



SEGREGATION RATING MANUAL

2017

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Introduction

This Segregation Rating Manual is a revision of earlier editions prepared by the Department. This document is intended to promote uniform specification interpretation leading to fair and consistent application. Information within this document is intended to supplement but not override specification requirements. The information in this manual reflects the current Standard Specifications for Highway Construction, Edition 15. The user is reminded to review contract documents as future specification revisions may not be captured in this document.

This manual has been prepared to help the user recognize the type and the severity of segregated areas on asphalt concrete pavement projects with updated reference photographs of segregated sites contained within Appendix A.

Questions and comments may be directed to the Pavement Engineering Section of the Technical Services Branch.

Pavement Engineering Section
Technical Services Branch
October, 2017

1.0 SEGREGATION INSPECTION PROCESS

The segregation inspection and classification process is described in the Standard Specifications 3.50 Asphalt Concrete Pavement (ACP) and 3.53 Asphalt Concrete Pavement – Superpave. This manual is not intended to repeat those specifications but to provide field staff with sample photographs of sites with different segregation severities along with examples of obvious defects.

The standard specifications also describe how segregation payment adjustments (i.e. penalties/bonuses) are to be calculated.

2.0 CLASSIFYING SEGREGATION SEVERITY

For the purposes of classifying pavement segregation, only segregated areas greater than 0.1m² and Centre-of-Paver streaks greater than 1 m in length are considered.

- Slight Segregation - 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 Segregation - Significantly more stone than the surrounding mix; moderately segregated areas usually exhibit a lack of surrounding matrix.
- Severe Segregation - 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".
- Obvious Defect - Moderate or severely segregated areas which do not meet the size parameters above. Other items that are considered Obvious Defects are areas of excess or insufficient asphalt, improper matching of longitudinal or transverse joints, roller marks, tire marks, cracking or tearing, improperly repaired core holes, etc.
- Blemish - A term not defined within the standard specifications but used by some to describe a pavement texture which is not yet considered to be slight segregation (i.e. segregation requirements do not apply).

As demonstrated in Figure 1, segregation severity is a continuum, and the transition between categories is not exact.

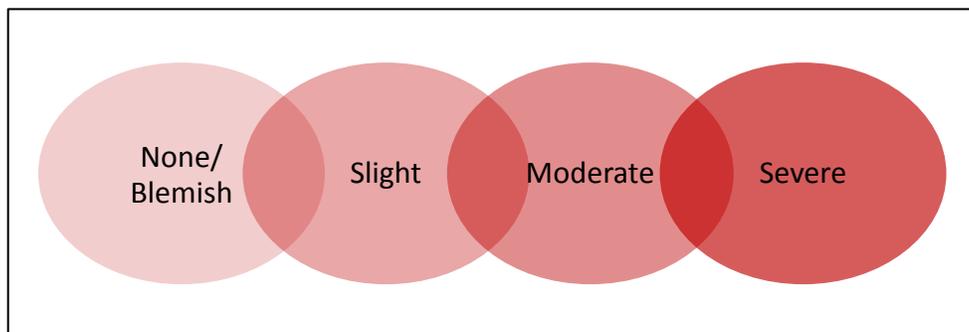


Figure 1 - Segregation Severity Continuum

Reference photographs of various severities of pavement segregation and Obvious Defect sites are located in Appendix A.

3.0 SEGREGATION INSPECTION AND REPORTING

Inspections of the top lift pavement are to be completed by the Consultant on an on-going basis during construction and provided to the Contractor in a timely manner. All areas of segregation, Centre-of-Paver streaks and Obvious Defects should be marked on the pavement. The Consultant should review the marking scheme used with the Contractor to avoid misunderstandings in the segregation assessments or repair requirements. Areas identified are to be recorded on the Segregation Inspection Worksheet.

The Consultant uses the information recorded on the Segregation Inspection Worksheet to calculate payment adjustments and summarizes that on the Segregation Summary Report. The Segregation Summary Report is to be included within the Final Details package (submitted along with the other required documents to trans.constructqa@gov.ab.ca). The Segregation Inspection Worksheet (B.17) and Segregation Summary Report (B.18) are in Appendix B of the Engineering Consultant Guidelines for Highway, Bridge and Water Projects – Vol. 2 (available at <http://www.transportation.alberta.ca/919.htm>). Both documents are provided in Excel format to assist in calculating the payment adjustments. Completed examples are also included within these documents.

3.1. Segregation Payment Adjustment Calculations

Segregated sites on entrances and approaches should be identified for repair but do not affect the segregation payment adjustments. Likewise, sites with Obvious Defects are identified for repair only. Individual sites of segregation which are separated by less than 3 m are considered to be a single site for the determination of payment adjustments. Similarly, in the Segregation Inspection Worksheet, the Centre-of-Paver streaks should only be marked in that column, without a checkmark in the severity column to avoid double counting the site. Data should not be copy/pasted to the spreadsheets to avoid altering the imbedded formulas.

