A d d e n d u m

Iowa Department of Transportation
Office of Contracts

Date of Letting: June 21, 2011
Date of Addendum: May 24, 2011

B.O.	Proposal ID	Proposal Work Type	County	Project Number	Addendum
159	50-0144-048	HMA Pavement / HMA Resurfacing	Jasper	STPN-014-4(48)--2J-50	21jun159.a01

Notice: Only the bid proposal holders receive this addendum and responsibility for notifying any potential subcontractors or suppliers remains with the proposal holder.

Make the following change to the Proposal:

Add the attached DS-09059, Developmental Specifications for Recycled Asphalt Shingles, to the Proposal.

Iowa Department of Transportation

DEVELOPMENTAL SPECIFICATIONS
FOR
RECYCLED ASPHALT SHINGLES

Effective Date
December 21, 2010

THE STANDARD SPECIFICATIONS, SERIES 2009, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE DEVELOPMENTAL SPECIFICATIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

Add the following to Article 2303.02, Materials:

F. Recycled Asphalt Shingles (RAS)

1. Pre-consumer or post-consumer shingles that have been processed, sized, and ready for incorporation into an asphalt mixture constitute RAS material. Other than explicitly stated in this subsection and Appendix A, use RAS according to the same requirements as prescribed for RAP material. Equipment used to incorporate RAS material shall comply with requirements of Article 2001.22, K, 1, g.

2. ~~Use between 2% and~~ Up to 5% RAS by weight of total aggregate may be used in an asphalt mixture. Consider the percentage of RAS used part of the maximum allowable RAP percentage.

3. RAS shall ~~come~~ be certified from an approved supplier designated in Appendix D. Material processed prior to source approval by the Department will not be certified.

Add the following to Article 2303.04, Method of Measurement:

I. Recycled Asphalt Shingles (RAS)
Two-thirds (67%) of the asphalt binder from RAS which is incorporated into the mixture will be included in the quantity of asphalt binder used.

Replace item 2 of Article 2303.05, B, Asphalt Binder:

2. Payment for asphalt binder will be for new asphalt binder, the asphalt binder in the RAP which is incorporated in the mixture, and two-thirds (67%) of the asphalt binder from RAS which is incorporated into the mixture. The quantity of asphalt binder in RAP, which is incorporated into the mix, will be calculated in tons (megagrams) of asphalt binder in the RAP. This will be based on the actual asphalt binder content determined for the mix design from the results of the Engineer's extraction test.

Appendix A – Instructions for RAS in ~~HMA~~ Asphalt Mixtures

GENERAL
This Appendix describes requirements for processing, storing, documenting, and sampling & testing of RAS intended for use in asphalt mixtures.

All notifications and documentation shall be submitted to the District Materials Engineer (DME) based on the District responsible for the location of the initial RAS stockpile.

PROCESSING
End users of RAS which also receive raw, unprocessed shingles and process the material for incorporation into an asphalt mixture, shall be considered a shingle Supplier and must adhere to Appendix C.

STORAGE
Stockpiles shall be placed on a base with adequate drainage sufficient to prevent contamination.

Separately stockpile pre-consumer RAS from post-consumer (tear-off) RAS. RAS may be pre-blended with RAP under the direction of the Engineer. Notify the Engineer and ~~District Materials Engineer~~ DME 48 hours prior to blending RAS materials with other materials or adding to a RAS stockpile. Equipment must be calibrated to ensure proper proportioning of blended piles. The Engineer may require verification testing for asphalt content, gradation, aggregate specific gravity, aggregate absorption, and fine aggregate angularity before the pile may be used.

All RAS stockpiles shall be identified by maps of stockpile areas and signs placed in or near each stockpile.

