TRANSPORTATION BULLETIN

Illinois Department of Transportation

ADDENDUM NO. 1

Dated: March 28, 2007

For: Transportation Bulletin
Letting Date: April 27, 2007
Volume 10 No. 12 Dated: March 23, 2007

Item No. 3A – Reconstruct Section of Runway 6/24 & Taxiways A & C
Decatur Airport
Decatur, Illinois
Macon County
IL Project No.: DEC-3667
AIP Project No.: 3-17-0033-30
Contract No.: DE067

REASON FOR ADDENDUM:

Policy Memorandum Number 2003-1 has been revised effective January 15, 2007, modifying the Contractor's responsibilities and requirements regarding the development of the Job Mix Formula for bituminous base course and bituminous surface course. Additionally, this addendum includes modifications to Recurring Special Provisions applicable to this project in order to incorporate the new Contractor responsibilities and requirements.

TO ALL PLAN HOLDERS:

2.) Amend the Supplemental Specifications and Recurring Special Provisions, Adopted July 1, 2004, to include the following:

Replace Check Sheet No. 21 with the following:

State of Illinois
Department of Transportation
Division of Aeronautics

SPECIAL PROVISION FOR

ITEM AR401003 BITUMINOUS SURFACE COURSE – METHOD I, SUPERPAVE
(Under 2,500 tons/pay item/location)

Effective: July 1, 2004

This Special Provision Modifies Item 401 Bituminous Surface Course of the Standard Specifications.

401-1.1

Add to the second paragraph:

"The Contractor shall be responsible for the Quality Control in the production and construction of the HMA surface course."

"The HMA surface course shall be laid in a maximum of two (2) inch lifts. Thicker lifts not to exceed three (3) inches may be authorized by the Resident Engineer provided a continuous paving operation is maintained."

401-2.1 AGGREGATE

Delete the first paragraph and replace with the following:

"Aggregates shall consist of crushed stone or crushed gravel, blended with crushed or natural sand(s) and/or mineral filler.

Crushed Stone: Crushed stone shall be defined as the angular fragments resulting from crushing, by mechanical means, the following types of rocks quarried from undisturbed consolidated deposits: granite and similar phanerocrystalline igneous rocks; limestone; dolomite; or massive metamorphic quartzite, or similar rocks.

Crushed Gravel: Crushed gravel shall be the product resulting from crushing by mechanical means, and shall consist entirely of particles obtained by crushing gravel, all of which before crushing will be retained on a screen with openings equal to or larger than the maximum nominal size of the resulting crushed material. If approved by the Engineer, final product gradations may be obtained by screening or blending various sizes of crushed gravel material.

Mineral Filler: Mineral filler shall consist of dry limestone dust, or other material approved by the Engineer and shall meet the requirements of ASTM D242.

The portion of the materials retained on the No. 8 sieve shall be known as coarse aggregate, the portion passing the No. 8 sieve and retained on the No. 200 sieve as fine aggregate, and the portion passing the No. 200 sieve as mineral filler."

401-2.1(a) COARSE AGGREGATE

Delete the first paragraph and replace with the following:

"Coarse aggregate shall consist of sound, tough, durable particles conforming to the following quality requirements:

QUALITY TEST (IDOT B Quality)	PERCENT
$Na_2 SO_4$ Soundness, 5 Cycle ASTM C 88 Max. % Loss	15
Los Angeles Abrasion ASTM C 131 Max. % Loss	40

DELETERIOUS TEST	PERCENT
Materials (Max. % allowed)	
-- Shale %	2.0
-- Clay Lumps %	0.5
-- Soft & Unsound Frag. %	6.0
-- Other Deleterious %	2.0
Total Deleterious Allowed %	6.0

Delete the second and third paragraphs.

401-2.1(b) FINE AGGREGATE

Delete the first paragraph and replace with the following:

"Fine aggregate shall be defined as follows:

Sand: Sand shall be the fine granular material resulting from the natural disintegration of rock. Sand produced from deposits simultaneously with and by the same operations as gravel coarse aggregate may contain crushed particles in the quantity resulting normally from the crushing and screening of oversize particles.

Stone Sand: Stone sand shall be produced by washing or processing by air separation the fine material resulting from crushing rock quarried from undisturbed consolidated deposits.

Slag Sand: Slag sand shall be the graded product resulting from the screening of air cooled blast furnace slag. Air cooled blast furnace slag shall be the nonmetallic product, consisting essentially of silicates and alumino-silicates of lime and other bases, which is developed in a molten condition simultaneously with iron in a blast furnace.

Steel Slag Sand: Steel slag sand shall be the graded product resulting from the screening of crushed steel slag. Crushed steel slag shall be the nonmetallic product which is developed in a molten condition simultaneously with steel in an open hearth, basic oxygen or electric furnace."

The fine aggregate shall also conform to the following quality requirements:

QUALITY TEST (IDOT B Quality)	PERCENT
$Na_2 SO_4$ Soundness, 5 Cycle ASTM C 88 Max. % Loss	15
Minus No. 200 Sieve Mat'l ASTM C 136 Max. % Loss [1]	6.0 [2]

[1] Fine aggregate shall not contain more than 3 percent clay (2 micron or smaller) particles.
[2] Does not apply to Stone Sand.

DELETERIOUS TEST	PERCENT
Materials (Max. % allowed)	
-- Shale %	3.0
-- Clay Lumps %	3.0
-- Coal, Lignite & Shells %	3.0
-- Conglomerate %	3.0
-- Other Deleterious %	3.0
Total Deleterious Allowed %	5.0

401-2.1(c) SAMPLING AND TESTING

Delete this paragraph and replace with the following:

"All aggregates proposed in the manufacture of the mix will be sampled and tested by the Contractor. ASTM D 75 shall be used in sampling coarse aggregate and fine aggregate, and ASTM C 183 shall be used in sampling mineral filler. The Contractor shall provide the Engineer with aggregate producer (quarry) and Contractor (plant) quality control gradations. No aggregate shall be used in the production of mixture without prior approval."

