and shall be removed when paving is resumed as directed by the Consultant. The transverse joint shall be straight and have a vertical face when the taper is removed.

### **3.50.5.3 Transporting the Asphalt Mix**

The mix shall be transported in accordance with Specification 4.5, Hauling. Trucks used for transportation of the mix shall be compatible with the size and capacity of the spreading equipment.

Truck boxes shall be clean, free from accumulations of asphalt mix and foreign material. Excess truck box lubricants such as light oil, detergent or lime solutions shall not be allowed to contaminate the mix, and shall be disposed of in an environmentally acceptable manner.

**The Contractor shall construct a smooth taper with asphalt mix.**

During transport, the mix shall be completely covered to protect it from precipitation and excessive heat loss by securely fastened waterproofed tarpaulins, unless otherwise approved by the Consultant.

#### 3.50.5.4 Placing the Mix

Asphalt mix shall be placed only on dry surfaces.

Unless otherwise shown on the plans, the asphalt mix shall be placed in the following lift thicknesses:

- (i) in a single lift when the design compacted total thickness is 70 mm or less.
- (ii) in two or more lifts when the design compacted total thickness is greater than 70 mm. The lift thickness selection shall be determined by the Contractor except that:
  - (a) the maximum thickness of any lift shall be 100 mm.
  - (b) the minimum thickness of a top lift shall be 50 mm.
  - (c) When a total ACP thickness of 80 mm is specified, the thickness of the first lift shall be 30 mm and the final lift shall be 50 mm.
  - (d) When a total ACP thickness of 90 mm or more is specified, the minimum thickness of all lifts except the top lift shall be 40 mm or greater.

Lift thickness will normally be designed and expressed in increments of 10 mm.

Longitudinal joints will not be permitted between the edges of driving lanes in the final lift of ACP. Longitudinal joints shall be offset a minimum of 150 mm from one lift to the next.

Longitudinal and transverse joints shall be vertical butt type, well bonded and sealed, and finished to provide a continuous, smooth profile across the joints. Surplus material at longitudinal joints shall be disposed of in a manner acceptable to the Consultant. Broadcasting surplus material across the mat will not be permitted.

If required by the Consultant the contact edge of any mat placed by the Contractor shall be coated with a thin film of liquid asphalt before placing the adjacent mat.

**The intent is for first stage construction and overlay projects where 80 mm, 90 mm or 100mm, etc., total lift structures are specified to be placed in two or more lifts as described herein. Separation of the lifts should always be shown on the plans. In rare cases when the design thickness is 70 mm or more and it is intended to be placed in one single lift, it should be clearly indicated on the plans as such.**

When paving is discontinued in any lane, the mat shall be tapered to a slope of 10 horizontal to 1 vertical. The taper may be placed on tar paper and shall be removed when paving is resumed. The transverse joint shall be straight and have a vertical face when the taper is removed.

Transverse construction joints from one lift to the next shall be separated by at least 2 metres.

Where the construction of a top lift of pavement next to a concrete curb section or curb and gutter section will be delayed, the Contractor shall construct a temporary asphalt concrete fillet next to the concrete section in accordance with the plans or as directed by the Consultant. These fillets shall be removed when paving is resumed.

Placement of ACP adjacent to guardrail shall conform with Dwg. No. TEB 3.56.

#### **3.50.5.5 Road Intersections and Entrances**

Road intersections and entrances shall be paved in accordance with the plans or as herein described in these specifications.

On all road intersections, median cross overs and residential farm entrances, the asphalt mix shall be spread by means of a paver. No grader laying will be permitted except for bottom lift or preliminary levelling.

On all other entrances, the asphalt mix shall be spread by means determined by the Contractor and in a manner acceptable to the Consultant.

#### **3.50.5.6 Compacting the Mix**

All asphalt mix, including those areas of the mat which are excluded from testing as noted in Section 3.50.4.4.2, 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.

After final rolling is complete, the Contractor shall ensure that the finished mat has cooled for a minimum period of 2 hours before opening the section to traffic.

#### **3.50.5.7 Asphalt Mix For Others**

The Contractor shall make available, on request, additional asphalt mix for the use of the Department. The estimated quantity of additional mix is shown in the unit price schedule as "Asphalt Mix For Others." This additional mix will be picked up at the mixing plant by other forces at times that are mutually agreeable to the Contractor and the Consultant.

**This cooling period is a critical requirement on heavily trafficked highways during warm weather to guard against premature rutting.**

### **3.50.5.8 Interim Lane Markings**

The Contractor shall provide interim lane markings on all newly constructed ACP surfaces, or on tacked surfaces that are to be exposed to traffic overnight.

**When paint is used, the paint shall be the same colour as the permanent markings designed for the Work.**

All paint spots shall be 100 mm wide and 300 mm long, shall be applied lengthwise to the road surface, shall be spaced 15 m apart on centre in tangent sections and 7.5 m apart on curves and shall be completely covered with glass beads at the time of painting.

**When self-adhesive, reflectorized pavement marking tape is used, the spacing shall be the same as is used for paint spots.**

When **Davidson Temporary Pavement** markers are used, they shall be placed at 25 m intervals on tangent sections and at 15 m intervals on curves and shall be removed immediately prior to being overlaid. Markers used on the upper lift must remain in place until the permanent markings are applied. **Markers used on lower lifts, shall be removed immediately prior to placement of the next lift of pavement.**

### **3.50.5.9 Grooved Rumble Strips**

When specified in the special provisions, the Contractor shall construct grooved rumble strips as shown on drawing CB6-3.50M15.

No grooving will be done across intersections or accesses nor at any other locations specified by the Consultant.

The grooving shall be applied only to the top lift of the pavement and may be formed by any means which the Contractor may propose and which are acceptable to the Consultant. The Contractor shall remove and repair any grooving placed beyond the limits outlined, at his own expense.

## **3.50.6 END PRODUCT ACCEPTANCE OR REJECTION**

### **3.50.6.1 General**

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

### 3.50.6.2 End Product Acceptance

#### 3.50.6.2.1 Acceptance at Full or Increased Payment

Acceptance of any Lot at full or increased payment will occur if it contains no obvious defects and if:

- (i) for lifts 35 mm or greater, the Lot Mean for density of the compacted mix in the Lot meets or exceeds 97.0% of the Lot Mean Marshall density as established from samples of the mix being produced.
- (ii) for lifts less than 35 mm and greater than 20 mm, full payment will occur if the Lot Mean for density of the compacted mix in the Lot meets or exceeds 94.0% and increased payment will occur if the Lot Mean for density in the Lot exceeds 97.0%.
- (iii) for 20 mm lifts, full payment will occur if the Lot Mean for density of the compacted mix in the Lot meets or exceeds 93.0 % and increased payment will occur if the Lot Mean for density in the Lot exceeds 97.0%.
- (iv) the Lot Mean for Actual Asphalt Content of the mix, is within 0.3 of the Approved Asphalt Content. **On QC Acceptance Lots, where quality assurance test results for asphalt content are not available, the Contractor's quality control test results shall be used. Quality assurance test results when available shall replace any corresponding quality control test results.**
- (v) for smoothness, full payment will occur if the Profile Index of all Sublots in the Lot in the top lift of pavement:
  - (a) does not exceed 10 mm for multi-lift applications,
  - (b) does not exceed 15 mm for single lift applications and
  - (c) does not exceed 22 mm for applications through areas of curb and gutter,over 0.1 km for any 0.1 km section.

Increased payment will occur for any of the above lift applications if the Profile Index of all Sublots in the Lot in the top lift of pavement is 0.

**Any reference to lift thickness refers to the design lift thickness(or target design thickness), not the average thickness placed using core thicknesses.**

**QC Acceptance Lots are NOT subject to asphalt penalties.**

- (vi) individual bumps and dips in the top lift of pavement do not exceed 8 mm.
- (vii) For gradation in QA Acceptance Lots only, full payment will occur if there are no Lot Mean Adjustments for gradation and increased payment will occur if there are no Lot Mean Adjustments and the Maximum Range as shown in Table 3.50 D is not exceeded for any sieve size in the Lot.  
  
For gradation in QC Acceptance Lots, consideration is only given to acceptance at full payment. No increased payment will be applied using quality control test results.