STOCKPILE DOCUMENTATION
The following documentation is required for owners of stockpiled RAS:

- Form 82009ras (see Appendix B) is completed by the stockpile owner and a copy is forwarded to the ~~District Materials Engineer~~ DME within 10 calendar days of completing the stockpile.
- Any special handling, treatment or conditions of the RAS should be described on this form.
- A record of addition and consumption of the RAS stockpile should be documented on this form.
- Maps shall provide details that depict the stockpile site, including adjacent stockpiles of RAP or aggregates, permanent plant equipment, and landmarks.
- Maps and signs shall identify the stockpile by RAP Identification Number.

The ~~District Materials Engineer~~ DME will review forms for accuracy. Portions of the form including assigning the stockpile identification number, average values for extracted aggregate gradation, ~~aggregate bulk specific gravity, aggregate absorption~~ and asphalt binder content will be completed by the ~~District Materials Engineer~~ DME.

Notify the ~~District Materials Engineer~~ DME at least 48 hours before relocating or reprocessing a RAS stockpile for future use (not intended for a specific project). The notification shall include the estimated quantity of RAS being relocated or reprocessed and the new location of the stockpile. Relocation of RAS shall be reported on the appropriate Form (820009ras) and submitted to the ~~District Materials Engineer~~ DME within 10 calendar days of completing the relocation. Reprocessing a RAS stockpile may require additional sampling, testing, and a new Form (820009ras) with reassignment of a RAS Identification Number.

Before January 1st of each year, the Contractor shall update Form 820009ras on the status of each RAS stockpile. Report the estimated quantity of RAS removed for the construction season completed and the available RAS in each stockpile for future use.

SAMPLING AND TESTING
DOT personnel may only sample and test RAS material from a pile that has been certified by an approved supplier.

Mix Design

When RAS is to be used on an existing contract, the DOT will perform mix design testing on samples from the certified stockpile dedicated to the project at the plant. Samples may also be collected at an in-state source. For out-of-state sources, the DME may approve mix design sampling and testing to be coordinated by the Contractor and Supplier at a qualified lab for preliminary information. Mix designs may then be given conditional approval pending DOT results. When the Contractor retains possession of the RAS, the DOT will sample and test. DOT results shall be available prior to start-up. Adjustments to the mix design may be required.

When mix design development needs to be expedited for an active DOT contract and the Supplier has not had sufficient time to certify the pile's quality, extraction samples may be taken by the District directly at the Supplier's site provided the material is certified free of asbestos containing materials (ACM). Provide a certification letter to the DME using guidelines in Appendix I. The Central lab will run extraction and material quality (gradation and deleterious content) testing on the sample. In the event of a failing quality test, the District may sample and test (gradation and deleterious) again after the Supplier has certified the material quality.

A certified Level I Aggregate Technician shall obtain the samples. RAS shall be sampled using methods similar to those for fine aggregate. Samples for mix design testing shall be obtained from at least 3 locations. A sampling plan shall be developed by the Contractor and approved by the ~~District Materials Engineer~~ DME prior to sampling.

Obtain sufficient material for contractor mix design testing and owner agency extraction testing as recommended in Materials I.M. 510. Samples shall be witnessed and secured. A representative 30 pound (15 kg) sample split from the total sample shall be delivered to the District Materials Laboratory for extraction testing. Results of the extraction test will be provided to the Contractor within 4 weeks of sample delivery.

Include extracted asphalt content~~, and~~ dry RAS gradation~~, aggregate specific gravity, fine aggregate angularity and absorption of the RAS material~~ in testing.

In lieu of a sieve analysis, the following gradation may be assumed for the RAS aggregate:

Shingle Aggregate Gradation	
Sieve Size	Percent Passing by Weight
3/8 in. (9.5 mm)	100
No. 4 (4.75 mm)	95
No. 8 (2.36 mm)	85
No. 16 (1.18 mm)	70
No. 30 (600 µm)	50
No. 50 (300 µm)	45
No. 100 (150 µm)	35
No. 200 (75 µm)	25

Appendix B –RAS Stockpile Report (Form 820009ras)

820009ras (December 2010)

RAS Stockpile Report	**RAS Stockpile ID #**
Stockpile Owner:	