401-2.1(d) SOURCES OF AGGREGATES

Delete this paragraph and replace with the following:

"All aggregate sources that are approved by the Illinois Department of Transportation, Division of Highways, conforming to the description, gradation and quality specified herein, shall be permitted for use in the manufacture of the HMA surface course. The supplier of aggregates must participate and meet the requirements of the Illinois Department of Transportation Division of Highways source certification program. The Engineer reserves the right to inspect the source(s) and manufacturing of all aggregates. If satisfactory quality control and production procedures are not being implemented, the Engineer may remove approval of the source(s). Approval of the source(s) of aggregate(s) does not relieve the Contractor in any way of the responsibility for delivery to the job site aggregates that meet the requirements specified herein."

401-2.1(e) SAMPLES OF AGGREGATES

Delete this paragraph and replace with the following:

"Once the source(s) of the aggregates have been approved by the Engineer, the Contractor shall furnish to the Engineer the quarry quality control gradations and the gradations of stockpile samples obtained for the purpose of performing the mix design."

401-2.3 BITUMINOUS MATERIAL

Add the following to the first paragraph:

"Performance Graded asphalt PG 64-22 shall be used.

401-3.2 JOB MIX FORMULA (JMF)

Delete the first paragraph and insert the following:

"The Engineer is responsible for the job mix formula (JMF) and no HMA mixture for payment shall be produced until the approved JMF is submitted to the Contractor in writing by the Project Engineer. The approved JMF shall indicate the definite percentage on each sieve for each aggregate, the percent of bitumen, and the number of gyrations specified for the individual project. The Contractor shall provide all laboratory sampling and testing to the Engineer, pursuant to completion of the JMF. The exact tests and procedures are outlined in the Illinois Division of Aeronautics (IDOA) latest *Policy Memorandum 2003-1: "Requirements for Laboratory, Testing, Quality Control and Paving of Superpave Bituminous Concrete Mixtures for Airports."*

Delete the third paragraph and replace with the following:

"The HMA mixture shall be tested according to the Asphalt Institute's most current Superpave Series No. 2 (SP-2) manual entitled, "Superpave Mix Design" and shall meet the criteria set forth in Tables 2 and 4 herein."

TABLE 2 SUPERPAVE DESIGN CRITERIA

TRAFFIC MIX					
Design Parameter	Aircraft over 60,000 lbs.[1]		Aircraft under 60,000 lbs.		Automobile
	Runway or Taxiway	Parking Apron	Runway or Taxiway	Parking Apron	Entrance Roads and Parking Lots
N_{ini} [2]	5	7	5	5	5
N_{des}[3]	40	50	30	30	30
N_{max}	58	74	42	42	42
% Air Voids V_a	2-4	2-4	2-4	2-4	2-4
VFA (min %)	75-90	75-90	75-90	75-90	75-90

[1] Stone sand (IDOT Gradation FA20 or FA21) shall be required as part of the fine aggregate portion of the Job Mix Formula. The exact amount of stone sand will be determined by the Engineer based on preparation of the Mix Design.
[2] Where N= number of gyrations on an IDOT approved superpave gyratory compactor.
[3] The N_{des} value may be changed in order to obtain an acceptable mix design when approved by the Engineer.

Delete: Table 3. Minimum Percent Voids in Mineral Aggregate

Delete the second and third sentences of the ninth paragraph and replace with the following:

"Deviation from the approved JMF for bitumen content and gradation of aggregates shall not be greater than the tolerances permitted and shall be based on extraction, or calibrated ignition oven test for aggregate gradations and asphalt content. The applicable ASTM and IDOT tests are outlined in the current IDOA *Policy Memorandum 2003-1: "Requirements for Laboratory, Testing, Quality Control and Paving of Superpave Bituminous Concrete Mixtures for Airports."* These tests shall be performed by Contractor quality control personnel. Split mix samples shall be maintained by the Contractor for random testing by the Engineer."

Delete the last paragraph for this section.

401-3.4 TEST SECTION

Delete this section.

401-4.2 HMA MIXING PLANT

Insert the following as the first paragraph:

"The HMA hot-mix plant(s) shall conform to the following requirements, or the Engineer may accept the use of a hot-mix plant approved by the IDOT Division of Highways for the manufacture of Class I HMA mixtures in accordance with Section 1102 of the current *Standard Specifications for Road and Bridge Construction.* When recyclable asphalt pavement is used, the hot-mix plant shall also conform to the additional IDOT plant requirements for hot-mix recycling."

(a) Requirements for all plants:

(12) Testing laboratory

Delete the first sentence of this paragraph and insert the following:

"The Contractor or producer shall provide a testing laboratory, meeting the requirements of Illinois Division of Aeronautics' latest *Policy Memorandum 96-2: "Requirements for Laboratory, Testing, Quality Control and Paving of Bituminous Concrete Mixtures"* for Quality Control and acceptance testing during periods of mix production, sampling, and testing, and whenever materials subject to the provision of these specifications are being supplied or tested."

401-4.4 HMA PAVERS

Add the following after "activated screed" in the first sentence of the first paragraph:

"capable of vibrating at approximately 3000 VPM".

Add the following at the end of the first paragraph:

"All width extensions required to place material shall have the same placement features and equipment functions as provided on the main body of the paver. Augers shall be extended as additional sections of screed are bolted on or automatically adjustable screeds are extended. The augers need not be extended when the screed extensions on either side of the machine are one foot or less and the finished surface of the mat is uniform. The use of any machine obsolete in design or in poor mechanical condition will not be permitted."

Delete the second and third sentences of the third paragraph and replace with the following:

"An automatic grade control system shall be used to automatically maintain the screed elevation as specified herein."

401-4.7 PREPARATION OF MINERAL AGGREGATE

Add the following as the second sentence of the first paragraph:

"Immediately after heating, the surface course aggregate(s) shall be screened into at least three sizes. This requirement does not apply to drum mixer plants."

401-4.9 TRANSPORTING, SPREADING, AND FINISHING

Add the following paragraph after the fourth paragraph:

"The first lane of the first lift of the HMA surface course shall be started at the center of the pavement with a taut stringline (guide wire) set to grade at both sides of the paver. The automatic grade control system of the paver shall be used to control grade of both sides of the paver from these reference stringlines. The grade control for the adjacent lanes of pavement shall be maintained by using a matching shoe with the previous laid pavement and a stringline on the outer edge of the next lane.