**3.50.6.2.2 Acceptance at Reduced or Adjusted Payment**

Acceptance of any Lot at reduced payment will occur if it contains no obvious defects and if;

- (i) the quality assurance test results are such that the Lot or Sublot meets with requirements for acceptance at a reduced payment. For asphalt content and aggregate gradation no decreased payment will be applied using quality control test results.
- (ii) the Lot or Sublot is approved in respect of all other requirements.
- (iii) the Contractor has not notified the Consultant in writing that he will exercise his option to repair or remove and replace the Work at his own cost with work meeting the requirements for acceptance at full or increased payment.
- (iv) individual bumps and dips measuring 12 mm or greater have been repaired.
- (v) individual bumps and dips exceeding 8 mm and less than 12 mm which have been designated by the Consultant as unacceptable, have been repaired.

Both bonus and penalty adjustments may be made for any Lot in accordance with Section 3.50.7, Measurement and Payment.

**3.50.6.3 End Product Rejection**

If the Lot Mean for Density, Actual Asphalt Content or Gradation are outside the applicable acceptance limits, then the Lot is rejected automatically, regardless of the values of the other control characteristics.

**QC Acceptance Lots are NOT subject to gradation penalties or bonuses.**

**The consultant has the option of leaving the bumps or dips between 8 mm and 12 mm without repair. However, all bumps or dips greater than 8mm are subject to the \$300 assessment, regardless whether or not they are repaired.**

If the smoothness of the top lift of any Sublot is outside the acceptance limit, then the Sublot is rejected automatically, regardless of the values of the other control characteristics.

The finished surface of any lift shall have a uniform close texture and be free of visible signs of poor workmanship. Any obvious defects as determined by the Consultant such as, but not limited to the following, will be cause for automatic rejection of asphalt concrete pavement regardless of the values of any other control characteristic.

- (i) individual bumps and dips 12 mm or greater. The Consultant may reject asphalt concrete pavement with individual bumps and dips exceeding 8 mm and less than 12 mm.
- (ii) segregated areas not already covered in Section 3.50.4.7, Pavement Segregation Requirements.
- (iii) areas of excess or insufficient asphalt.
- (iv) improper matching of longitudinal and transverse joints.
- (v) roller marks.
- (vi) tire marks.
- (vii) cracking or tearing.
- (viii) sampling locations not properly reinstated.
- (ix) improperly constructed patches.

When ACP is rejected by reason of obvious defects, the minimum area of rejection will be Sublot size as defined in Section 3.50.1.2 of this specification.

Rejected work shall be promptly repaired, remedied, overlaid, or removed and replaced all in a manner acceptable to the Consultant. The Contractor shall be responsible for all costs including materials.

No payment will be made for work in any Lot or Sublot which has been rejected, until the defects have been remedied.

If an overlay is used as a corrective measure on a defective Lot or Sublot, the overlay thickness will be subject to the approval of the Consultant. Where an overlay is used as a corrective measure in any lane, adjacent lanes shall also be overlaid to the same thickness and length, regardless of whether the adjacent lanes were acceptable or not. The overlay will be subject to the same specifications as the original pavement, except that the minimum thickness of an overlay shall be 40 mm.

**This covers small areas of segregation (0.1 m<sup>2</sup> or less) and any segregation that in the opinion of the Consultant requires repair. These areas would be considered as moderate or severe segregation.**

**Any obvious defects on bottom lifts should be evaluated for repair in full consideration that the material will be overlaid. However, it is not the intention of this specification to allow continual production of material with obvious defects on any lifts, the Contractor shall modify his operation so that the finished surface of any lift is free of obvious defects.**

**Application of asphalt (by distributor, hand spraying, squeegeeing etc.) will not be permitted for obvious defect repairs.**

**The method of repair shall be determined by the Contractor with any methods of repair proposed by the Contractor subject to the approval of the Consultant.**

### 3.50.7 MEASUREMENT AND PAYMENT

The unit prices for the following items of work shall be full compensation for all labour, material, tools, equipment and incidentals necessary to complete the work in accordance with these specifications.

#### 3.50.7.1 **Asphalt Concrete Pavement - EPS**

Accepted asphalt concrete pavement will be measured in tonnes and will be paid for at the unit price bid per tonne for "Asphalt Concrete Pavement - EPS" subject to the unit price adjustments and assessments hereinafter specified. This payment will be full compensation for supplying, applying and maintaining tack coat; supplying the asphalt binder; processing, hauling and placing the mix; interim lane marking and quality control.

##### 3.50.7.1.1 Pay For Acceptable Work

The following end product properties of "Asphalt Concrete Pavement - EPS" will be measured for acceptance in accordance with Section 3.50.4.4, Acceptance Sampling and Testing.

- (i) Density
- (ii) Actual Asphalt Content
- (iii) Smoothness
- (iv) Aggregate Gradation

For the Density, Actual Asphalt Content and Gradation of a Lot to be acceptable, the Lot Means must be within the acceptance limits shown in Tables 3.50 A, 3.50 B and 3.50 E respectively.

For each Lot, the unit price adjustments for Density and Actual Asphalt Content will be the amounts shown in Tables 3.50 A and 3.50 B for the Sample Mean of the test results for that Lot.

For each Lot, the unit price adjustment for Gradation will be as defined in Section 3.50.4.6, Aggregate Gradation Adjustments.

The Unit Price applicable to each Lot quantity of "Asphalt Concrete Pavement - EPS" will be calculated as follows:

$$\boxed{\begin{array}{c} \text{Lot Unit} \\ \text{Price} \\ \text{Per Tonne} \end{array}} = \boxed{\begin{array}{c} \text{Contract Unit} \\ \text{Price Bid Per} \\ \text{Tonne} \end{array}} + \boxed{\begin{array}{c} \text{the sum of the} \\ \text{unit price} \\ \text{adjustment for} \\ \text{PAd and PAa} \\ \text{and PAg} \end{array}}$$

where:

PAd = Unit Price Adjustment for Density  
(bonus or penalty)

PAa = Unit Price Adjustment for Asphalt Content (penalty only; **QA Acceptance Lots only**)

PAg = Unit Price Adjustment for Gradation (bonus or penalty; **QA Acceptance Lots only**)

If the Lot Mean for Density, Actual Asphalt Content or Gradation for any Lot is outside the acceptance limit, the Lot is rejected, and no payment will be made for the quantity of asphalt concrete pavement in that Lot, until the defect has been remedied.

For the Smoothness of any Sublot in the top lift of ACP to be acceptable, the PrI must be within the limits shown in Table 3.50 C. For each Sublot in the top lift of ACP, the penalty assessment for Smoothness will be the amounts shown in Table 3.50 C for the PrI of that Sublot. All of these penalty assessments so determined will be deducted from the payment made for Asphalt Concrete Pavement-EPS.

Every Sublot in the top lift of ACP that is outside the acceptance limit for smoothness will be rejected and payment will not be made for the quantity of asphalt concrete pavement in these Sublots until they have been made acceptable. Payment for the remainder of the Lot will be made in accordance with the above formula using PAd, PAa and PAg as determined for the Lot from which will be subtracted any penalty assessment for smoothness.

No payment will be made for any material, equipment or manpower used to improve acceptable work that is or was subject to unit price adjustment or penalty assessment.

#### **3.50.7.1.2 Segregation Payment Adjustments**

Payment adjustments for pavement segregation shall apply to the top lift of ACP only and in accordance with the following:

Segregated areas, centre-of-paver streak and any repaired segregated areas identified by the Consultant either during construction or during the inspection conducted 2 weeks after the completion of paving work, will be used to determine payment adjustments. Payment adjustments will not apply to segregated areas 0.1 m<sup>2</sup> or less or on centre-of-paver streaks 1 metre or less in length.

Segregated areas (excluding centre-of-paver streaks) separated by less than 3 metres shall be considered a single area for the determination of payment adjustments. For centre-of-paver streaks, each area will be measured separately for payment adjustments.

Payment adjustments for segregation will not apply to entrances or the portion of an intersection outside the through travel lanes and shoulders.

If a segregated area is identified by the Contractor and repaired prior to inspection by the Consultant it will be classified as "moderate" for the purpose of determining payment adjustments.