SOURCE OF RAS

☐ **Post Consumer Scrap (Tear-offs)** ☐ **Post Manufactured Scrap**

LOCATION OF RAS STOCKPILE:

County	Section	Township	Range
Description of stockpile base:			
Processing remarks:			

STOCKPILE INVENTORY LOG

RAS Addition			RAS Consumption		
Date	Quantity	Supplier	Date	Quantity	Disposition (Project No. and use)
					Total initial stockpile quantity

Average EXTRACTION TEST RESULTS

Dry RAS Gradation	Lab Report nos.
3/4 1/2	Moisture % =
3/8 No. 4	Pb =
No. 8 No. 16	~~Gsb =~~
No. 30 No. 50	~~Abs% =~~
No. 100 No. 200	~~FAA =~~

Shaded boxes to be completed by the District Materials Engineer

Stockpile Owner Representative		Date
District Materials Representative		Date

Appendix C –Recycled Asphalt Shingle Suppliers

DEFINITIONS

Deleterious Material:	Paper, plastics, wood, metals, glass, rubber, soil, brick, tars, and any other material not part of the asphalt shingle.
End User:	One who incorporates processed recycled asphalt shingles into an asphalt mixture.
RAS:	Pre-consumer or post-consumer shingles that have been processed, sized, and ready for incorporation into an asphalt mixture.
Source:	A Supplier's operational site
Supplier:	One who collects, processes, or distributes pre-consumer or post-consumer shingles for incorporation into an asphalt mixture.

SCOPE

This ~~IM~~ appendix describes requirements for the collection, sorting, sizing, processing, and stockpile management of raw and recycled asphalt shingles (RAS). Secure DOT approval for each operational site (source) before collecting, processing, and furnishing RAS to the end user. Approved suppliers and sources are listed in Appendix D.

APPLICATION FOR APPROVAL

~~Submit applications for approval in writing, to the DOT Office of Materials in Ames~~. Suppliers seeking source approvals may submit a written application and quality control plan to the DME in each district of operation. A sample application is provided in Appendix E. ~~Suppliers within the state of Iowa who are not the End User of the RAS material shall apply for a permit with the Iowa DNR Land Quality Bureau for each source. Submit proof of securing a sanitary disposal project permit or documentation from the IDNR that a permit is not needed.~~ Contact the Iowa DNR Land Quality Bureau to determine if a sanitary disposal project permit is needed. End users may not collect or process raw shingle material at portable facilities. In addition to the requirements stated in this ~~IM~~ appendix, all suppliers (both in-state and out-of-state) shall comply with local, state, and federal environmental regulations~~., and follow IDNR asbestos testing protocols. Once the Office of Materials receives notification that the required permits have been secured, t~~The appropriate District Materials Office may recommend the approval when assured that the supplier has met all DOT qualifications. The Office of Materials will issue a letter of approval. This letter shall serve as a supplier's approval until Appendix D can be updated.

~~Suppliers seeking source approvals may submit a written application to the District Materials Engineer (DME) in each district of operation. A sample application is provided in Appendix E.~~

CERTIFICATION REQUIREMENTS

Certified RAS shall meet the following requirements:

A. Pre-processing
   1. Remove all visible materials not part of the shingle, including but not limited to ~~extra~~ wood, paper, metals, rubber, and plastics prior to processing. Unroll or remove shingles found in rolls prior to processing.

   2. ~~Follow IDNR protocols for identifying, removing, and reporting~~ Identify and reject loads with Asbestos Containing Materials (ACM).

B. Processing Operation
   Process the raw shingles by ambient grinding or granulating methods such that the following gradation is met:

Sieve Size	Minimum % Passing (by weight)
1/2 inch (12.5 mm)	100
3/8 inch (9.5 mm)	98
#4 (4.75 mm)	90

Separately process pre-consumer and post-consumer raw material.

Ensure the RAS material does not contain more than 1.5% deleterious content by weight. Notify the Engineer 48 hours prior to processing. Collect samples for quality control testing to be performed by a qualified lab.