A stringline and matching shoe shall be used to pave all remaining lanes of the first lift of surface course. If grade is established on the first lift, succeeding lifts shall be laid with a traveling ski on both sides of the paver for the center lane with matching shoe and traveling ski on adjacent lanes. If grade is not established on the first lift, the Resident Engineer shall require taut stringline references until satisfactory grade is established."

401-4.10 COMPACTION OF MIXTURE

Add the following to the end of the second paragraph:

"A self-propelled pneumatic-tire roller meeting the following requirements shall be required on the top lift of surface course mixture:

The roller shall be of the oscillating wheel type consisting of not less than 7 pneumatic-tired wheels revolving on 2 axles, and capable of being ballasted to the mass (weight) required. The front and rear wheels shall be staggered so that the tire sidewalls will have a minimum overlap of 1/2 inch. The roller shall provide for a smooth operation when starting, stopping or reversing direction. The tires shall withstand inflation pressures between 60 and 120 psi. The roller shall be equipped with an adequate scraping or cleaning device on each tire to prevent the accumulation of material on the tires. When used for the compaction of HMA mixtures, the roller shall be equipped with a water system which will keep all tires uniformly wet to prevent material pickup. The contractor shall provide means for determining the mass (weight) of the roller as distributed on each wheel. Ballast shall be included in determining the mass (weight)."

Delete the third paragraph and substitute the following:

"Sufficient rollers shall be used to handle the output of the plant. Rolling shall continue until all roller marks are eliminated producing a surface of uniform texture true to grade and cross section.

The Contractor shall provide, at all times, an approved Troxler (or equal) nuclear density gauge with a qualified operator to maintain quality control of the density as specified herein."

401-4.11 JOINTS

Add the following as the fourth paragraph for this section:

All longitudinal joints constructed are to be compacted in such a manner that they are "pinched" to provide adequate density at the joint. The method of "pinching" shall be as defined in Article 406.16 on compaction of HMA concrete in the most current issue of the I.D.O.T. Standard Specifications for Road and Bridge Construction. The contractor shall cut one core per 2,500 tons or one per project at a random location over the longitudinal construction joint. The core shall be delivered to the Resident Engineer for density testing. The density at the joint shall be a minimum of 90%.

401-4.13 ACCEPTANCE TESTING OF HMA MIXES FOR DENSITY.

Delete this entire Section and insert the following:

"401-4.13 ACCEPTANCE TESTING OF HMA MIXES FOR DENSITY.
After the completion of compaction, the pavement will be tested and accepted on the basis of percent air voids in the final compacted mat. The HMA surface course shall be compacted to a minimum density of 93 percent (7 percent air voids) of the Maximum Theoretical Specific Gravity (ASTM D 2041). If, during construction, the density test falls below 93 percent, additional approved rollers shall be required. Two random nuclear density tests shall be required. Two random nuclear density shall be taken for each 500 tons of mix placed. Each nuclear density test shall be the average of five (5) nuclear tests taken as a cross-section of the pavement. One random mix sample shall be taken from each 1,000 tons of mix laid for Marshall, Extraction, Maximum Specific Gravity and Air Void tests. The Resident Engineer shall have a nuclear gauge and qualified operator on the project when constructing this item."

401-6.1 PAYMENTS

Payment will be made under:

Item 401-6.10 Bituminous Surface Course - Per Ton
and/or
Item 401-6.20 Bituminous Surface Course, Leveling - Per Ton

Replace Check Sheet No. 22 with the following:

State of Illinois
Department of Transportation
Division of Aeronautics

SPECIAL PROVISION FOR

ITEM AR401004 BITUMINOUS SURFACE COURSE – METHOD II, SUPERPAVE
(Over 2,500 tons/pay item/location)

Effective: July 1, 2004

This Special Provision Modifies Item 401 Bituminous Surface Course of the Standard Specifications.

401-1.1

Add to the second paragraph:

"The Contractor shall be responsible for the Quality Control in the production and construction of the HMA surface course."

"The HMA surface course shall be laid in a maximum of two (2) inch lifts. Thicker lifts not to exceed three (3) inches may be authorized by the Resident Engineer provided a continuous paving operation is maintained."

401-2.1 AGGREGATE

Delete the first paragraph and replace with the following:

"Aggregates shall consist of crushed stone or crushed gravel, blended with crushed or natural sand(s) and/or mineral filler.

Crushed Stone: Crushed stone shall be defined as the angular fragments resulting from crushing, by mechanical means, the following types of rocks quarried from undisturbed consolidated deposits: granite and similar phanerocrystalline igneous rocks; limestone; dolomite; or massive metamorphic quartzite, or similar rocks.

Crushed Gravel: . Crushed gravel shall be the product resulting from crushing by mechanical means, and shall consist entirely of particles obtained by crushing gravel, all of which before crushing will be retained on a screen with openings equal to or larger than the maximum nominal size of the resulting crushed material. If approved by the Engineer, final product gradations may be obtained by screening or blending various sizes of crushed gravel material.

Mineral Filler: Mineral filler shall consist of dry limestone dust, or other material approved by the Engineer and shall meet the requirements of ASTM D242.

The portion of the materials retained on the No. 8 sieve shall be known as coarse aggregate, the portion passing the No. 8 sieve and retained on the No. 200 sieve as fine aggregate, and the portion passing the No. 200 sieve as mineral filler."

401-2.1(a) COARSE AGGREGATE

Delete the first paragraph and replace with the following:

"Coarse aggregate shall consist of sound, tough, durable particles conforming to the following quality requirements:

QUALITY TEST (IDOT B Quality)	PERCENT
$Na_2 SO_4$ Soundness, 5 Cycle ASTM C 88 Max. % Loss	15
Los Angeles Abrasion ASTM C 131 Max. % Loss	40

DELETERIOUS TEST	PERCENT
Materials (Max. % allowed)	
-- Shale %	2.0
-- Clay Lumps %	0.5
-- Soft & Unsound Frag. %	6.0
-- Other Deleterious %	2.0
Total Deleterious Allowed %	6.0

Delete the second and third paragraphs.