**Segregation on approaches and entrances are not included in the determination of any pay adjustments. However, areas of moderate and severe segregation are to be repaired as outlined in this Specification as a moderate.**

**Repairs to slight segregated areas will be classified as moderate segregation and penalized accordingly.**

<p>The total payment adjustment for segregation is determined as follows:</p> <p>Each lane.km of the completed pavement is inspected separately by the Consultant. A "lane" includes the adjoining shoulder. Measurement of lane.kms will be made in 1 kilometre (or partial kilometre) long segments, 1 lane wide as shown on the contract plan. Acceleration and deceleration lanes and interchange ramps are considered separate lanes.</p> <p>For each lane.km, the Consultant will determine the following:</p> <ul style="list-style-type: none"> <li>(i) the total number of slight segregated areas and</li> <li>(ii) the total number of moderate and severe segregated areas and</li> <li>(iii) the total length of centre-of-paver streak (determined by adding each instance of streak that is in excess of 1 metre in length)</li> </ul> <p>These values will be used for the "segregation frequencies" and "length of centre-of-paver streak" in Tables A, B &amp; C as applicable, with the exception that for partial lane.kms, the segregation frequency for slight segregation will be calculated by dividing the actual number of slight segregated areas by length of the segment assessed (expressed in kilometres) and rounding to the nearest whole number.</p>	<p><b>A Segregation Summary Report data sheet is available from the Highway Engineering Section, in Excel format, to calculate the segregation adjustments. An example is shown in Appendix B.</b></p> <p><b>Since slight segregation frequency has an allowance of 2 sites per kilometre, there is a requirement to prorate the frequency and adjustment (bonus or penalty) for a partial lane.kms.</b></p> <p><b>For example : (0.560 km) with 2 slight areas of segregation and no other areas of segregation</b>  <math>2 / 0.560 = 3.57</math> (Rounded to a whole number is 4)  <b>Pay Adjustment = - (4 - 2) X \$100 = -\$200</b>  <b>Prorated based upon the actual length of the segment assessed = -\$200 X 0.560 = - \$112</b></p>
--	---

Table A Payment Adjustment for Slight Segregation

Segregation Frequency of Slight Areas (per lane-km)	Payment Adjustment \$ per lane-km
0	Note 3
1 or 2	Note 4
Greater than 2	- (number of areas - 2) x \$100

Table B Payment Adjustment for Moderate and Severe Segregation

Segregation Frequency of Moderate and Severe Areas (per lane-km)	Payment Adjustment \$ per lane-km
0	Note 3
Greater than 0	- (number of areas) x \$500

Table C Payment Adjustment for Centre-of-Paver Streak

Length of Centre-of-Paver Streak (per lane-km)	Payment Adjustment \$ per lane-km
1 metre or less	Note 3
Greater than 1 metre	- \$1.50 per linear metre

Notes:

1. Total payment adjustment per lane-km for segregation will be the sum of Tables A, B and C.
2. For partial lane kilometres, the payment adjustments for Table A will be prorated based upon the actual length of segment assessed.
3. Lane kilometres with no areas of segregation of any type or severity, or any centre-of-paver streaks will be assigned a bonus payment of \$1000 per lane.km.  
  
(For partial lane.kms the bonus will be prorated based upon the actual length of the segment assessed.)
4. Lane kilometres with 1 or 2 areas of slight segregation, no moderate or severely segregated areas and no centre-of-paver streak will be assigned a bonus payment of \$500 per lane.km.  
  
(For partial lane.kms the bonus will be prorated based upon the actual length of the segment assessed.)
5. The maximum penalty adjustment for segregation shall be limited to \$2,000 per lane-km. For partial lane-kms, this adjustment will be prorated based upon the actual length of segment assessed.

**3.50.7.1.3 Payment For Work That Had Been Rejected. But Was Made Acceptable**

When defects have been remedied in Lots or Sublots which had been rejected, payment for the original quantity of material in those Lots or Sublots will be made subject to unit price adjustments and penalty assessments determined as follows:

- (i) Penalty or bonus assessments will be made for smoothness as follows:

Penalty or bonus assessments for PrI will be the amounts shown in the applicable section of Table 3.50 C and will be based on Profilograph tests following **any corrective action taken by** the Contractor.

Penalty assessments for bumps and dips will be \$300.00 for each individual bump or dip over 8 mm and will be based on initial Profilograph testing conducted by the Consultant. Repairs carried out by the Contractor will not affect the penalty assessment for bumps and dips.

**If bumps or dips are treated by the Contractor prior to Profilograph tests by the Consultant, such defects will be considered greater than 8 mm and will be assessed as a \$300 penalty for each individual bump or dip.**

**ATT 59, outlines the methods of manually reviewing the profilograph trace for proper bump or dip identification in cases of multiple bump/dip situations. The penalty for bumps or dips over 8mm has been increased to \$300. Earlier editions of this specification had \$100 penalties.**

**This has been added so that if the contractor repairs bumps or dips prior to QA profilograph testing they will be still assessed. Contractors have done Quality Control Profilograph testing to find bumps and dips and have fixed them without the Consultants knowledge.**

- (ii) The unit price adjustment for Asphalt Content, Density and Gradation will be based on testing of the replacement or overlay material where applicable. Where replacement or overlay material does not cover the entire Lot or Sublot, prior tests on the uncovered area will be averaged with new tests on the corrective work.

The unit price adjustment determined through retesting of the corrective work will be applied to that quantity of material in the Lot or Sublot which was originally rejected, to determine payment.

No payment will be made for any material used to replace, repair or overlay rejected work and all corrective work shall be performed entirely at the Contractor's expense.

#### **3.50.7.2 Repair of Failed Areas in Existing Surfaces**

Repair of failed areas in existing surfaces as identified under Section 3.50.5.2 will be paid for at the Contract unit prices bid for the work. Unit price adjustment will not apply to material used to repair failed areas in existing surfaces.

#### **3.50.7.3 Removal and Disposal of Fillet and Ramp Material**

The removal and disposal of fillet and/or ramp material will be considered incidental to the Work and will not be paid for separately.

#### **3.50.7.4 Transverse Pavement Joints**

Constructing transverse pavement joints including any required cold-milling will be considered incidental to the Work and will not be paid for separately.

#### **3.50.7.5 Preliminary Levelling**

Accepted material used for preliminary levelling will be measured and paid for at the unit price bid for Asphalt Concrete Pavement - EPS where applicable. Unit Price Adjustments will not apply to material used for levelling. No payment will be made for unacceptable material.

#### **3.50.7.6 Asphalt Mix For Others**

Accepted additional asphalt concrete mixture will be measured in tonnes and paid for at the unit price bid for "Asphalt Mix For Others".

Unit price adjustment will not apply to additional asphalt concrete received at the plant by other forces.

#### **Preliminary Levelling**

**In most cases this work is done ahead of the paver and the first lift is placed over it the same day.**

**Unit price adjustments do not apply to this work, therefore this mix tonnage has to be separated from first lift Lot tonnage. If this work is done during placing of first lift, separate testing is not required for this work as random loads are usually sent ahead of the paver.**

**When the work is done in a separate operation it is expected that Marshall design limits for asphalt content, gradation and air voids be targeted.**

**Preliminary levelling mix should be removed from the cores taken for testing the first lift main alignment Lot as there is usually a clear separation between these lifts.**

**3.50.7.7 Grooved Rumble Strips**

Measurement of shoulder grooving will be made parallel to the road centreline, to the nearest 0.001 km of through highway chainage for each side of the road where accepted grooving is performed.

Payment for shoulder grooving will be made at the unit price bid per kilometre for "Grooved Rumble Strips". This payment will be full compensation for all labour, equipment, tools, materials and incidentals necessary to complete the Work.

