

1812 BITUMINOUS MIXTURE SAMPLES – TRIAL MIX VERIFICATION**1812.1 SAMPLE SUBMITTAL**

- A. For detailed requirements of mixture submittals refer to the bituminous specification.
- B. For Marshall verification a 15kg (35 lb.) bag of uncompacted mix along with 3 contractor compacted specimens are submitted for approval.
- C. For Gyratory mixes a 34kg (70-75 lb.) bag of uncompacted mix along with two contractor compacted specimens are needed.
- D. When a Lottman Test is required an additional nine Marshall or six gyratory specimens shall be submitted and tested as per section 1813.

1812.2 SAMPLE PREPARATION

- A. Heat the sample in its container until it becomes workable - a range of 70 –110 °C (160-230 °F).
- B. Immediately place in a large pan sufficient material to run all required tests.
- C. Thoroughly hand-mix the material in the pan with a scoop and trowel.
- D. Take a representative 2000 - 2100 gram sample for extraction and gradation. Test according to section 1852, 1853 or 1854 as appropriate.

NOTE 1: Verifying the % AC in the submitted mixture shall be by chemical extraction. Additional samples may be taken for determining a mix correction factor when using the ignition furnace. Test these samples according to Section 1854.

- E. Re-mix and quarter the material remaining in the pan.

NOTE 2: When quartering the sample the goal is to be as representative as possible for all the tests.

- F. From one part weigh out two portions (2000 – 2050 grams each) to run the maximum specific gravity ("Rice test"), spread each out in a separate pan and test according to Section 1807.
- G. From the other three-quarters prepare three specimens for bulk specific gravity on Marshall mixtures or at least two if not three specimens for Gyratory mixtures.

- H. For each of the three Marshall specimens weigh out enough material for a 63.5 ± 3.175 mm (2.5 ± 0.125 ") puck, approximately 1200 grams. It will vary depending upon the aggregates.) Refer to Section 1805.
- I. For Gyratory mixtures weigh out enough material for a puck that will compact to 115 ± 5 mm in height at design. Somewhere between 4800 – 4900 grams per specimen should be adequate; but, it will be dependent upon the level of gyrations and the aggregate.
- J. Return the molds with the material into an oven and bring the material to 135 ± 5.6 °C (275 ± 10 °F) or to the compaction temperature required for the PG graded asphalt used in the mixture. See NOTES 3 & 4.
- K. When the material reaches the desired temperature compact and measure in accordance with Sections 1805 or 1820.

NOTE 3: Be certain to measure the material temperature; thermometer must not touch the bottom or side of the mold.

NOTE 4: After the material in the molds has reached 135 ± 5.6 °C (275 ± 10 °F) or the required temperature for the PG graded asphalt, compaction must commence within 30 minutes.

- L. Return extra material to its container and save for a short time in case re-checks are needed.
- M. Determine the bulk specific gravity according to Section 1806. For gyratory computations refer to section 1820.
- N. Determine the stability and flow (for Marshall mixes) according to Section 1805.
- O. Determine the air voids in accordance to Section 1808. For gyratory computations refer to section 1820.

NOTE 5: Steps "M" through "O" must be performed on both Mn/DOT's lab compacted specimens and on the compacted specimens submitted by the contractor or other submitter.

- P. For the Lottman verification set up and test as per Section 1813.

NOTE 6: For new mix designs use the contractor's maximum specific gravity if they submitted pre-compacted Lottman specimens and if the max. gravity is within the 0.019 tolerance. (If it is not the reason for the difference must be resolved before calculating the Lottman voids.)

NOTE 7: For new mix designs use Mn/DOT's verification of the maximum specific Gravity when Mn/DOT compacts the specimens from the submitted mix.

1812.3 MIXTURE PROPERTIES FORM – GYRATORY VERIFICATION OF CONTRACTOR'S SPECIMENS

Mixture Properties

2360 TMV Sample

CONTRACTOR'S PUCKS			
Lift =	0	NOMINAL MIX MAX =	0.0
Type =	0	Gyrations@Initial =	0
Gsb =	0.000	Gyrations@Design =	0
Gse =	#DIV/0!	Gyrations@Maximum =	0
Gb =	0.000	Optimum % Binder	0.0
PG =	0.000	Actual % Binder Used	
		Percent passing #200 =	
		TM #	2000-1
		SP #	0
		Field ID #	0
		Mix Designation	SPWEA640E
		Date Received	01/01/00
		Date Tested	01/01/00
		Time Received :	0

Sample # 1			Sample # 2		
Dry Wt. = 4900.0			Dry Wt. = 4899.9		
hx	Vmx	Gmb(est.)	hx	Vmx	Gmb(est.)
	(hx*17.6715)	Dry Wt./Vmx		(hx*17.6715)	Dry Wt./Vmx
I	0.0	#DIV/0!		0.0	#DIV/0!
D	0.0	#DIV/0!		0.0	#DIV/0!
M	0.0	#DIV/0!		0.0	#DIV/0!
Gmb Measured =			Gmb Measured =		
Cfactor = #DIV/0!			Cfactor = #DIV/0!		
(Gmb measured/Gmb(est.))			(Gmb measured/Gmb(est.))		
*Gmm (Max.Spg.)=			0.000		

	Gmb(Corr.)	Va	% Gmm	Gmb(Corr.)	Va	% Gmm
D	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

Average Corrected Properties

	Gmb	Va	% Gmm	% Gmm Required
I	#DIV/0!	#DIV/0!	#DIV/0!	
D	#DIV/0!	#DIV/0!	#DIV/0!	
M	#DIV/0!	#DIV/0!	#DIV/0!	