401-2.1(b) FINE AGGREGATE

Delete the first paragraph and replace with the following:

Sand: Sand shall be the fine granular material resulting from the natural disintegration of rock. Sand produced from deposits simultaneously with and by the same operations as gravel coarse aggregate may contain crushed particles in the quantity resulting normally from the crushing and screening of oversize particles.

Stone Sand: Stone sand shall be produced by washing or processing by air separation the fine material resulting from crushing rock quarried from undisturbed consolidated deposits.

Slag Sand: Slag sand shall be the graded product resulting from the screening of air cooled blast furnace slag. Air cooled blast furnace slag shall be the nonmetallic product, consisting essentially of silicates and alumino-silicates of lime and other bases, which is developed in a molten condition simultaneously with iron in a blast furnace.

Steel Slag Sand: Steel slag sand shall be the graded product resulting from the screening of crushed steel slag. Crushed steel slag shall be the nonmetallic product which is developed in a molten condition simultaneously with steel in an open hearth, basic oxygen or electric furnace."

The fine aggregate shall also conform to the following quality requirements:

QUALITY TEST (IDOT B Quality)	PERCENT
$Na_2 SO_4$ Soundness, 5 Cycle ASTM C 88 Max. % Loss	15
Minus No. 200 Sieve Mat'l ASTM C 136 Max. % Loss [1]	6.0 [2]

[1] Fine aggregate shall not contain more than 3 percent clay (2 micron or smaller) particles.
[2] Does not apply to Stone Sand.

DELETERIOUS TEST	PERCENT
Materials (Max. % allowed)	
-- Shale %	3.0
-- Clay Lumps %	3.0
-- Coal, Lignite & Shells %	3.0
-- Conglomerate %	3.0
-- Other Deleterious %	3.0
Total Deleterious Allowed %	5.0

401-2.1(c) SAMPLING AND TESTING

Delete this paragraph and replace with the following:

"All aggregates proposed in the manufacture of the mix will be sampled and tested by the Contractor. ASTM D 75 shall be used in sampling coarse aggregate and fine aggregate, and ASTM C 183 shall be used in sampling mineral filler. The Contractor shall provide the Engineer with aggregate producer (quarry) and Contractor (plant) quality control gradations. No aggregate shall be used in the production of mixture without prior approval."

401-2.1(d) SOURCES OF AGGREGATES

Delete this paragraph and replace with the following:

"All aggregate sources that are approved by the Illinois Department of Transportation, Division of Highways, conforming to the description, gradation and quality specified herein, shall be permitted for use in the manufacture of the HMA surface course. The supplier of aggregates must participate and meet the requirements of the Illinois Department of Transportation Division of Highways source certification program. The Engineer reserves the right to inspect the source(s) and manufacturing of all aggregates. If satisfactory quality control and production procedures are not being implemented, the Engineer may remove approval of the source(s). Approval of the source(s) of aggregate(s) does not relieve the Contractor in any way of the responsibility for delivery to the job site aggregates that meet the requirements specified herein."

401-2.1(e) SAMPLES OF AGGREGATES

Delete this paragraph and replace with the following:

"Once the source(s) of the aggregates have been approved by the Engineer, the Contractor shall furnish to the Engineer the quarry quality control gradations and the gradations of stockpile samples obtained for the purpose of performing the mix design."

401-2.3 BITUMINOUS MATERIAL

Add the following to the first paragraph:

"Performance Graded asphalt PG 64-22 shall be used.

401-3.2 JOB MIX FORMULA (JMF)

Delete the first paragraph and insert the following:

"The Engineer is responsible for the job mix formula (JMF) and no HMA mixture for payment shall be produced until the approved (JMF) is submitted to the Contractor in writing by the Project Engineer. The approved (JMF) shall indicate the definite percentage on each sieve for each aggregate, the percent of bitumen, and the number of gyrations specified for the individual project. The Contractor shall provide all laboratory sampling and testing to the Engineer, pursuant to completion of the (JMF). The exact tests and procedures are outlined in the Illinois Division of Aeronautics (IDOA) latest *Policy Memorandum 2003-1: "Requirements for Laboratory, Testing, Quality Control and Paving of Superpave Bituminous Concrete Mixtures for Airports."*

Delete the third paragraph and replace with the following:

"The HMA mixture shall be tested according to the Asphalt Institute's most current Superpave Series No. 2 (SP-2) manual entitled, "Superpave Mix Design"and shall meet the criteria set forth in Tables 2 and 4 herein."

TABLE 2 SUPERPAVE DESIGN CRITERIA

TRAFFIC MIX					
Design Parameter	Aircraft over 60,000 lbs.[1]		Aircraft under 60,000 lbs.		Automobile
	Runway or Taxiway	Parking Apron	Runway or Taxiway	Parking Apron	Entrance Roads and Parking Lots
N_{ini} [2]	5	7	5	5	5
N_{des}[3]	40	50	30	30	30
N_{max}	58	74	42	42	42
% Air Voids V_a	2-4	2-4	2-4	2-4	2-4
VFA (min %)	75-90	75-90	75-90	75-90	75-90

[1] Stone sand (IDOT Gradation FA20 or FA21) shall be required as part of the fine aggregate port of the Job Mix Formula. The exact amount of stone sand will be determined by the Engineer bas on preparation of the Mix Design.
[2] Where N= number of gyrations on an IDOT approved superpave gyratory compactor.
[3] The N_{des} value may be changed in order to obtain an acceptable mix design when approved by Engineer.

Delete: Table 3. Minimum Percent Voids in Mineral Aggregate

Delete the second and third sentences of the ninth paragraph and replace with the following:

"Deviation from the approved (JMF) for bitumen content and gradation of aggregates shall not be greater than the tolerances permitted and shall be based on extraction, or calibrated ignition oven test for aggregate gradations and asphalt content. The applicable ASTM and IDOT tests are outlined in the current IDOA *Policy Memorandum 2003-1: "Requirements for Laboratory, Testing, Quality Control and Paving of Superpave Bituminous Concrete Mixtures for Airports."* These tests shall be performed by Contractor quality control personnel. Split mix samples shall be maintained by the Contractor for random testing by the Engineer."

Delete the last paragraph for this section.