**TABLE 3.50 A  
UNIT PRICE ADJUSTMENT FOR DENSITY**

% of Marshall Density	UNIT PRICE ADJUSTMENT - DOLLARS PER TONNE		
	DESIGN LIFT THICKNESS		
Lot Mean	35 MM OR GREATER	LESS THAN 35 MM AND GREATER THAN 20 MM	20 MM
\$ 98.0	+ 0.50	+ 0.50	+ 0.50
97.9	+ 0.45	+ 0.45	+ 0.45
97.8	+ 0.40	+ 0.40	+ 0.40
97.7	+ 0.35	+ 0.35	+ 0.35
97.6	+ 0.30	+ 0.30	+ 0.30
97.5	+ 0.25	+ 0.25	+ 0.25
97.4	+ 0.20	+ 0.20	+ 0.20
97.3	+ 0.15	+ 0.15	+ 0.15
97.2	+ 0.10	+ 0.10	+ 0.10
97.1	+ 0.05	+ 0.05	+ 0.05
97.0	0.00	0.00	0.00
96.9	- 0.10	0.00	0.00
96.8	- 0.20	0.00	0.00
96.7	- 0.30	0.00	0.00
96.6	- 0.40	0.00	0.00
96.5	- 0.50	0.00	0.00
96.4	- 0.60	0.00	0.00
96.3	- 0.70	0.00	0.00
96.2	- 0.80	0.00	0.00
96.1	- 0.90	0.00	0.00
96.0	- 1.00	0.00	0.00
95.9	- 1.10	0.00	0.00
95.8	- 1.20	0.00	0.00
95.7	- 1.30	0.00	0.00
95.6	- 1.40	0.00	0.00
95.5	- 1.50	0.00	0.00
95.4	- 1.60	0.00	0.00
95.3	- 1.70	0.00	0.00
95.2	- 1.80	0.00	0.00
95.1	- 1.90	0.00	0.00
95.0	- 2.00	0.00	0.00
94.9	- 2.20	0.00	0.00
94.8	- 2.40	0.00	0.00
94.7	- 2.60	0.00	0.00
94.6	- 2.80	0.00	0.00
94.5	- 3.00	0.00	0.00
94.4	- 3.20	0.00	0.00
94.3	- 3.40	0.00	0.00
94.2	- 3.60	0.00	0.00
94.1	- 3.80	0.00	0.00
94.0	- 4.00	0.00	0.00
93.9		- 0.10	0.00
93.8		- 0.20	0.00
93.7		- 0.30	0.00
93.6		- 0.40	0.00
93.5		- 0.50	0.00

**TABLE 3.50 A  
UNIT PRICE ADJUSTMENT FOR DENSITY**

% of Marshall Density	UNIT PRICE ADJUSTMENT - DOLLARS PER TONNE		
Lot Mean	DESIGN LIFT THICKNESS		
	35 MM OR GREATER	LESS THAN 35 MM AND GREATER THAN 20 MM	20 MM
93.4		-0.60	0.00
93.3		-0.70	0.00
93.2		-0.80	0.00
93.1		-0.90	0.00
93.0		-1.00	0.00
92.9		-1.10	-0.10
92.8		-1.20	-0.20
92.7		-1.30	-0.30
92.6		-1.40	-0.40
92.5		-1.50	-0.50
92.4		-1.60	-0.60
92.3		-1.70	-0.70
92.2		-1.80	-0.80
92.1		-1.90	-0.90
92.0		-2.00	-1.00
91.9		-2.20	-1.10
91.8		-2.40	-1.20
91.7		-2.60	-1.30
91.6		-2.80	-1.40
91.5		-3.00	-1.50
91.4		-3.20	-1.60
91.3		-3.40	-1.70
91.2		-3.60	-1.80
91.1		-3.80	-1.90
91.0		-4.00	-2.00
90.9			-2.20
90.8			-2.40
90.7			-2.60
90.6			-2.80
90.5			-3.00
90.4			-3.20
90.3			-3.40
90.2			-3.60
90.1			-3.80
90.0			-4.00

For lower lifts greater than 35 mm design lift thickness, when the Lot Mean for Density is less than 94.0% and greater than 91.0%, payment will be at 50% of the unit bid price.

For 20 mm designated lifts, when the Lot Mean for Density is less than 90.0% and greater than 88.0%, payment will be at 50% of the unit bid price. 20 mm designated lifts below 88% average density shall be removed and replaced.

For top lifts where the Lot Mean for Density is from 93.9% to 92.0%, the Contractor shall either overlay or remove and replace the previously placed mix.

Except for 20 mm lifts, the Contractor shall remove and replace the mix when the Lot Mean for Density is less than 92.0% for top lifts and when the Lot Mean for Density is less than 91.0% on lower lifts.

**TABLE 3.50 B**  
**UNIT PRICE ADJUSTMENT FOR ASPHALT CONTENT**

Deviation of the Actual Asphalt Content from the Approved Asphalt Content	Unit Price Adjustment for Asphalt Content PAA \$ per tonne			
	Top Lift		Lower Lift	
	Below	Above	Below	Above
From 0 to 0.30	0.00	0.00	0.00	0.00
From 0.31 to 0.35	-1.10	-0.90	-1.10	-0.90
From 0.36 to 0.40	-2.20	-1.80	-2.20	-1.80
From 0.41 to 0.45	-3.30	-2.70	-3.30	-2.70
From 0.46 to 0.50	-4.40	-3.60	-4.40	-3.60
From 0.51 to 0.55			-5.50	-4.50
From 0.56 to 0.60			-6.60	-5.40
From 0.61 to 0.65			-7.70	-6.30

For top lift deviations of more than 0.50% the Contractor shall either overlay or remove and replace the previously placed mix.

For lower lift deviations of more than 0.65%, the Department will determine whether removal and replacement is necessary. For material that is allowed to stay in place, payment will be at 50% of the unit price bid.

**TABLE 3.50 C**  
**LUMP SUM SUBLOT ASSESSMENT FOR SMOOTHNESS**

PrI for Tangents and Curves	Assessment for Smoothness of Top Lift \$ per Sublot Lump Sum		
	Multilift	Single Lift	Curb and Gutter
0	25.00	25.00	25.00
>0 and 10 or less	0.00	0.00	0.00
11	-40.00	0.00	0.00
12	-65.00	0.00	0.00
13	-90.00	0.00	0.00
14	-115.00	0.00	0.00
15	-140.00	0.00	0.00
16	-165.00	-40.00	0.00
17	-190.00	-80.00	0.00
18	-215.00	-120.00	0.00
19	-240.00	-160.00	0.00
20	-265.00	-200.00	0.00
21	-290.00	-240.00	0.00
22	-315.00	-280.00	0.00
23	-340.00	-320.00	-40.00
24	REJECT	REJECT	-80.00
25	"	"	-120.00
26	"	"	-160.00
27	"	"	-200.00
28	"	"	-240.00
29	"	"	-280.00
30	"	"	-320.00
Greater than 30	"	"	REJECT

PrI assessment for smoothness will not be applied to interchange ramps with radii of less than 190 metres. Penalty assessments for bumps and dips will be applied to all top lifts of pavements.

Single lift criteria shall also apply to cold mill and inlay and Hot In-Place Recycling.

**TABLE 3.50 D**

**GRADATION TOLERANCES FOR THE LOT MEAN FROM THE JOB MIX FORMULA AND MAXIMUM RANGE BETWEEN INDIVIDUAL TEST RESULTS IN A LOT**

CHARACTERISTICS	SIEVE SIZE F <sub>m</sub>					
	<sup>(1)</sup> 12500 10000 5000	1250	630	315	160	80
Tolerances for the Lot Mean from the Job Mix Formula	+/-5	+/-3	+/-2	+/-2	+/-1.5	+/-1.5
Maximum Range Between Individual Test Results in a Lot	10	6	5	4	3	3

<sup>(1)</sup> Note: Include all sieves up to one size smaller than topsize.

**TABLE 3.50 E**

**MAXIMUM DEVIATION FOR THE LOT MEAN FROM THE GRADATION LIMITS SPECIFIED IN TABLE 3.2.3.1 OF SPECIFICATION 3.2, AGGREGATE PRODUCTION AND STOCKPILING**

CHARACTERISTIC	SIEVE SIZE F <sub>m</sub>		
	<sup>(1)</sup> 12500 10000	5000 1250 630 315	160 80
Maximum Deviation for the Lot Mean from Specification 3.2 Gradation Limits	2	1	0.5

<sup>(1)</sup> Note: Include all sieves up to one size smaller than topsize.