C. Storage
Separately construct RAS stockpiles based on similarities in source (pre-consumer or post-consumer) and place them on a base with adequate drainage to prevent contamination. Assign each stockpile a unique identification number. Document the size of each stockpile by weight. Notify the Engineer 48 hours prior to adding to or moving an existing stockpile. Properly remove discarded non-shingle material from the site.

D. Stockpile Uniformity
Take proper measures to ensure a uniform stockpile.

Approval to deliver certified material may be withdrawn for inadequate compliance with these requirements.

QUALITY CONTROL PROGRAM

The Supplier has the overall responsibility of certifying that material being placed in a certified stockpile is produced under and conforms to a Quality Control (QC) Program. The DOT, through its monitoring activities (sampling/testing, visual observation, etc.), will verify the continued compliance to the program. Any certified stockpile must meet the designated quality before shipment. Intentional shipment of untested or out of specification material will constitute grounds for immediate rejection of material and placement of the source and/or the Supplier on conditional status. Develop a QC program document that contains the following aspects:

1. Knowledge of Current Specifications
Maintain up-to-date knowledge of the specifications that apply to RAS products. Maintain copies of the current Standard Specifications, all applicable Supplemental Specifications and all applicable Material I.M.s at the testing lab. Be aware of any Special Provisions, which change current RAS specifications. The supplier shall be responsible for providing these up-to-date publications to their QC representative.

2. RAS Production Log
Maintain a production log when operating under the QC program. This production log shall contain detailed information on test samples that include date, time, stockpile identification number, asbestos testing results, QC representative information, quantity, gradation results, deleterious content results, moisture content, pass/fail results, corrective actions, etc. Keep the log at a designated location and readily available to the DOT representative for review.

3. Visual Inspection
Visually inspect the shingle collection, sorting, sizing, and processing operations on a frequent basis. Visual inspection can be defined as observing the processing area, as well as the condition of the RAS in the flow stream or stockpiles. Observe the overall operation to detect ACMs as well as oversized and deleterious materials that are detrimental to the quality of the product. Visual inspection does not replace testing, but enhances the quality control program.

4. Production

A. Testing and Reporting
Perform and report testing for deleterious content, gradation, and moisture content of the RAS material. The Engineer may obtain a split sample to verify QC results.

Testing for RAS Certification
The supplier shall be responsible for performing and reporting the following tests for each sample. The testing laboratory shall be approved by the Engineer.

1. Deleterious Content

   Determine the percentage of deleterious material retained on the #4 (4.75 mm) sieve. Pick, remove, and weigh the waste material from ~~by weight of~~ a ~~200~~ 500-700 g sample. Calculate deleterious content as follows:

$$P = \frac{C}{W} \times 100\%$$

   Where P = percentage of deleterious material
   C = Mass of deleterious material, g
   W = Mass of test sample, g

   No sample shall exceed 1.5% deleterious content.

2. RAS Particle Distribution

   Determine the RAS gradation in accordance with Materials I.M. 302. Dry the sample in an oven at 90°F for 70 minutes. Shake a 500 to 700 g sample over the 1/2 inch, 3/8 inch, and #4 (12.5 mm, 9.5 mm, 4.75 mm) sieves. At least 90% of the samples shall meet gradation requirements described above for the material to be certified (i.e. if 2 out of 3 samples meet requirements, the material would only be 67% compliant and thus would be rejected).

3. Determine the percentage of moisture by weight within 48 hours of delivery in accordance with Appendix H. Results shall be logged and provided to the end user.

4. Certify the product does not contain ACMs.

Testing for Mix Design
Additional information on the RAS material is required before it may be used in an asphalt mixture. When the end user has an existing contract for a DOT project, the District may sample from a pile dedicated to the project at an in-state supplier's location~~. The Supplier may submit samples for additional testing on behalf of the End User to be performed by the Central Materials Laboratory~~ in accordance with Appendix A.

