

**Procedure for Evaluating Quality Control Test Results
of Aggregate Gradations, Theoretical Maximum Specific Gravity,
and Bulk Specific Gravity of Asphalt Concrete Mixes**

1. Scope:

To provide a procedure for comparing the Contractor's quality control (QC) test results with the Department of Transportation's quality assurance (QA) test results for the lot. This procedure is for aggregate gradation and specific gravities of hot mix asphalt concrete and should be used by Area personnel to determine if the QC and QA samples are similar or dissimilar. The similar/dissimilar test should be used to verify that sampling and testing methods are giving comparable test results for the lot tested.

2. Procedure:

- 2.1 Immediately after the completion of a lot, determine the average of the QC test results for that individual lot. Determine the average percent passing for each sieve size and the average of the theoretical maximum (Rice) and bulk (Marshall) specific gravities of the hot mix asphalt concrete.
- 2.2 Determine the range (R) of the QC samples from the lot by subtracting the smallest test value from the largest value. The range will be calculated for each sieve size, theoretical maximum (Rice) and bulk (Marshall) specific gravities.
- 2.3 Determine the upper and lower interval (I) of the QC test results by using the following equation:

$$I = \text{Average} \pm \text{Constant} \times \text{Range}$$

Number of QC samples used in calculating average	Constant
9	0.97
8	1.05
7	1.17
6	1.33
5	1.61

- 2.4 Compare the quality assurance sample tests with the calculated interval (I). A comparison will be made on each sieve size. The comparison will also be made for the theoretical maximum and bulk specific gravities.
- 2.5 Determine if the results are similar or dissimilar. If all the test results of the QA sample coincide with, or lie between, the upper and lower limits of their interval, the QC samples will be considered similar to the QA sample. If the QA sample has any sieve size or specific gravity in which a result does not coincide with or lie between the upper and lower limits of their interval, the QC samples will be considered dissimilar to the QA sample.

- 2.6 If the results are dissimilar, action must be taken to determine the reason for the dissimilar results. Review the QA and QC sampling procedures. Review the QA and QC testing procedures. Check scales and all other testing equipment. Review computations and the reporting procedure. Perform any additional investigation that may clarify the reason for the dissimilarity. The Region Materials Engineer should be involved in the review and investigation. Region Materials IA test results may be used to help identify the reason for the dissimilar test result.
- 2.7 Perform additional testing if any test result is found to be dissimilar until the reason for the dissimilar test result is found and documented. Document the results of the additional testing and findings in the field diary and the similar/dissimilar worksheet.

3. Report:

Report the results on the similar/dissimilar worksheet. Report the similarity as (Yes) similar or (No) dissimilar on the DOT 3 or DOT 42QA and include the signature of the individual determining if the results are similar or dissimilar. The following computer spread sheet can be used for determining similar/dissimilar results. The spread sheet is available from the SDDOT Bituminous Engineer or from the DOT U drive (<U:\ms\Qcqa>). The spreadsheet will be available in the MS&T system to record the results.

4. References:

Similar/dissimilar worksheet

For Asphalt Concrete

Contract: 8022 Lot Nbr: 2
 Project NH 0212(187)327 PCN: 05TX
 County: Clark, Spink
 Compared By: _____ Comparison Date: 12/01/2021

QC Test Information			Percent (%) Passing the Control Sieves								Hot Mix Asphalt		
Test Date	Tested By	Test No.	3/4"	1/2"	3/8"	#4	#8	#16	#40	#200	Max. Theoretical (Rice)	Bulk (Marshall)	Air Void (Percent)
08/19/2021	Larson, Andy	QC06	100	91	82		50			3.1	2.419	2.346	3.0
08/19/2021	Larson, Andy	QC07	100	94	83		50			3.3	2.422	2.343	3.3
08/23/2021	Larson, Andy	QC08/OA	100	92	82		51			2.9	2.420	2.313	4.4
08/24/2021	Larson, Andy	QC09	100	92	81		49			3.3	2.418	2.334	3.5
08/24/2021	Larson, Andy	QC10	100	92	80		49			3.1	2.421	2.323	4.0
	Average		100.0	92.2	81.6		49.8			3.1	2.420	2.332	3.640
	Constant		1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61
	Range (R)		0.0	3.0	3.0		2.0			0.4	0.004	0.033	1.400
	Interval (I)												
	upper		100	97	86		53			3.8	2.426	2.385	5.894
	lower		100	87	77		47			2.5	2.414	2.279	1.386
QA Test Information			Percent (%) Passing the Control Sieves								Hot Mix Asphalt		
Test Date	Tested By	Test No.	3/4"	1/2"	3/8"	#4	#8	#16	#40	#200	Max. Theoretical (Rice)	Bulk (Marshall)	Air Void (Percent)
08/23/2021	Soward, Kevin	QA02/QC	100	91	81		50			3.0	2.419	2.318	4.2
	Similar/Dissimilar		similar	similar	similar		similar			similar	similar	similar	similar

Comments: _____

Figure 1

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