



Minnesota Department of Transportation

MEMO

Office of Materials
Mailstop 645
1400 Gervais Avenue
Maplewood, MN 55109

DATE: April 6, 2006

TO: District Lab Supervisors
Minnesota Asphalt Contractors – QM Personnel
Minnesota Asphalt Pavement Association
State Aid – Julie Skallman/Ron Bumann
MnDOT Pavement Engineer – Curt Turgeon
Contract Administration – Joel Williams

FROM: Joe Thomas, Assistant Bituminous Engineer
Office of Materials

A handwritten signature in cursive script that reads "Joe Thomas".

PHONE: 651-779-5619

**SUBJECT: Statewide Uniformity of Asphalt Material Submittal and District Lab Policy
(2006 Update – Final)**

The purpose of this memorandum is to provide the Contractor with guidance in regard to material submittal and MnDOT policy between the various District Materials

Laboratories. The Uniformity Group meets on a yearly basis to review interactions between Contractor and Agency Laboratories. An updated memo, based on the yearly meeting, will be issued on an as-needed basis. Any references to specific sections of the specification are based on the most current specification at the date this memo is updated.

Statewide uniformity and consistency between District Laboratories is essential for those Contractors who bid construction projects across district lines. This memorandum has been developed by a joint MnDOT/Contractor Asphalt Uniformity group and will be adhered to by all MnDOT District Labs. Likewise, to promote uniformity, the Contractor should adhere to these guidelines. This memo is not intended to replace good communication skills, common sense, and team effort between the Contractor and MnDOT personnel. Specific test procedures are described in the MnDOT Laboratory Manual.

Pre-Production Samples

Per the Materials Control Schedule, the Contractor must notify the District Materials Engineer 24 hours in advance of sampling aggregates for quality testing. The District has the option to monitor the sampling.

Sample ID Cards must be completed for **ALL** samples being submitted to a District Materials Laboratory. A MnDOT Sample ID card (PINK) must accompany each aggregate type. The ID card must be completely filled and shall include pit number and/or legal description for all aggregate sources. Tim Andersen, MnDOT Aggregate Engineer (651.779.5609), should be

contacted with any questions regarding pit number or pit legal description. Gradations must be included on the back of the ID card and each sample bag must have an ID card.

Percent crushed

See attached % crushed particles reference sheet.

Sample Size

Aggregate Quality Samples

Sample Size: 30 days prior to the start of asphalt production submit:

35 kg (75 lbs) +4 aggregate from each source for Mag sulfate and LAR testing.¹

Pit run material shall be processed to ¾ minus or smaller.

15 days prior to the start of asphalt production submit:

15kg (35 lbs) +4 and -4 aggregate from each pile for Quality and Spg testing.²

Samples shall be dried and split and submitted in small sample bags 16 kg to 18 kg (35-40 lbs), unless other arrangements are made with the District Lab Supervisor.

¹Communicate with the MnDOT laboratory for possible exclusion of this submittal.

²For any product that contains 5-14% retained or passing the #4, a 2 kg (5 lbs) is sufficient.

Flat and Elongated

Aggregates shall be evaluated **length to thickness**. The maximum length to thickness ratio is 5:1. See MnDOT Lab Manual section 1208 - Flat and Elongated Particles in Coarse Aggregate for test requirements.

Mixture Review

JMF request and approval procedures

Each proposed JMF submitted for review shall include the documentation and results specified in 2360.3C. JMF adjustments that are requested, approved and reflected in a new MDR will be in effect at the time it is received by the agency's fax. The agency's fax machine should automatically record the time received. Requests for JMF's should include the number of the next sample number to follow the time of JMF request submittal. Samples which are taken on the same day as the JMF request, but taken earlier than the submittal time shall be subject to the requirements of the MDR in effect before the JMF request.