401-3.4 TEST SECTION

Delete this entire section and replace with the following:

"Prior to the manufacture of mix for the test section, Contractor quality control personnel shall have completed all proportioning and testing in accordance with Policy Memorandum 2003-1, to assure that the mix produced will meet the (JMF). The Contractor shall then prepare a quantity of HMA surface course mixture in order to construct the test section.

The test section shall have a length of approximately 200 to 300 lineal feet and shall be of the same depth specified for the construction of the course which it represents. The Contractor may place up to 50 tons of mix prior to construction of the test section in order to line-out the plant, the mix, and the paving operation. The underlying grade or pavement structure upon which the test section is to be constructed shall be the same as the remainder of the course represented.

A. Construction of the Test Section:

The test section shall consist of two (2) parts: Development of a Growth Curve and establishing a Rolling Pattern.

1. Growth Curve

To construct the Growth Curve a self-propelled vibratory roller meeting the following minimum requirements shall be required:

Drum diameter 48 inches, length of drum 66 inches, vibrators 1600 vibrations per minute (VPM) minimum, unit static force on vibrating drum(s) 125 pounds per lineal inch (PLI), total applied force 325 pounds per inch (PLI), adjustable eccentrics, reversible eccentrics on nondriven drum(s). The total applied force for various combinations of VPM and eccentric positions shall be shown on decals on the vibrating roller or on a chart maintained with the roller. The vibratory roller shall be equipped with water tanks and sprinkling devices, or other approved methods, which shall be used when necessary to wet the drum to prevent the HMA mixture from sticking. The contractor shall have a vibrating reed tachometer (hand type) at the job site for checking roller vibrations. The reed tachometer shall have a range of 1000 to 4000 vibrations per minute (vpm). The vibrating reed tachometer shall have two (2) rows of reeds. One row shall range from 1000 to 2000 vpm and the other row shall range from 2000 to 4000 vpm.

The Growth Curve shall be constructed by successive passes of the vibratory roller, in a given area, in order to determine the maximum compactibility of the mix. More than one Growth Curve may be required as part of the test section if adjustments to the mix, plant operation, laydown, etc., are necessary to reach optimum compactibility.

2. Rolling Pattern

The Contractor shall then proceed to establish the Rolling Pattern using the equipment that he intends to use for compaction of the rest of the HMA course.

B. Test Section Acceptance

The Test Section shall be evaluated and approved based on the following:

1. The completed Test Section (Rolling Pattern area) shall be divided into four (4) subsections with one (1) sample, consisting of two (2) cores, obtained from each subsection for determination of density. One additional core sample shall be obtained from the Growth Curve.

2. The Contractor shall correlate a nuclear density gauge to the Test Section for Quality Control testing. The nuclear density gauge shall not be used for acceptance testing.

3. The completed Test Section (rolling pattern area) shall have a minimum density of 94 percent (6 percent air voids) of the maximum theoretical specific gravity of the mix (ASTM D2041). Individual test (average of two cores) results below 94% shall constitute a failing test section.

4. If the test section fails to meet these requirements, the Contractor shall construct a new Test Section meeting these requirements at his own expense.

5. Full production shall not be allowed until all tests, Reflux extraction or Ignition Oven, Gradation, Gravities of mix, and Core Densities are completed in order to determine compliance with these specifications.

6. The completed Test Section(s) shall be part of the proposed work. When recommended by the Resident Engineer and approved by the Engineer, test sections that do not conform to the specifications shall be removed and replaced at the Contractor's expense.

7. When a Test Section passes, the Test Section tonnage shall be paid 100%.

The mix used in construction of the Test Section shall be paid under Section 401-6.10. Construction of the Test Section shall be paid for under Section 401-6.30. Payment will be made for only one (1) Test Section."

401-4.2 HMA MIXING PLANT

Insert the following as the first paragraph:

"The HMA hot-mix plant(s) shall conform to the following requirements, or the Engineer may accept the use of a hot-mix plant approved by the IDOT Division of Highways for the manufacture of Class I HMA mixtures in accordance with Section 1102 of the current *Standard Specifications for Road and Bridge Construction.* When recyclable asphalt pavement is used, the hot-mix plant shall also conform to the additional IDOT plant requirements for hot-mix recycling."

(a) Requirements for all plants:

(12) Testing laboratory

Delete the first sentence of this paragraph and insert the following:

"The Contractor or producer shall provide a testing laboratory, meeting the requirements of Illinois Division of Aeronautics' latest *Policy Memorandum 2003-1: "Requirements for Laboratory, Testing, Quality Control and Paving of Superpave Bituminous Concrete Mixtures for Airports."* for Quality Control and acceptance testing during periods of mix production, sampling, and testing, and whenever materials subject to the provision of these specifications are being supplied or tested."

401-4.4 HMA PAVERS

Add the following after "activated screed" in the first sentence of the first paragraph:

"capable of vibrating at approximately 3000 VPM".

Add the following at the end of the first paragraph:

"All width extensions required to place material shall have the same placement features and equipment functions as provided on the main body of the paver. Augers shall be extended as additional sections of screed are bolted on or automatically adjustable screeds are extended. The augers need not be extended when the screed extensions on either side of the machine are one foot or less and the finished surface of the mat is uniform. The use of any machine obsolete in design or in poor mechanical condition will not be permitted."

Delete the second and third sentences of the third paragraph and replace with the following:

"An automatic grade control system shall be used to automatically maintain the screed elevation as specified herein."

401-4.7 PREPARATION OF MINERAL AGGREGATE

Add the following as the second sentence of the first paragraph:

"Immediately after heating, the surface course aggregate(s) shall be screened into at least three sizes. This requirement does not apply to drum mixer plants."

401-4.9 TRANSPORTING, SPREADING, AND FINISHING

Add the following paragraph after the fourth paragraph:

"The first lane of the first lift of the HMA surface course shall be started at the center of the pavement with a taut stringline (guide wire) set to grade at both sides of the paver. The automatic grade control system of the paver shall be used to control grade of both sides of the paver from these reference stringlines. The grade control for the adjacent lanes of pavement shall be maintained by using a matching shoe with the previous laid pavement and a stringline on the outer edge of the next lane. A stringline and matching shoe shall be used to pave all remaining lanes of the first lift of surface course. If grade is established on the first lift, succeeding lifts shall be laid with a traveling ski on both sides of the paver for the center lane with matching shoe and traveling ski on adjacent lanes. If grade is not established on the first lift, the Resident Engineer shall require taut stringline references until satisfactory grade is established.