Prorating for payment adjustments is done automatically within the excel Segregation Summary Report. Below is an explanation of the calculations done to determine the prorated payment adjustment for Slight Segregation, **these are accounted for automatically in the excel Segregation Summary Report.**

For example:

0.560 km with 2 slight areas of segregation and no other areas of segregation. Since slight segregation frequency has an allowance of 2 sites per kilometre, there is a requirement to prorate the frequency and payment adjustment for a partial lane.km.

$$\text{Segregation Frequency (Slight)} = \frac{2 \text{ sites}}{0.560 \text{ km}} = 3.57 = 4 \text{ sites (rounded to whole number)}$$

$$\text{Payment Adjustment} = -(4 - 2) \times \$100 = -\$200$$

$$\text{Prorated Payment Adjustment} = -\$200 \times 0.560 = -\$112$$

4.0 SEGREGATION REPAIRS

Table 1 further summarizes segregation repair requirements outlined in Edition 15 of the Standard Specifications.

Table 1 - Segregation Repair Requirements

Segregation Type	Lower Lift(s)	Top Lift
Slight Segregation	Contractor option to repair	Contractor option to repair
Moderate Segregation	Contractor option to repair	Repair
Severe Segregation	Repair if segregated area will affect the long term structural integrity of the pavement structure	Repair (including entrances and intersections)
Center of Paver Streak	Contractor option to repair	Repair (only if Moderate/ Severe)
Obvious Defects	Repair not typically required	Repair

The following methods of repair are pre-approved according to the Specifications:

- Moderate Segregation: Slurry Patch or Hot Mix Patch
- Severe Segregation: Remove and replace or overlay

The following factors should be considered for approval of a slurry patch product (there is no category for segregation repair products in Alberta Transportation's Approved Products List):

- The product must be a slurry (a uniform mixture of asphalt emulsion, fine aggregate and other additives).
- The product should be intended for use on asphalt surfaces.
- The product should not deteriorate the pavement ride.
- The product should be able to provide a neat application.
- Application of blotter sand or cement on top of the slurry to reduce tracking is acceptable.
- Commercial or proprietary products are acceptable if they meet all other requirements.
- Hand laid slurry patches are acceptable if they provide a good finished product.

The following methods are generally **not** acceptable: restorative or rejuvenating sand seal treatment, spray patching, application of asphalt by distributor, hand spraying, squeegeeing asphalt by itself (current specifications explicitly disallow this method), or application of asphalt followed by sprinkling of sand.

5.0 APPEAL PROCEDURES

As outlined in the specifications the Contractor may appeal the segregation ratings and payment assessments. In such cases the Project Sponsor is to forward the following information to the Pavement Engineering Section, Attn: Roadway Construction Standards Specialist:

- Contractor's written Notice of Appeal
- Prime Consultant's original assessment (including worksheets)
- Confirmation that the sites in the appeal have not been repaired

TSB staff will coordinate with the Consultant and Region to undertake an inspection of the appealed portion of work. The Contractor is to be informed of the inspection schedule and can be present during the inspection but is not to be involved in the actual reassessment.

The Region typically arranges for traffic control through the local MCI and maintenance contractor. In some cases the paving contractor may be able to provide this service. The appeal team will typically inspect 4 lane-km of pavement to determine whether the original assessment and payment adjustments are valid or if the inspection work needs to be redone.

Responsibility for the payment of costs associated with the appeal testing (Contractor versus Department) is described in section 3.50.4.9.6 of Specification 3.50 ACP – EPS.

Appendix A

List of Photographs

- Photograph 1 - Slight Segregation
- Photograph 2 - Slight Segregation
- Photograph 3 - Slight Segregation
- Photograph 4 - Slight Segregation (Close-Up)
- Photograph 5 - Moderate Segregation
- Photograph 6 - Moderate Segregation
- Photograph 7 - Moderate Segregation
- Photograph 8 - Moderate Segregation
- Photograph 9 - Moderate Segregation (Close-Up)
- Photograph 10 - Severe Segregation
- Photograph 11 - Severe Segregation
- Photograph 12 - Severe Segregation (Close-Up)
- Photograph 13 - Center of Paver Streak
- Photograph 14 - Obvious Defect (Improperly Matching Joint - View 1)
- Photograph 15 - Obvious Defect (Improperly Matching Joint - View 2)
- Photograph 16 - Obvious Defect (Improperly Repaired Core Holes)
- Photograph 17 - Obvious Defect (Hairline Cracking)



Photograph 1- Slight Segregation



Photograph 2 - Slight Segregation



Photograph 3 - Slight Segregation



Photograph 4 - Slight Segregation (Close up)



Photograph 5 - Moderate Segregation



Photograph 6 - Moderate Segregation



Photograph 7 - Moderate Segregation



Photograph 8 – Moderate (bordering on Severe) Segregation



Photograph 9 - Moderate Segregation (bordering on Severe) (Close-Up)



Photograph 10 - Severe Segregation



Photograph 11 - Severe Segregation



Photograph 12 - Severe Segregation (Close-Up)



Photograph 13 - Centre-of-Paver Streak



Photograph 14 - Improperly Matching Joint (View 1)



Photograph 15 - Improperly Matching Joint (View 2)



Photograph 16 - Obvious Defect (Improperly Repaired Core Holes)



Photograph 17 - Obvious Defect (Hairline Cracking)