**TABLE 3.50 F**  
**ADJUSTMENT POINTS FOR DEVIATIONS IN GRADATION**  
**BEYOND THE REQUIREMENTS IN TABLE 3.50 D**

SIEVE SIZE F <sub>m</sub>	MEAN
<sup>(1)</sup> 12500, 10000, 5000	5 for each 1% Deviation
1250	1 for each 1% Deviation
630	2 for each 1% Deviation
315	2 for each 1% Deviation
160	0.2 for each 0.1% Deviation
80 Deviation ~ 1.0%	1.0 for each 0.1% Deviation
80 Deviation™ 1.0%	2.0 for each additional 0.1% Deviation

<sup>(1)</sup> Note: Include all sieve sizes up to one size smaller than topsize.

Lot Mean Adjustment points will be calculated for each Lot. A Lot Gradation Price Adjustment per tonne will be applied based on the following formula, if the Lot Mean does not exceed the requirements in Table 3.50 E.

$\mathbf{PAg} = ( \mathbf{A} \times \mathbf{-\$0.02} ) + ( \mathbf{B} \times \mathbf{-\$0.20} ) + \mathbf{Bonus}$
---

**Where:**

- PAg** = Unit Price Adjustment for Gradation (bonus or penalty; **QA Acceptance Lots only**)
- A** = Mean Adjustment Points assessed within the gradation limits specified in Specification 3.2
- B** = Mean Adjustment Points assessed outside the gradation limits specified in Specification 3.2.
- Bonus** = +\$0.10 when there are no Mean Adjustment Points and the maximum range as shown in Table 3.50 D, is not exceeded for any sieve size in the Lot.

## **Appendix A**

### **List of Figures**

- Figure 1 - Slight Segregation
- Figure 2 - Longitudinal Blemish with Area of Slight Segregation
- Figure 3 - Moderate Segregation
- Figure 4 - Moderate Segregation
- Figure 5 - Severe Segregation
- Figure 6 - Severe Segregation
- Figure 7 - Centre of Paver Streak with Segregated Area Rated as Moderate
- Figure 8 - Centre of Paver Streak with Segregated Area Rated as Severe
- Figure 9 - Unacceptable Repair Method
- Figure 10 - Pre-approved Repair Methods
- Figure 11 - Obvious Defects



**Figure 1**

**Slight Segregation**

Area within paint stripes is rated as slight segregation, slightly segregated area outside stripe would be considered a blemish. Slight segregation is only rated in the inspection following construction (normally two weeks after construction).

No repair of slight segregation is required.



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**Figure 2**

**Longitudinal blemish with  
area of slight segregation**

Blemish would not be rated for  
assessments. Slight segregated  
area would be assessed and penalized.



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**Figure 3**

**Moderate Segregation**

Moderate segregation is rated during construction and repaired during construction.

The "marked area for repair" shall extend a minimum of 0.5 metres beyond the segregated area.

Moderate segregation that is identified during the two week after construction inspection does not have to be repaired but is assessed for Payment Adjustments.



**Figure 4**

**Moderate Segregation  
Pre-approved Repair Methods  
DURING CONSTRUCTION  
ONLY**

Repairs must  
provide neat, uniform  
and complete coverage.

Pre-approved methods  
of repair are:  
slurry patch  
hot mix patch

**spray patch no  
longer acceptable  
repair method.**

Slurry patches shall consist  
of a uniform mixture of asphalt  
emulsion, fine aggregate and  
other additives. Commercial  
fine aggregate patching or  
slurry products that have been  
pre-mixed may also be used.

**The application of asphalt binder  
and sprinkling of sand on top is  
not considered an acceptable  
procedure for slurry patches.**



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**Figure 5**

**Severe Segregation**

Repair methods for severe segregation is removal and replacement or overlay.



**Figure 6**  
**Severe Segregation**





**Figure 7**

**Centre of Paver Streak  
with area rated as moderate  
segregation**

Subject to pay adjustment if greater than 1 metre in length. The "marked area for repair" shall extend a minimum of 100 mm laterally and 0.5 metres longitudinally beyond the streak.

**Repair methods**

**DURING CONSTRUCTION**

same repair methods  
as listed for segregation

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**Figure 8**

**Centre of Paver Streak  
with area rated as severe  
segregation**

Subject to pay adjustment if  
greater than 1 metre in length.

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**Figure 9**

**UNACCEPTABLE Repair Method**

Any methods of repair proposed by the Contractor is subject to the approval of the Consultant.

**Application of asphalt (by distributor, hand spraying, squeegeeing etc.) is NOT permitted.**



**Figure 10**

**Pre-approved repair methods**  
**DURING CONSTRUCTION PERIOD**  
**INSPECTION**

Slurry patches shall consist of a uniform mixture of asphalt emulsion, fine aggregate and other additives. Commercial fine aggregate patching or slurry products that have been pre-mixed may also be used.

**The application of asphalt binder and sprinkling of sand on top is not considered an acceptable procedure for slurry patches.**



Slurry Machine -Commercial type applicators are not required if handlaid slurry patches provide a good finished product meeting specification requirements.



**Figure 11**

**Obvious Defects**

Application of asphalt (by distributor, hand spraying, squeegeeing etc.) will not be permitted for obvious defect repairs.

Unacceptable repair of Core Hole



Unacceptable repair of Sample Location



Hairline Cracking



## **Appendix B**

### **List of Data and Report Sheets**

Segregation Worksheet  
Segregation Worksheet(During Construction Inspection example)  
Segregation Worksheet(After Construction-Two Week Inspection example)  
Segregation Summary Report  
Segregation Summary Report(example)  
Asphalt Mix Design and Job Mix Formula Summary Sheet  
Superpave Mix Design and Job Mix Formula Summary Sheet  
Profilograph Index Report  
Profilograph Index Report(example)  
Lot Paving Report  
Lot Paving Report (MQA QC Acceptance Lot example)  
Lot Paving Report Report (MQA QA Acceptance Lot example)  
MQA Superpave Lot Paving Report  
HIR Lot Paving Report  
Final Details ACP EPS Projects



# SEGREGATION WORKSHEET

SHEET \_\_\_\_ of \_\_\_\_

CONTRACT NO.	PROJECT NO.	CONTRACTOR	CONSULTANT
PROJECT FROM	PROJECT TO	INSPECTION <sup>1</sup> During Construction or <sup>2</sup> Following Construction (Two Week)	

MAT 6 - 95/02

DATE INSPECTED	STATION	LOCATION	LANE	MAT	SEGREGATED AREAS			Centre of Paver Length(m)	OBVIOUS DEFECT	COMMENTS
					SLIGHT	MODERATE	SEVERE			

1. During Construction Inspection to include all moderate and severe segregation, moderate and severe centre-of-paver segregation and obvious defects.
2. Following Construction (Two Week) Inspection to include all additional segregation not previously rated.

**OBVIOUS DEFECT CODES**

- SG Segregation(<.1 sq.m)
- EA Excess Asphalt
- SL Sample Location
- MJ Imp. Matching Joint
- CR Cracking
- CH Imp. Rep. Core Holes
- RM Roller Mark
- TM Tire Mark
- TR Roller Tears
- HC Hairline Cracking
- AP Approach Seg.
- OH Other\_\_\_\_\_

INSPECTED BY: \_\_\_\_\_

RECEIVED BY: \_\_\_\_\_  
\*\*\* Contractor's Representative

DATE RECEIVED \_\_\_\_\_ TIME \_\_\_\_\_

\*\*\* Signature indicates receipt of data on the date and time indicated



# SEGREGATION WORKSHEET

SHEET \_\_\_\_\_ of \_\_\_\_\_

<b>CONTRACT NO.</b> 9999/08	<b>PROJECT NO.</b> Hw 99:99	<b>CONTRACTOR</b> Good Road Builder	<b>CONSULTANT</b> Better Rater
<b>PROJECT FROM</b> Lido Creek		<b>PROJECT TO</b> Pedicot Junction	<b>INSPECTION</b> ( <sup>1</sup> During Construction or <sup>2</sup> Following Construction(Two Week)) During Construction