If a JMF request is made outside of normal working hours, the following procedure shall be used:

1. Fax the JMF request to the District Lab. Signature of Plant Monitor is not required at this time.
2. When the agency personnel are back in the office, they will review and take proper action using the information that was available at the time

the request was made. If the information does not support approving the JMF request, then the old MDR will be in effect.

For Mixture Design Option #2

Different products from the same “source” can be utilized. For example a ¾” rock product that has been used in a previous mix can be further processed into a ½” chip and 3/8” chip, etc. Early sample submittal for qualities and specific gravities is encouraged. Aggregates qualities must be from the same year.

RAP should be considered as previously tested, since it was used in a previous mix design.

Aggregate Specific Gravity

The mixture design submittal shall include +4 and -4 specific gravities for the proportions in the mixture. If the mix design utilizes the optional add rock/add sand provision these specific gravities shall also be included. In addition, all supporting test documentation must be included with the submittal.

Aggregate Specific Gravity changes – submit a JMF and 35 lbs. of material (same as at design). The new aggregate specific gravity will be in effect from when the material was sampled.

RAP Specific Gravity

An alternate test method for determining the specific gravity of RAP material has been developed and approved for use. This method is known as, “Determination of RAP Aggregate Bulk Specific Gravity--MnDOT Alternate Method (1/6/2003)” and is described in the MnDOT Laboratory Manual as procedure 1815.

Mixture Sample

Sample size for Specification 2360 – “Combined 2360/2350 (Gyratory/Marshall Design) Specification For Construction Season 2004” mix designs are as follows:

Marshall: For bulk specific gravity and maximum specific gravity testing, submit three Marshall pucks and two full cylinder molds (about 35 lbs.) of uncompacted mix at optimum AC, seven days prior to mixture production. For TSR testing, submit nine Marshall pucks at the required 6.0 - 8.0% air voids.

For resubmittal of TSR sample, submit nine Marshall pucks at the required 6.0 - 8.0% air voids and one cylinder mold (about 18 lbs.) of uncompacted mix.

Gyratory: For bulk specific gravity and maximum specific gravity testing, submit two gyratory compacted pucks and three full cylinder molds (about 70-75 lbs.) of uncompacted mix at optimum AC, seven days prior to production. For TSR testing, submit six gyratory pucks at the required 6.5-7.5% air voids.

For resubmittal of TSR sample, submit six gyratory pucks at the required 6.5-

7.5% air voids and one cylinder mold (about 18 lbs.) of uncompacted mix.

SMA Gyratory:

The CorelokTM test procedure for determining bulk specific gravity shall be used for determining the design bulk specific gravity for all SMA mixtures.

Mix Maximum Specific Gravity

The MnDOT Laboratory Manual requires the use of wire baskets in the container when determining maximum specific gravity.

Sample Curing Times

Marshall: For mix design, cure the mixture for 45 minutes (± 15 minutes) at 290 \pm 10F prior to compacting the specimens for determining bulk specific gravity and prior to testing for maximum specific gravity.

For TSR, cure the mixture for 2 hours (± 15 minutes) at 290 \pm 10F prior to compacting the specimens.

Gyratory: For mix design, cure the mixture for 2 hours at 290 \pm 10F prior to compacting the specimens for determining bulk specific gravity and prior to testing for maximum specific gravity.

For TSR, cure the mixture for 2 hours (± 15 minutes) at 290 \pm 10F prior to compacting the specimens.

Design Voids

In addition to the mixture meeting all volumetric requirements, optimum point design voids, at time of Trial Mix submittal, must be within $\pm 0.5\%$ of the specified requirement.

Ignition Oven Correction Factor (Calibration Factor) and Burn Temperature

The ignition oven correction factor shall be determined by mixture calibration only. When the mixture contains 20% or less Class B carbonate, mixture calibration and mixture burn may be performed at 538°C. When the mixture contains more than 20% Class B carbonate, mixture calibration and asphalt content determination shall be performed at 482°C. The Mixture Design Report shall include the required ignition burn temperature. Incinerator oven correction factor should be handled at mixture design time.