B. Sampling

A minimum of 3 random samples or 1 per 1000 tons (MG), whichever is greater, of each stockpile shall be tested during its construction. Collect a minimum of 20 pounds (9 kg) of RAS per sample. Obtain samples for moisture content within 48 hours of delivery from a cross section of the ~~pile~~ material to be delivered. A certified Level I Aggregate Technician shall obtain the samples.

Test results shall be known before delivery to the end user. All test results will be available at a designated location within 24 hours of sampling when the material is being placed into a certified stockpile.

5. Delivery
Ensure delivery of RAS material from proper stockpiles by verifying the stockpile identification number and associated test results match.

6. Quality Control Structure
In order to ensure quality as a priority, the source QC personnel shall have a line of communication

directly to their management, as well as their production operation.

MONITORING ACTIVITIES

Monitoring activities of Suppliers, including inspection of test reports and shipping records will be conducted by the appropriate District Materials Engineer. The Engineer may obtain samples from the source or End User's stockpile to verify compliance to quality standards. Noncompliant verification results may require re-sampling and re-testing.

All District Materials Office monitoring activities shall be reported to the Central Materials Office.

DOCUMENTATION

Documentation shall be required to establish a chain of possession of raw shingle and processed RAS materials. Make all forms available to the DOT and Iowa DNR upon request.

A. Transactions of raw, unprocessed shingles
   Keep on file a signed Form 820010a (See Appendix F) for each accepted load of unprocessed raw shingles. Loads of unknown origin may not be processed and added to certified piles for use on DOT projects.

B. Transactions of processed RAS
   Keep on file a signed Form 820010b (See Appendix G) for each load of RAS delivered to the end user to certify compliance with DOT specifications. Suppliers who are also end users should complete this form. Copies of this form shall be furnished to the Engineer and end user at the time of delivery.

C. RAS Stockpile Inventory
   The owner of the stockpile shall document accumulation, consumption, and current testing results for each RAS stockpile in Form 820009ras (See Appendix B). ~~A copy of this form shall be sent to the Engineer within 48 hours each time stockpile testing is completed.~~ Before January 1st of each year, the owner shall update report form 82009ras on the status of each RAS stockpile. In addition, the owner shall provide annually, an electronic tabulated spreadsheet containing load origin information compiled from Form 820010a.

ACCEPTANCE

Properly identified and certified materials may be incorporated into a project. Final acceptance will be based on the certifications and the results of tests on samples secured in accordance with Materials I.M. 204 or in accordance with special requirements when specified. Verification samples with noncompliant test results may require additional tests. Continued approval of a source will be based on the following:

A. Ability to consistently supply material meeting specifications
B. Maintenance of required records
C. Proper documentation of shipments
D. Proper handling and storage of the material

Appendix D – Approved List of RAS Suppliers and Sources

Dem-Con	Shakopee, MN
*Eastern Iowa Roofing	Marion, IA
Metro Waste Authority	Des Moines, IA
R2R Recycling, LLC	Cedar Rapids, IA Newton, IA West Des Moines, IA Omaha, NE
Waste Commission of Scott County	Buffalo, IA

*~~The following~~ Supplier~~s has have~~ been given conditional approval pending completion of the application process~~:~~.

Appendix E – RAS SOURCE APPROVAL APPLICATION

Supplier Name _____
Phone _____
Address _____
(IF MORE THAN ONE SOURCE PLEASE ATTACH LIST AND AREA COVERED.)

~~1. Have the appropriate permits been obtained from the Iowa DNR Land Quality Bureau? (Yes or No) If No, explain.~~
~~2. Please submit proof of securing a sanitary disposal project permit or documentation from the IDNR that a permit is not needed.~~

~~3~~1. What testing laboratory capable of determining gradation, deleterious content, and moisture content will be used?

~~4~~2. Are copies of current applicable specifications, testing Material I.M.s and source information data available at the respective sources or testing facilities? (Yes or No) If No, explain.