MAT 6 - 95/02

DATE INSPECTED	STATION	LOCATION	LANE	MAT	SEGREGATED AREAS			Centre of Paver Length(m)	OBVIOUS DEFECT	COMMENTS
					SLIGHT	MODERATE	SEVERE			
22-Jul	3+330	2.0 m RT	W	R		√				Requires slurry or hot mix patch
22-Jul	3+340	3.0 m RT	W	R		√				Requires slurry or hot mix patch
22-Jul	3+380	2.7 m RT	W	R		√				Requires slurry or hot mix patch
22-Jul	4+250	Centerline							MJ	From 4+250 to 4+390
22-Jul	4+430	3.0 m RT	W	R		√				Requires slurry or hot mix patch
22-Jul	4+600	2.9 m RT	W	R		√				Requires slurry or hot mix patch
22-Jul	4+680	2.9 m RT	W	R		√				Requires slurry or hot mix patch
22-Jul	5+181	3.9 m RT	W	R					SL	Requires slurry or hot mix patch
22-Jul	5+280	2.85 m RT	W	R				592		From 5+280 to 5+872(Rated as slight, no repair)
22-Jul	5+872	2.85 m RT	W	R				40		From 5+872 to 5+912(Rated as moderate,slurry or hot mix patch required)
22-Jul	6+177	0.8 m RT	W	R					CH	Core hole needs topping up
22-Jul	6+252	0.6 m RT	W	R		√				Requires slurry or hot mix patch
22-Jul	6+680					√			AP	Mod.Seg. on Approach(Not subject to Adjustments)
22-Jul	8+185	1.9 m RT	W	R		√				Requires slurry or hot mix patch
22-Jul	8+865	0.9 m RT	W	R		√				Requires slurry or hot mix patch
22-Jul	8+965	3.6 m RT	W	R		√			SG	Mod.Seg. < 0.1 sq.m.(Not subject to Adjustments)

1. During Construction Inspection to include all moderate and severe segregation, moderate and severe centre-of-paver segregation and obvious defects.
2. Following Construction (Two Week) Inspection to include all additional segregation not previously rated.

**OBVIOUS DEFECT CODES**

- SG Segregation(<.1 sq.m)
- EA Excess Asphalt
- SL Sample Location
- MJ Imp. Matching Joint
- CR Cracking
- CH Imp. Rep. Core Holes
- RM Roller Mark
- TM Tire Mark
- TR Roller Tears
- HC Hairline Cracking
- AP Approach Seg.
- OH Other\_\_\_\_\_

INSPECTED BY: Harry Cotter, Oranthe Crusher

RECEIVED BY: Bob Roadbulider  
\*\*\* Contractor's Representative

DATE RECEIVED July 22, 2008 TIME 6pm

\*\*\* Signature indicates receipt of data on the date and time indicated



# SEGREGATION WORKSHEET

SHEET \_\_\_\_ of \_\_\_\_

CONTRACT NO. 9999/08	PROJECT NO. Hw 99:99	CONTRACTOR Good Road Builder	CONSULTANT Better Rater
PROJECT FROM Lido Creek	PROJECT TO Pedicot Junction	INSPECTION <sup>(1)During Construction or <sup>2</sup>Following Construction(Two Week)</sup> <b>Following Construction (Two Week)</b>	

MAT 6 - 95/02

DATE INSPECTED	STATION	LOCATION	LANE	MAT	SEGREGATED AREAS			Centre of Paver Length(m)	OBVIOUS DEFECT	COMMENTS
					SLIGHT	MODERATE	SEVERE			
6-Aug	3+215	2.9 m RT	W	R	√					
6-Aug	3+321	3.8 m RT	W	R	√					
6-Aug	3+720	1.7 m RT	W	R	√					
6-Aug	4+123	2.2 m RT	W	R		√				New moderate segregation not identified during construction no repair required.
6-Aug	4+288	2.3 m RT	W	R	√					
6-Aug	4+621	1.5 m RT	W	R	√					
6-Aug	4+721	2.5 m RT	W	R	√					
6-Aug	5+201	3.3 m RT	W	R	√					
6-Aug	5+320	3.6 m RT	W	R	√					
6-Aug	5+402	3.1 m RT	W	R	√					
6-Aug	6+057	1.8 m RT	W	R	√					
6-Aug	6+100	2.85 m RT	W	R				540		From 6+100 to 6+640(Rated as slight)
6-Aug	6+698	2.85 m RT	W	R				100		From 6+698 to 6+798(Rated as slight)
6-Aug	8+133	4.6 m RT	W	R	√					

1. During Construction Inspection to include all moderate and severe segregation, moderate and severe centre-of-paver segregation and obvious defects.
2. Following Construction (Two Week) Inspection to include all additional segregation not previously rated.

**OBVIOUS DEFECT CODES**

- SG Segregation(<.1 sq.m)
- EA Excess Asphalt
- SL Sample Location
- MJ Imp. Matching Joint
- CR Cracking
- CH Imp. Rep. Core Holes
- RM Roller Mark
- TM Tire Mark
- TR Roller Tears
- HC Hairline Cracking
- AP Approach Seg.
- OH Other \_\_\_\_\_

INSPECTED BY: Harry Cotter, Oranthal Crusher

RECEIVED BY: Bob Roadbulider  
\*\*\* Contractor's Representative

DATE RECEIVED August 6, 2008 TIME 6pm

\*\*\* Signature indicates receipt of data on the date and time indicated





# SEGREGATION SUMMARY REPORT

SHEET 1 of 1

CONTRACT NO. 9999/08	PROJECT NO. Hw 99:99	CONTRACTOR Good Road Builder	CONSULTANT Better Rater
PROJECT FROM Lido Creek		PROJECT TO Pedicot Junction	PROJECT LANE.KMS 68.2

MAT 6 - 95s/02

LANE.KM					TOTALS NUMBER					SEGREGATION ADJUSTMENTS (+ / - \$)
LIMITS		LANE	MAT	LENGTH (KM)	SEGREGATED AREAS			Centre of Paver Length(m)	OBVIOUS DEFECTS	
FROM	TO				SLIGHT	MODERATE	SEVERE			
3.200	4.000	W	R	0.800	3	3	0	0	0	-\$1,600.00
4.000	5.000	W	R	1.000	3	4	0	0	1	-\$2,000.00
5.000	6.000	W	R	1.000	3	0	0	632	0	-\$1,048.00
6.000	7.000	W	R	1.000	1	1	0	640	2	-\$1,460.00
7.000	8.000	W	R	1.000	1	2	0	0	0	-\$1,000.00
8.000	9.000	W	R	1.000	2	0	0	0	3	\$500.00
9.000	10.000	W	R	1.000	0	1	0	20	3	-\$530.00
10.000	11.000	W	R	1.000	1	1	1	0	3	-\$1,000.00
11.000	12.000	W	R	1.000	0	5	0	0	3	-\$2,000.00
12.000	13.000	W	R	1.000	3	0	0	0	3	-\$100.00
13.000	14.000	W	R	1.000	4	3	0	0	3	-\$1,700.00
14.000	15.000	W	R	1.000	3	0	0	0	3	-\$100.00
15.000	16.000	W	R	1.000	0	0	0	0	3	\$1,000.00
16.000	17.000	W	R	1.000	1	0	0	0	3	\$500.00
17.000	18.000	W	R	1.000	0	1	0	0	3	-\$500.00
18.000	19.000	W	R	1.000	0	1	0	0	3	-\$500.00
19.000	20.000	W	R	1.000	1	0	0	0	3	\$500.00
20.000	21.000	W	R	1.000	2	0	0	0	3	\$500.00
21.000	22.000	W	R	1.000	3	0	0	0	3	-\$100.00
22.000	23.000	W	R	1.000	0	1	0	0	3	-\$500.00
23.000	24.000	W	R	1.000	0	0	0	0	3	\$1,000.00
24.000	25.000	W	R	1.000	0	0	0	0	3	\$1,000.00
25.000	26.000	W	R	1.000	3	0	0	0	3	-\$100.00
26.000	27.000	W	R	1.000	0	1	0	0	3	-\$500.00
27.000	28.000	W	R	1.000	0	1	0	0	3	-\$500.00
28.000	29.000	W	R	1.000	0	0	0	0	3	\$1,000.00
29.000	30.000	W	R	1.000	0	0	0	0	3	\$1,000.00
30.000	31.000	W	R	1.000	3	0	0	0	3	-\$100.00
31.000	32.000	W	R	1.000	0	0	0	0	3	\$1,000.00
32.000	33.000	W	R	1.000	2	0	0	0	3	\$500.00
33.000	34.000	W	R	1.000	0	0	0	0	3	\$1,000.00
34.000	35.000	W	R	1.000	0	0	0	0	3	\$1,000.00
35.000	36.000	W	R	1.000	0	1	0	0	3	-\$500.00
36.000	37.000	W	R	1.000	0	0	0	0	3	\$1,000.00
37.000	37.300	W	R	0.300	2	0	0	0	4	-\$150.00
Total(s)				34.100	41	26	1	1292	94	-\$4,488.00

NOTE: SUMMARY COMBINES BOTH DURING CONSTRUCTION AND FOLLOWING CONSTRUCTION (AT LEAST TWO WEEKS) INSPECTIONS.