401-4.10 COMPACTION OF MIXTURE

Add the following to the end of the second paragraph:

"A self-propelled pneumatic-tire roller meeting the following requirements shall be required on the top lift of surface course mixture:

The roller shall be of the oscillating wheel type consisting of not less than 7 pneumatic-tire wheels revolving on 2 axles, and capable of being ballasted to the mass (weight) required. The front and rear wheels shall be staggered so that the tire sidewalls will have a minimum overlap of 1/2 inch. The roller shall provide for a smooth operation when starting, stopping or reversing direction. The tires shall withstand inflation pressures between 60 and 120 psi. The roller shall be equipped with an adequate scraping or cleaning device on each tire to prevent the accumulation of material on the tires. When used for the compaction of HMA mixtures, the roller shall be equipped with a water system which will keep all tires uniformly wet to prevent material pickup. The contractor shall provide means for determining the mass (weight) of the roller as distributed on each wheel. Ballast shall be included in determining the mass (weight)."

Delete the third paragraph and substitute the following:

"Sufficient rollers shall be used to handle the output of the plant. Rolling shall continue until all roller marks are eliminated producing a surface of uniform texture true to grade and cross section.

The Contractor shall provide, at all times, an approved Troxler (or equal) nuclear density gauge with a qualified operator to maintain quality control of the density as specified herein."

401-4.11 JOINTS

Add the following as the fourth paragraph for this section:

All longitudinal joints constructed are to be compacted in such a manner that they are "pinched" to provide adequate density at the joint. The method of "pinching" shall be as defined in Article 406.16 on compaction of HMA concrete in the most current issue of the I.D.O.T. Standard Specifications for Road and Bridge Construction. The contractor shall cut one core per 2,500 tons or one per project at a random location over the longitudinal construction joint. The core shall be delivered to the Resident Engineer for density testing. The density at the joint shall be a minimum of 90%.

401-4.13 ACCEPTANCE TESTING OF HMA MIXES FOR DENSITY

Delete this entire section and insert the following:

"401-4.13 ACCEPTANCE TESTING OF HMA MIXES FOR DENSITY
After the compaction is completed, the pavement will be tested and payment made on the basis of percent air voids in the final compacted mat.

The HMA surface course shall be compacted to a minimum density of 93 percent (7 percent air voids) of the maximum theoretical specific gravity (ASTM D2041) and accepted by the following statistical procedure. When more than one surface course mix design is used on the same project, each mix will be evaluated separately under the statistical acceptance procedure specified herein.

(a) Lot Size. The plant-produced mixture shall be tested on a lot basis. A lot shall consist of 4 sublots. End or final lots may contain between 3 and 6 sublots.

(1) A sublot shall consist of 500 tons for each type of mix.

One density sample shall be taken randomly from each sublot. Each density sample shall be the average of two cores extracted from the sample location.

The Contractor shall take one random mix sample from each 1,000 tons of mix laid. This sample shall be split into two samples with one half tested by the Contractor for Extraction or Ignition oven, Maximum Specific Gravity, Gradation, and Air Void tests. The other sample half shall be appropriately marked and retained by the Contractor until the Engineer requests the mix for testing or directs the Contractor in writing to dispose of the mix.

All tests shall be completed and reported to the Engineer no later than the morning of the day following production."

(b) Lot Early Termination. When less than 3 sublots are produced, such as at the end of construction of the surface course or at the end of the construction season, the final sublot data

shall be included with the previous lot for payment. The final lot may thus contain up to six (6) sublots.

(c) Acceptance Criteria. The acceptance of each lot of HMA base course shall be based on the **P**ercentage of material **W**ithin specification **L**imits (PWL). The PWL is determined using standard statistical techniques and involves the number of tests in each lot (n) and the quality indexes (Q_L is the Quality Index for the lower limit; Q_U is the Quality Index for the upper limit). The quality indexes are calculated using the following formulae:

$$Q_L = \frac{\overline{X} - 1}{S} \qquad Q_U = \frac{7 - \overline{X}}{S}$$

Where Q = Quality Index (lower or upper)

$\overline{X}$ = Mean (average) value of air voids in percent.

(% air voids = 100 - % density)

S = Standard Deviation of test results

For mat in-place air voids, estimate the **P**ercentage **W**ithin **T**olerance (PWT) for the lower and upper tolerance limits by entering Table 8 with Q_L and Q_U using the column appropriate to the total number (n) of core samples. The total percent of material between the lower and upper limits is defined as the **P**ercent **W**ithin **L**imits and is calculated by the following formula:

PWL = [PWT(lower) + PWT(upper)] - 100

Each lot of HMA material shall be accepted for 100 percent payment when the PWL equals or exceeds 90 percent. When the PWL is below 90 percent for a given lot, the lot tonnage shall be adjusted in accordance with Table 7.

TABLE 7 -- PAY ADJUSTMENT SCHEDULE
(see *Note 2.*)

PWL	% ADJUSTMENT IN LOT QUANTITY
90 - 100	100
80 - 89.9	0.5 PWL + 55.0
65 - 79.9	2.0 PWL - 65.0
Below 65	Note *1.*

Note 1. The lot shall be removed and replaced. However, the Engineer may decide to accept the deficient lot. In that case, it will be paid for at 50% adjustment.

Note 2. All preliminary calculations used in determining the Percent Within Limits should be rounded to a minimum of four digits right of the decimal point. The PWL that is used for Table 7 purposes should then be rounded to one digit right of the decimal point to determine the percent of contract quantity to be paid. The final percent pay figure should be rounded to one digit right of the decimal point. The Resident Engineer shall notify the Contractor, in writing, of the final percent pay for each lot as soon as all lot tests are completed.

(d) Mix sampling All mix sampling shall be done on a random basis as determined by the Resident Engineer. Samples that are obviously defective or become defective prior to testing shall be discarded and retaken. New samples shall be considered as if they were initial samples.