~~5~~3. Is a production log maintained on a daily basis and available for inspection? (Yes or No) If No, explain.

~~6~~4. Who (position) is responsible for production notification to the District Materials Engineer?

~~7~~5. Which company representative (position) is normally responsible for daily overall Quality Control processes at the source?

~~8~~6. Describe the certified stockpile identification system in place at each source (Map, signing, etc.)

~~9~~7. Please attach a detailed summary of your Quality Control Program and ~~Iowa DNR~~ plans for identifying and removing asbestos ~~testing protocol implementation plans~~ containing materials.

~~10~~8. Please attach a flow chart of your current Quality Control structure (Include names, addresses, phone numbers of appropriate management personnel, chain of command, etc., for problem resolution).

Indicate the District(s) for which you are seeking approval.

1 2 3 4 5 6

AUTHORIZED SIGNATURE _____ DATE _____

DME RECOMMENDATIONS _____

_____

_____

DME SIGNATURE _____ DATE _____

APPROVAL (YES or NO) REMARKS _____

_____

MATLS. ENGINEER SIGNATURE _____ DATE _____

Appendix F – Unprocessed Asphalt Shingles Delivery Certification Form (Form 820010a)

DELIVERING ENTITY	
Company Name	
Address	
Phone	
Contact Name	
Address of Shingle Source	
License Plate Number	

ACCEPTING ENTITY	
Company Name	
Address	
Phone	
Contact Name	
~~*IDNR Permit #~~	

~~*If required~~

□ **Post-consumer** □ **Pre-consumer**

(Check One)

We undersigned certify the following:

1. _____ tons of whole, unprocessed asphalt shingles have been delivered for processing. *(Report number of tons)*

2. The delivered material is from a NESHAP exempt structure or documentation stating the material does not contain asbestos has been submitted. The material has not been in contact with hazardous wastes and consists of asphalt shingles and normal roofing debris only.

3. Delivered asphalt shingles have been tested or inspected ~~in accordance with Iowa DNR protocol~~ for asbestos-containing materials (ACM) by_____, (provide trainee name and certification number) who has been trained to identify ~~asbestos-containing materials (~~ACM~~)~~ by _____ (provide training program name). Suspected ACM have been rejected.

□ **Accept** □ **Reject**

Comments:

_____ _____

Delivering Entity (*signature)* Date

_____ _____

Accepting Entity (*signature)* Date

Appendix G – Processed Recycled Asphalt Shingles Certification Form (Form 820010b)

RECYCLED ASPHALT SHINGLE SUPPLIER (1)	
Company Name	
Address	
Phone	
Contact Name	
~~IDNR Permit # (if required)~~	
RAS Stockpile ID	

(1) Required for non-End Users

END USER	
Company Name	
Address	
Phone	
Contact Name	
RAS Stockpile ID(2)	

(2) Required if Supplier is also the End User

□ **Pre-consumer** □ **Post-consumer**

(Check One)

We undersigned certify the following:

1. _____ tons of asphalt shingles have been processed, sized (100% by weight passing the 1/2 inch sieve, 98% by weight passing the 3/8 inch sieve, and 90% by weight passing the #4 sieve), and delivered. *(Report number of tons)*

2. All visible materials not part of the shingle, including but not limited to ~~extra~~ wood, paper, metals, glass, rubber, soil, brick, tars, and plastics were removed prior to processing.

3. The material does not contain more than 1.5% deleterious material by weight.
   Note: Deleterious material consists of paper, plastics, wood, metal, glass, rubber, soil, brick, tars, and any other material not part of the asphalt shingles.

4. The moisture content (%) of the load is _____.

5. The material meets all requirements of ~~Materials IM 506~~ DS-09059.

_____ _____

Asphalt Shingle Supplier (*authorized signature)* Date

_____ _____

End User (*authorized signature)* Date

Appendix H– DETERMINING THE MOISTURE CONTENT OF AGGREGATE AND RECYCLED MATERIALS FOR USE IN ~~HMA~~ ASPHALT MIXTURES

This test method is used to determine the percent of moisture in stockpiles being used in the production of ~~HMA~~ asphalt mixtures. The moisture contents determined are used to correct the weight of material to dry weight. Moisture correction is required for materials being fed into mixing plants that measure the weight prior to drying.