COMMENTS *This summary is for the west bound lane, right mat.*

CERTIFIED CORRECT:

*Tom Corporate*

POSITION:

*Project Director*

Alberta Transportation  
**ASPHALT MIX DESIGN AND JOB MIX FORMULA SUMMARY SHEET**

<b>SECTION A Project Identification Information</b>			
Contract No.:	Highway:	Region:	Contractor:
Project From:	Project To:	Mix Design Consultant:	QA Review Consultant:
Pit Name and Location:		Blend Sand Pit Name and Location:	
Marshall Design No.:	Specified Mix Type:	Date Submitted:	RAP Source and Location:

<b>SECTION B Mix Design Properties</b>			
Combined Aggregate Properties		Design Recommendations	
Bulk Specific Gravity		Virgin Asphalt Content(%)	
% Asphalt Absorption		Total Asphalt Content(%)	
% Manufactured Fines(in -5000 Portion)		Marshall Density (kg/m3)	
% Two Face Fractures		Air Voids (%)	
% One Face Fractures		V.M.A (%)	
% Detrimental Matter Content		V.F.A. (%)	
Plasticity Index		Theoretical Film Thickness	
Fine Aggregate Angularity		Stability (N)	
Asphalt Properties		Flow (mm)	
Asphalt Grade		Retained Stability (%)	
Supplier		NOTE: Complete entire form for mix design submissions. For changes in JMF complete Section A and Section C.	
Specific Gravity			

<b>SECTION C Job Mix Formula or Change in Job Mix Formula</b>				
Aggregate Gradation	%Passing	Aggregate Proportions (%)		
16 000		Coarse		Natural Fines
12 500		Manufactured Fines		Additive_____
10 000		Blend Sand		Chips_____
5 000		Washed MF		RAP
2 500(Film Thick.)		New Target A. C.		New Film Thick.*
1 250		* Value calculated based upon new JMF aggregate gradation and target asphalt content with other information included in the original mix design(must meet design criteria)		
630		Reviewed by :		First Lot No. For Change:
315		Signature:		Date:
160		Remarks:		
80				

ACPJMF/02

Alberta Transportation  
**SUPERPAVE MIX DESIGN AND JOB MIX FORMULA SUMMARY SHEET**

**SECTION A Project Identification Information**

Contract No.:		Highway:		Region:		Contractor:	
Project From:		Project To:		Mix Design Consultant:		QA Review Consultant:	
Pit Name and Location:				Blend Sand Pit Name and Location:			
Mix Design No.:		Specified Mix Type:		Date Submitted:		RAP Source and Location:	

**SECTION B Mix Design Properties**

Combined Aggregate Properties		Design Recommendations	
Bulk Specific Gravity		Total Asphalt Content(%)	
% Clay Content		Gyratory Density (kg/m3)	
Fine Aggregate Angularity		% Asphalt Absorption	
% Two Face Fractures		Gmm	
% One Face Fractures		Cini (%) @Nini_____Gyrations	
% Elongated Particles		Cdes (%)@Ndes_____Gyrations	96
% Detrimental Matter Content		Cmax(%)@Nmax_____Gyrations	
Plasticity Index		V.M.A (%)	
Asphalt Properties		V.F.A (%)	
Asphalt Grade		Fines Asphalt Ratio	
Supplier		Tensile Strength Ratio(Wet-Dry)	
Specific Gravity		Tensile Strength Ratio(Freeze-Thaw)	
NOTE: Complete entire form for mix design submissions. For changes in JMF complete Section A and Section C.			

**SECTION C Job Mix Formula or Change in Job Mix Formula**

Aggregate Gradation	%Passing	Aggregate Proportions (%)			
25 000		Coarse		Natural Fines	
20 000		Manufactured Fines		Additive_____	
16 000		Blend Sand		Chips_____	
12 500		Washed MF		RAP	
10 000		New Target A. C.		Fines Asp. Ratio*	
5 000		* Value calculated based upon new JMF aggregate gradation and target asphalt content with other information included in the original mix design (must meet design criteria)			
2 500		Reviewed by :		First Lot No. For Change:	
1 250		Signature:		Date:	
630		Remarks:			
315					
80					







# LOT PAVING REPORT



CONTRACT NO. <b>9999/02</b>		PROJECT NO.			PROJECT FROM <b>N. of LIDO CREEK</b>		LOT NO.	MIX TYPE	MST DESIGN NO.	DESIGN DENSITY (kg/m <sup>3</sup> )	PIT NAME
WEEK ENDING YY MM DD <b>2002 07 08</b>		CL	NO.	A	CS	PROJECT TO <b>City Limits</b>	<b>6</b>	<b>1</b>	<b>9999-1</b>	<b>2341</b>	<b>CHERRY</b>
HWY <b>99</b>		PAVING CONTRACTOR <b>Star Paving Ltd.</b>		QA CONSULTANT <b>GOOD ENGINEERING</b>		DESIGN ASPHALT CONTENT (%)	TARGET ASPHALT CONTENT (%)	DESIGN AIR VOIDS (%)	DESIGN VMA (%)	DESIGN LIFT THICKNESS (mm)	
						<b>5.5</b>	<b>5.5</b>	<b>3.5</b>	<b>13.9</b>	<b>50</b>	

LOT AGGREGATE PROPORTIONS				FORMED MARSHALL SPECIMENS				ASPHALT CONTENT (%)				LOT PAVEMENT AND COMPACTION DATA										
DATE LAID	COARSE SPLIT %	NAT. FINE SPLIT %	BLEND SAND %	MANUFACTURED FINES %	ADDITIVE WM %	DENSITY kg/m <sup>3</sup>	AIR VOIDS %	V.M.A. %	MIX MOISTURE CONTENT (%)	SAMPLE SOURCE	SEGMENT ASPHALT CONTENT	TEST METHOD	SEGMENT #	STATION	LOCATION	LANE	LIFT	CORE THICKNESS (mm)	DENSITY kg/m <sup>3</sup>	AIR VOIDS %	COMPACTION %	CORE MOISTURE (%)
July 7/02	70	10.0	11.0	9.0	2333	3.9	13.7	0.10	BP	5.83	IG 1	12+665	- 3.3	S	2	55	2233	8.4	95.3	0.70		
LOT PAVING LIMITS (km)																						
FROM	TO	LANE	MAT	2345	3.4	14.3	0.09	BP	5.24	IG 2	13+645	- 1.5	S	2	53	2289	6.0	97.7	0.12			
12+620	16+571	S	R	2348	3.9	13.7	0.05	BP	5.45	IG 3	14+133	- 0.8	S	2	58	2245	5.1	95.8	0.54			
				2345	3.4	14.3	0.09	BP	5.55	IG 4	15+633	- 1.8	S	2	45	2269	7.9	97.0	0.07			
				2343	3.7	14.0	0.08	BP	5.52	IG 5	16+123	- 3.3	S	2	67	2299	6.6	98.1	0.05			
												- LOT MEAN -		56	2267	6.8	** 96.8	0.30				

\* Use Lot Mean Corrected AC to Air Voids & V.M.A. on QA Lots, Target AC on QC Lots. \*\* Lot Mean % Compaction = (100 X Lot Mean Density) / (Lot Mean Marshall Density)

## GRADATION

TEST/SEG NO.	TEST/SEG SOURCE	20000	16000	12500	10000	5000	1250	630	315	160	80
1	BP	100	91	83	61	41	33	25	12.3	6.4	
2	BP	98	88	82	54	37	32	26	11.9	6.3	
3	BP	99	89	81	58	40	35	26	12.0	6.5	
4	CF	100	91	82	63	41	36	27	13.1	6.0	
5	CF	97	87	77	55	35	31	22	10.5	5.4	