Vma=(100-((%Gmm@design*Gmm*Ps)/Gsb))
 Vma = #DIV/0! Required = FALSE

Vfa=100*((Vma-Va@design)/Vma)
 Vfa = #DIV/0! Required =

Fines to Effective Asphalt = P# 0.075/ Pbe
 F/E = #DIV/0! Required =

Remarks:

*Using State Run Test

Technician : rb

1812.4 MIXTURE PROPERTIES FORM – GYRATORY VERIFICATION USING MN/DOT COMPACTED SPECIMENS

Mixture Properties

2360 TMV Sample

MN.DOT LAB RESULTS					
Lift =	<input type="text"/>	NOMINAL MIX MAX =	<input type="text"/>	TM #	2000-1
Type=	<input type="text"/>	Gyrations@Initial =	<input type="text"/>	SP #	<input type="text"/>
*Gsb =	<input type="text"/>	Gyrations@Design =	<input type="text"/>	Field ID #	<input type="text"/>
Gse =	#DIV/0!	Gyrations@Maximum =	<input type="text"/>	Mix Designation :	SPWEA640E
*Gb =	<input type="text"/>	Optimum % Binder	<input type="text"/>	Date Received :	January 1, 2000
*PG =	<input type="text"/>	Actual % Binder Used	<input type="text"/>	Date Tested :	January 1, 2000
		Percent passing #200 =	<input type="text"/>	Time Received :	<input type="text"/>
	Sample #	A		Sample #	B
	Dry Wt. =	<input type="text"/>		Dry Wt. =	<input type="text"/>
	hx	Vmx	Gmb(est.)	hx	Vmx
		(hx*17.6715)	Dry Wt./Vmx		(hx*17.6715)
I	<input type="text"/>	0.0	#DIV/0!	<input type="text"/>	0.0
D	<input type="text"/>	0.0	#DIV/0!	<input type="text"/>	0.0
M	<input type="text"/>	0.0	#DIV/0!	<input type="text"/>	0.0
	Gmb Measured =	<input type="text"/>		Gmb Measured =	<input type="text"/>
	Cfactor =	#DIV/0!		Cfactor =	#DIV/0!
		(Gmb measured/Gmb(est.))			(Gmb measured/Gmb(est.))
	Gmm (Max.Spg.)=		<input type="text"/>		
	Gmb(Corr.)	Va	% Gmm	Gmb(Corr.)	Va
D	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
	<u>Average Corrected Properties</u>				
	Gmb	Va	% Gmm	% Gmm Required	
I	#DIV/0!	#DIV/0!	#DIV/0!	<input type="text"/>	
D	#DIV/0!	#DIV/0!	#DIV/0!	<input type="text"/>	
M	#DIV/0!	#DIV/0!	#DIV/0!	<input type="text"/>	
	VMA=(100-((%Gmm@design*Gmm*Ps)/Gsb))			Required =	
	VMA = #DIV/0!				
	Vfa=100*((Vma-Va@design)/Vma)			Required =	
	VFA = #DIV/0!				
	Fines to Effective Asphalt = P# 0.075/ Pbe			Required =	
	F/E = #DIV/0!				

Remarks:

* Using Contractor's Submitted Information

Technician : rb

1812.5 TRIAL MIX VERIFICATION WORKSHEET – MARSHALL METHOD

Trial Mix Verification Worksheet

T.M. # _____

PROJ. # _____
 SPEC. # _____
 Mix Type: _____

Contractor: _____
 Gyrations _____ Max
 # of Blows _____

Date Sampled: _____
 Date Received: _____
 Time Received: _____

	<u>State Specimens</u>			<u>Contractor's Pucks</u>				
Sample I.D.	0	0	0		0	0	0	
Height	0.000	0.000	0.000		0.000	0.000	0.000	
Dry Wt.	0.0	0.0	0.0		0.0	0.0	0.0	
SSD Wt.	0.0	0.0	0.0	<u>Cont. Opt.</u>	0.0	0.0	0.0	
Wt. In H ² O	0.0	0.0	0.0		0.0	0.0	0.0	
Volume	0.0	0.0	0.0	<u>Avg.</u>	0.0	0.0	0.0	<u>Avg.</u>
Bulk Spg.(Gmb)	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Ht.Correction Factor	FALSE	FALSE	FALSE	<u>Avg.</u>	FALSE	FALSE	FALSE	<u>Avg.</u>
Flow (1/100 inches)				0				0
Stability (Lbs.)								
Stability Corrected	0	0	0	0	0	0	0	0
				<u>Cont.Stab.</u>				

				<u>Cont.Max.</u>				

				<u>Avg.</u>				<u>Avg.</u>
Max. SpG.(Gmm)	#DIV/0!	#DIV/0!		#DIV/0!				#DIV/0!
				<u>Cont. Voids</u>				

				<u>Avg.</u>				<u>Avg.</u>
% Air Voids(Va)				#DIV/0!				#DIV/0!
Tests Required	1 -TMV- 1109				Original Rec. Number : _____			
	1 -Ext- 1135				Date 1st Issued : _____			
	1 -Grad- 1011							
	1 -TSRV- 1107							

Remarks:

Technician : _____
 Date Completed: _____

This page intentionally left blank