Procedure for recycled materials containing asphalt:

Apparatus: Oven capable of maintaining a temperature of 275 ± 5°F.
Balance capable of weighing a minimum of 1000 g and accurate to 0.1 g.
Sample pans
Spatula or spoon for stirring sample

Obtain a representative sample of the recycled material as per Materials I.M. 301. Immediately reduce the sample to the test sample size, minimum of 500 g, by splitting or quartering as per Materials I.M. 336. Record the empty mass of the sample pan and the spatula or spoon. Tare the sample pan on the scale. Place the test sample in the pan and record the original mass of the sample to the nearest 0.1 g. Place the sample in the oven maintained at 275 ± 5°F. Stir the sample occasionally. Dry the sample to a constant mass defined as no change in mass exceeding 0.1% of the sample mass in 15 minutes of oven heating. Weigh the sample, pan and spatula or spoon together to avoid any loss of material.

> Note: Samples must be split and weighed as quickly as possible to avoid loss of moisture. If the splitting and test sample mass determination cannot be accomplished quickly, the sample should be sealed in a plastic bag until the test sample preparation can be done.

Once the sample has achieved a constant mass, cool the sample to room temperature. Weigh the sample, pan and spatula or spoon together to the nearest 0.1 g. Subtract the mass of the pan and the spatula or spoon from the total mass to obtain the final dry mass of the sample. Calculate the percent moisture by determining the difference between the original mass of the test sample and the final dry mass of the sample and dividing the result by the final dry mass. Multiply the result by 100 to convert to a percentage. Report the moisture content to the nearest 0.1%.

Procedure for aggregates:

Apparatus: Hot Plate (Optional)

Obtain a representative sample of the aggregate as per Materials I.M. 301. Immediately reduce the sample to the test sample size, minimum of 500 g, by splitting or quartering as per Materials I.M. 336. Record the empty mass of the sample pan. Tare the sample pan on the scale. Place the test sample in the pan and record the original mass of the sample to the nearest 0.1 g. Place the sample in the oven maintained at 275 ± 5°F or on a hot plate. Stir the sample occasionally. Dry the sample to a constant mass defined as no change in mass exceeding 0.1% of the sample mass in 15 minutes of heating.

> Note: Samples must be split and weighed as quickly as possible to avoid loss of moisture. If the splitting and test sample mass determination cannot be accomplished quickly, the sample should be sealed in a plastic bag until the test sample preparation can be done.

Once the sample has achieved a constant mass, cool the sample to room temperature. Weigh the sample to the nearest 0.1 g. Calculate the percent moisture by determining the difference between the original mass of the test sample and the final dry mass of the sample and dividing the result by the final dry mass. Multiply the result by 100 to convert to a percentage. Report the moisture content to the nearest 0.1%.

$$\text{Percent Moisture} = \frac{Original\ Wet\ Mass - Final\ Dry\ Mass}{Final\ Dry\ Mass} \times 100$$

Appendix I– CERTIFICATION LETTER FOR ASBESTOS CONTAINING MATERIALS

General
Prior to sampling by the Department, submit a letter of certification for ACM to the DME. The letter shall be signed by an authorized representative from the RAS supplier.

(SAMPLE ACM CERTIFICATION LETTER)

DATE: _____

TO: _____(District Materials Engineer)

FROM: _____(Supplier's authorized representative)

SUBJECT: Certification of ACM_____

The recycled asphalt shingles in pile number _____ located at _____

(source) have been certified asbestos free. The ACM testing protocol outlined in the _____

(Supplier name) quality control plan was followed and records are available upon request.

Signed,

_____(Authorized Representative's Name)

_____(Authorized Representative's Signature)