401-4.15 SAMPLING PAVEMENT

Delete this section and replace with the following:

"401-4.15 Sampling Pavement Cores from each sublot shall be taken at random locations as outlined by the Resident Engineer. No core samples shall be taken within two feet of the edge of pavement. Any core less than 1-1/2 inch thickness shall not be used and a new location and sample shall be selected.

Core samples of approximately 4 inches in diameter, for determination of in-place air voids of the completed pavement, shall be obtained by the Contractor at no extra expense. The number and locations of the samples shall be as determined by the Resident Engineer. The Contractor shall furnish all tools, labor, and materials for sampling and replacing pavement.

All core tests necessary to determine initial conformance with specification requirements will be performed by the Resident Engineer at no cost to the Contractor.

(A) Resampling and Retesting Resampling of a lot may be allowed only under the following conditions:

(1) The Contractor must request, in writing, the resampling and retesting of a complete lot within 48 hours after receiving the written test results of the lot from the Resident Engineer. Only one retest per lot will be permitted.

(2) If the retested lot should result in a higher "Percent Within Limits" figure than the original, based on all lot samples (original and new) the following will apply:

(a) The cost of resampling and retesting will be borne by the Engineer.

(b) The new "Percent Within Limits" figure shall be calculated using all LOT samples, (original and new) for calculating the lot payment.

(3) If the retested lot should result in a "Percent Within Limits" figure equal to or less than the original, based on all the lot samples (original and new), the following will apply:

(a) The cost of resampling and retesting will be borne by the Contractor.

(b) The new "Percent Within Limits" figure shall be calculated using all lot samples, (original and new) for calculating the lot payment.

(4) Procedures in ASTM E-178 shall be used to determine outliers based on all samples taken and a 5% significance level.

(5) Results of the retesting and resampling shall be final."

The completed pavement shall be cleaned so that no debris or dirt from coring operations is left on the surface of the pavement.

401-6.1 BASIS OF PAYMENT

Delete this section and replace with the following:

"401-6.1 Basis of Payment The quantity of HMA surface course mixture measured as outlined in Section 401-5.1 shall be adjusted in accordance with Section 401-4.13 herein. Payment shall be calculated by multiplying the contract unit price per ton of HMA base course and the adjusted tons per lot. Final payment shall be compensation for furnishing all materials, for all preparation, mixing, testing, and placing of these materials, and for all labor, equipment, tools, and incidentals necessary to complete this item.

The test section shall be paid for at the contract unit price per each, which price shall include the additional specified equipment, labor, Engineering, and testing time necessary to construct this item.

Payment will be made under:

Item 401-6.10 -- Bituminous Surface Course - Per Ton.
Item 401-6.30 -- Test Section - Per Each.

State of Illinois
Department of Transportation
Division of Aeronautics

POLICY MEMORANDUM

January 15, 2007	Springfield, Illinois	Number 2003-1

TO: CONTRACTORS

SUBJECT: REQUIREMENTS FOR LABORATORY, TESTING, QUALITY CONTROL, AND PAVING OF SUPERPAVE HMA CONCRETE MIXTURES FOR AIRPORTS

I. SCOPE

The purpose of this policy memorandum is to define to the Contractor the requirements concerning the laboratory, testing, Quality Control, and paving of HMA concrete mixtures utilizing Superpave technology. References are made to the most recent issue of the Standard Specifications for Construction of Airports and to American Society for Testing and Materials (ASTM) testing methods. The Quality Assurance and acceptance responsibilities of the Engineer are described in Policy Memorandum 96-3.

II. LABORATORY

The Contractor shall provide a laboratory located at the plant and approved by the Illinois Division of Aeronautics (IDA). The laboratory shall be of sufficient size and be furnished with the necessary equipment and supplies for adequately and safely performing the Contractor's Quality Control testing as well as the Engineer's acceptance testing as described in Policy Memorandum 96-3.

The effective working area of the laboratory shall be a minimum of 600 square feet with a ceiling height of not less than 7.5 feet. Lighting shall be adequate to illuminate all working areas. It shall be equipped with heating and air conditioning units to maintain a temperature of 70º F ±5ºF.

The laboratory shall have equipment that is in good working order and that meets the requirements set forth in the following ASTM test standards:

ASTM D 70	Test Method for Specific Gravity and Density of Semi-Solid Materials
ASTM C 117	Test Method for Materials Finer than 75 µm (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C 136	Sieve or Screen Analysis of Fine and Coarse Aggregate
ASTM C 566	Total Moisture Content of Aggregate by Drying
ASTM D 75	Sampling Aggregates
ASTM D 2041	Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures
ASTM D 2172	Quantitative Extraction of Bitumen from Bituminous Paving Mixtures
IDOT	Ignition Method for Determining Asphalt Content
ASTM D 2726	Bulk Specific Gravity of Compacted Bituminous Mixtures using Saturated Surface Dry Specimens

ASTM D 3203	Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures
ASTM D 2950	Density of Bituminous Concrete in Place by Nuclear Method
ASTM D 4125	Asphalt Content of Bituminous Mixtures by Nuclear Method
ASTM C 127	Standard Test Method for Specific Gravity and Absorption of Coarse Aggregate
ASTM C 128	Standard Test Method for Specific Gravity and Absorption of Fine Aggregate

The Asphalt Institute's *Superpave Mix Design, Superpave Series No. 2 (SP-2)*

The laboratory and equipment furnished by the Contractor shall be properly calibrated and maintained. The Contractor shall maintain a record of calibration results at the laboratory. The Engineer may inspect measuring and testing devices at any time to confirm both calibration and condition. If the Resident Engineer determines that the equipment is not within the limits of dimensions or calibration described in the appropriate test method, the Engineer may stop production until corrective action is taken. If laboratory equipment becomes inoperable or insufficient to keep up with mix production testing, the Contractor shall cease mix production until adequate and/or sufficient equipment is provided.

III. MIX DESIGN SUBMITTAL

Based upon data and test results submitted by the Contractor, the Illinois Division of Aeronautics Engineer of Construction & Materials shall issue the final Job Mix Formula approval letter that concurs or rejects the Contractor's proposed JMF. The Contractor will be required to perform the sampling and laboratory testing and develop a complete mix design, according to the following guidelines:
[Note: A testing summary chart can be found in Appendix B.]