When the Modified Mixture Design is utilized, it is recommended that one cylinder (10,000 grams) of mix at the optimum asphalt cement content be submitted with each modified mix design to the District laboratory. Mix should be submitted three days before field production starts. Incinerator oven correction factor should be handled at mixture design time.

A procedure for determining a new correction factor is on file in the Bituminous Unit.
(6/15/04)

NOTE: A correction factor (same mixture) for one oven may not be the same for another oven.

Mixture Production

Mix temperature

Mixing temperatures above 325° F are rare. Binder mixing temperatures are not shown on the Mixture Design Report (MDR). There must be communication between the contractor labs and MnDOT labs so that mixtures are compacted at the same temperatures. Ideally, the verification card (pink) would have the compaction temperature on it.

Sample Sizes

Sample sizes shall follow the amounts listed in the most recent Schedule of Materials Control. At this time, verification testing sample size has not been finalized. Check with the District Lab Supervisor for verification sample size.

Rollover of Mix Design Report

After winter suspension, the Mix Design Report from the previous year may be rolled over to the current year provided the aggregate (and rap) stockpiles are consistent with the material from the previous year (gradation, source, specific gravity). Accelerated testing is required at the start of production after winter suspension.

Truck Box Sampling (QC/QA)

Truck box sampling is allowed when approved by the Engineer. When truck box sampling has been approved, the daily verification sample must still be taken from behind the paver. The procedure for truck box sampling (1/24/05) is on file in the Bituminous Unit.

Truck Box Sampling – SMA

Truck box sampling is required for all SMA samples. Verification samples are not taken from behind the paver.

Tensile Strength Ratio (Lottman) Sampling

This sample must be taken per the 2360 specification. It is recommended that this sample be taken from either the truck box or the windrow. If verification samples are taken with the TSR samples, the verification samples are required to be taken from behind the paver.

SMA Density Cores

The Corelok™ test procedure for determining bulk specific gravity of density cores is required for all SMA mixtures. The use of a Corelok™ also applies to production sample bulk specific gravities.

Other Reminders

Submit materials to the District Materials Laboratory where the project is located, unless prior approval is obtained.

Sample Cards must be completed for any samples being submitted to a District Laboratory; PINK Cards are for asphalt mixture and aggregates, BLUE Cards are for asphalt binder.

During production, specify the gradation type, whether wear or non-wear (i.e., LVNW3 or SPWEB) on the test summary sheet and sample cards.

Write “verification” on the test summary sheet for the appropriate sample. Write the “Mix Design Report” number on the ID card that is active at the time the sample is taken.

Note: All MnDOT District Laboratories and the Maplewood Trial Mix Lab have agreed to the guidelines and policies indicated above. If, under special circumstances, the contractor and the District personnel agree to other arrangements, it is to be understood that those are for that District only and should not be assumed to be valid in other areas.

This memo is subordinate to the Schedule of Materials Control, the contract specifications, and other contract documents.

% Crushed Particles – See Mn/DOT Procedure 1214 (Lab Manual)

The intended purpose of crushing aggregates is to change the particle surface *texture* from smooth to rough and the particle *shape* from round to angular (cubical).

Crushed Particle -

Defined as a particle of aggregate having at least one fractured face or two fractured faces, as required by the specifications.

Fractured Face –

- A fractured face is defined as being a broken surface, caused either by mechanical means or by nature
- Natural fractures, to be accepted, must be similar to fractures produced by a crusher.
- The fractured face should have sharp or slightly blunted edges.
- The surface of the fractured face should be rough (not smooth nor polished) in texture.

Characteristics to look for:

Crushed Particles -

- Sharp Edges, Rough Surfaces
- Sharp Edges, Smooth Surfaces
- Slightly Blunted Edges, Rough Surfaces

Non Crushed Particles -

- Rounded Particles, Smooth Surfaces
- Rounded Edges, Smooth Surfaces