LOT TONNAGE **5412.20**

QA AC CORRECTION FACTOR (%) **-0.56**

REGULAR QA TESTING

QA PROJECT  QA ACCEPTANCE LOT **5.41**

QA ACCEPTANCE LOT (QC Lots) %

COMMENTS **Contractors gradations and asphalt contents reported MQA - QC LOT**

Air voids based on Target AC of 5.5%

SAMPLE SOURCE CODE

TECHNOLOGISTS **Bob Goodroads**

PROJECT MANAGER **Bob Roadbuilder**

RECEIVED BY **Rob Painter**

DATE RECEIVED **July 8, 2002** TIME **12:00 PM**

# LOT PAVING REPORT



CONTRACT NO. <b>9999/02</b>		PROJECT NO.			PROJECT FROM <b>N. of LIDO CREEK</b>		LOT NO.		MIX TYPE		MST DESIGN NO. <b>9999-1</b>		DESIGN DENSITY <b>2341</b> (kg/m³)		PIT NAME <b>CHERRY</b>	
WEEK ENDING YY MM DD	CL	NO.	A	CS	PROJECT TO <b>City Limits</b>	NO.	5	1	DESIGN ASPHALT CONTENT (%)	5.5	DESIGN AIR VOIDS (%)	3.5	DESIGN VMA (%)	13.9		
2002 07 08	HWY	99			PAVING CONTRACTOR <b>Star Paving Ltd.</b>	QA CONSULTANT	<b>GOOD ENGINEERING</b>		TARGET ASPHALT CONTENT (%)	5.5	DESIGN LIFT THICKNESS (mm)	50				

DATE LAID	LOT AGGREGATE PROPORTIONS			FORMED MARSHALL SPECIMENS			ASPHALT CONTENT (%)			LOT PAVEMENT AND COMPACTION DATA											
	% COARSE SPLIT	NAT. FINE SPLIT %	BLEND SAND %	MANUFACTURED FINES %	DENSITY kg/m³	* AIR VOIDS %	* V.M.A. %	MIX MOISTURE CONTENT (%)	SAMPLE SOURCE	SEGMENT ASPHALT CONTENT	TEST METHOD	STATION	OR +	LOCATION	LANE	LIFT	CORE THICKNESS (mm)	DENSITY kg/m³	AIR VOIDS %	COMPACTION %	CORE MOISTURE (%)
July 4 & 6/02	70		10.0	11.0	2345	3.5	13.7	0.10	CO	5.83	IG 1	13+733	-	5.1	N	2	60	2264	6.3	96.9	0.30
LOT PAVING LIMITS (km)																					
FROM	TO	LANE	MAT	2334	3.9	14.0	0.09	CO	5.40	IG 2	14+287	-	1.2	N	2	63	2249	7.4	96.2	0.35	
13+620	15+571	N	L	2335	3.9	14.0	0.05	CO	5.24	IG 3	14+431	-	3.2	N	2	65	2310	5.1	98.8	0.17	
									5.60	IG 4	14+970	-	2.5	N	2	62	2268	6.3	97.0	0.34	
									5.15	IG 5	15+255	-	4.2	N	2	65	2290	6.1	98.0	0.43	
					2337	3.8	13.9	0.08	CO	5.44						63	2276	6.2	** 97.4	0.32	

\* Use Lot Mean Corrected AC to Air Voids & V.M.A. on QA Lots, Target AC on QC Lots. \*\* Lot Mean % Compaction = (100 X Lot Mean Density) / (Lot Mean Marshall Density)

ADDITIVE MAT

## GRADATION

TEST/ SEG NO.	SAMPLE SOURCE	20000	16000	12500	10000	5000	1250	630	315	160	80
1	CO	99	93	84	62	40	35	26	12.2	6.9	
2	CO	98	89	80	58	38	33	25	11.5	6.1	
3	CO	99	92	80	59	38	33	26	12.2	7.1	
4	CO	99	92	83	62	40	35	26	11.9	6.7	
5	CO	97	85	72	51	34	29	22	10.3	5.7	

LOT TONNAGE 2012.23

QA AC CORRECTION FACTOR (%) -0.56

REGULAR QA TESTING

MQA PROJECT

QA ACCEPTANCE LOT

QA ACCEPTANCE LOT

COMMENTS July 4th was a short day/less than 4 hours) tonnage added to July 6th

Production

TECHNOLOGISTS Bob Goodroads

Rick Anglot

PROJECT MANAGER Bob Roadbuilder

RECEIVED BY Rob Painter

DATE RECEIVED July 7, 2002 TIME 12:00 PM

CH Chips R Right  
RA Reclaim L Left  
CF Coarse Fines C Centerline  
MF Manufactured Fines RS Right Shoulder  
BS Blend Sand LS Left Shoulder  
C 2nd Coarse  
WM Washed MF  
OR Other

TEST METHOD LANE

FE Filterless Extraction N Northbound  
NU Nuclear S Southbound  
RE Reflux W Westbound  
FC Filter Centrifuge E Eastbound  
IG Ignition  
OR Other

SAMPLE SOURCE CODE

CO Core  
BP Behind Paver  
CF Cold Feed  
OR Other

LOT MEAN

1-5	CO	98	90	80	58	38	33	25	11.6	6.5
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JOB MIX FORMULA

98	87	75	54	35	31	22	9.5	5.5
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TOLERANCES FOR THE LOT MEAN FROM JOB MIX FORMULA

5	5	3	2	2	1.5	1.5
---	---	---	---	---	-----	-----

MAXIMUM RANGE BETWEEN INDIVIDUAL TEST RESULTS IN A LOT

10 10 6 5 4 3 3

\*\*\* Signature indicates receipt of data on the date and time indicated







**Appendix C**

**DEPARTMENT'S QUALITY ASSURANCE TESTING PROGRAM**

**FOR**

**ASPHALT CEMENTS**

**HIGHWAY TRAFFIC PAINTS AND GLASS BEADS**

Firms are contracted periodically by the Technical Standards Branch to provide the testing of asphalt cements, paints and glass beads. The following is for the 2002 season.

### **ASPHALT CEMENT SAMPLING**

Ensure that the sampling frequencies outlined in Alberta Transportation's Standard Specifications for Highway Construction, Specification 5.7 – Supply of Asphalt are followed. A minimum of one sample per contract is to be taken.

All Performance Grade Asphalt Cements (PGAC) samples should be shipped to the following address:

Dr. Ludo Zanzotto, P. Eng  
Bituminous Materials Chair  
University of Calgary  
ENF 262  
2500 University Drive NW  
Calgary, AB T2N 1N4  
Attention: "Asphalt Lab"

The Department approves the Quality Control Plans for the suppliers of PG asphalt products on a province wide basis. The Consultant should contact the Project Sponsor to determine if the asphalt supplier's quality control plan has been previously approved.

All other asphalt samples should be shipped to the following address:

AMEC Earth & Environmental Limited  
221 18<sup>th</sup> Street SE  
Calgary, AB, T2E 6J5  
Attention: "Asphalt Lab"

Samples are to be submitted in an timely manner and with sufficient project information. All asphalt samples are to be shipped on a weekly basis and require the following information:

- Contract number
- Highway and control section
- Contractor
- Project manager
- Bill of lading number
- Asphalt type and grade
- Asphalt supplier
- Batch number
- Date sampled
- Sampled by

The Department's test procedure ATT-42 (manual of test procedures) provides information on sample size and container types.

Marta Juhasz is responsible for the Department's asphalt quality assurance program. Please direct any questions or concerns you may have regarding this program to her at (780) 415-0691.

**HIGHWAY TRAFFIC PAINTS AND GLASS BEADS**

All Highway Traffic Paints and Glass Beads samples should be shipped to the following address:

AMEC Earth & Environmental Limited  
Don Stefanyk, Project Engineer  
4810 - 93 Street  
Edmonton, Alberta  
T6E 5M4  
Attention: "Paint Lab"

Terry Willis is responsible for the Department's paints and glass beads quality assurance program. Please direct any questions or concerns you may have regarding this program to him at (780) 427-7761.