A. Material sources meeting the requirements of the contract shall be submitted in writing at or before the preconstruction conference (see BITUMINOUS WORKSHEET in Appendix A) in the following format:

1. To: Steven J. Long, P.E., Acting Chief Engineer
   Attn: Michael F. Wilhelm, P.E., Engineer of Construction & Materials
   Division of Aeronautics
   One Langhorne Bond Drive
   Springfield, Illinois 62707

2. Producer name and location of each aggregate

3. Producer # for each aggregate (producers are assigned this number by IDOT Central Bureau of Materials)

4. Material code for each aggregate

5. Gradation and Quality designation for each aggregate (i.e. CA-11, etc.)

6. Producer, producer #, and specific gravities of asphalt cement

7. Performance Graded Binder 64-22 shall be used unless otherwise approved by the IDA Engineer of Materials.

B. The Contractor shall obtain representative samples of each aggregate. The individual obtaining samples shall have successfully completed the IDOT Aggregate Technician Course under the IDOT Division of Highways, QC/QA program. The sample size shall be approximately 280 lb. for each coarse aggregate, 150 lb. for each fine aggregate, 15 lb. for the mineral filler or collected dust, and 1 gallon of asphalt cement.

C. The Contractor shall split the aggregate samples down and run gradation tests according to the testing methods referenced in Appendix B of this memorandum. The remaining aggregates shall be set aside for further Mix Design testing. The results of the gradation tests, along with the most recent stockpile gradations, shall be reported by fax to the IDA Engineer of Materials for engineering evaluation. If the gradation results are deemed non-representative or in any way unacceptable, new representative samples may be required at the direction of the IDA Engineer of Materials. Only composite gradations are required under this procedure.

D. Based on the accepted gradation results, the Contractor will determine blend percentages in accordance with the contract specifications (see Section 201/401 – 3.2 JOB MIX FORMULA under Table 4) for each aggregate to be used in determining the Job Mix Formula, as well as mix temperature and asphalt content(s), and number of Gyrations (N_{des}) for preparation of the Superpave Mix Design. The Contractor will verify the aggregate percentages, mix temperatures, asphalt content(s), and number of gyrations with the IDA Engineer of Construction & Materials before beginning any testing.

E. After verification of the information from step D., the Contractor shall make specimens and perform the following tests at various asphalt contents in order to obtain the optimum mix design. [Note: Actual test designation is referenced in Appendix B of this memorandum.]

Tests
Maximum Specific Gravity -- G_{mm}
Bulk Specific Gravity -- G_{mb}
% air voids -- V_a
% VMA
VFA %
TSR

The JMF will be designed in accordance with TABLE 4 as modified in the Recurring Special Provisions for the type of mix being produced. Appendix C contains a copy of the TABLE 4 targets and ranges for the JMF.

F. All technicians who will be performing mix design testing and plant sampling/testing shall have successfully completed the IDOT Division of Highways Bituminous Concrete Level 1 Technician Course "Bituminous Concrete Testing". The Contractor may also provide a Gradation who has successfully completed the Department's "Gradation Technician Course" to run gradation tests only under the supervision of a Bituminous Concrete Level 2 Technician.

G. The mix design testing results and resulting optimal JMF shall be reported to the IDA Engineer of Construction & Materials with the following data included:

a) Aggregate & liquid asphalt material codes
b) Aggregate & liquid asphalt producer numbers, names, and locations
c) Aggregate Blend of each aggregate
d) Optimum Blend % for each sieve
e) AC Specific Gravity
f) Bulk Specific Gravity and Absorption for each aggregate
g) Summary of Superpave Design Data: AC % Mix, G_{mb}, G_{mm}, VMA, Voids (Total Mix), Voids Filled, V_{be}, P_{be}, P_{ba}, G_{se}
h) Optimum design data listing: AC % Mix, G_{mb}, G_{mm}, VMA, Voids (Total Mix), Voids Filled, G_{se}, G_{sb}, TSR

i) Percent of asphalt that any RAP will add to the mix
j) Graphs for the following: gradation on 0.45 Power Curve, AC vs. Voids (Total Mix), AC vs. Specific Gravities, AC vs. Voids Filled, AC vs. VMA

H. The IDA Engineer of Construction & Materials shall generate and issue a concurrence or rejection of the Contractor's proposed Mix Design with the JMF for the manufacture of HMA mixtures based upon the Contractor's submitted testing and completed mix design results. The Contractor shall not be permitted to use the proposed HMA mix in production for the project until an approval letter is issued to the Contractor by the IDA Engineer of Construction & Materials, and the mix passes all test section requirements, when a test section is specified.

I. The above procedure, III. MIX DESIGN SUBMITTAL, shall be repeated for each change in source or gradation of materials.

IV. MIX PRODUCTION TESTING

The Quality Control of the manufacture and placement of HMA mixtures is the responsibility of the Contractor. The Contractor shall perform or have performed the inspection and tests required to assure conformance to contract requirements. Quality Control includes the recognition of defects and their immediate correction. This may require increased testing, communication of test results to the plant or the job site, modification of operations, suspension of HMA production, rejection of material, or other actions as appropriate. The Resident Engineer shall be immediately notified of any failing tests and subsequent remedial action. Form AER M-14 shall be reported to the Engineer and Resident Engineer no later than the start of the next work day. In addition, AER M-9 and M-11 shall be given to the Resident Engineer daily (Appendix A). The Contractor shall provide a Quality Control (QC) Manager who will have overall responsibility and authority for Quality Control. This individual shall have successfully completed the IDOT Division of Highways Bituminous Concrete Level II Technician Course "Bituminous Concrete Proportioning and Mixture Evaluation." In addition to the QC Manager, the Contractor shall provide sufficient and qualified personnel to perform the required visual inspections, sampling, testing, and documentation in a timely manner. The following plant tests and documentation shall be required: [Note: A summary chart of testing can be found in Appendix B.]

A. Minimum of one (1) complete hot bin or combined belt analysis per day of production or every 1,000 tons, whichever is more frequent.

B. Minimum one (1) stockpile gradation for each aggregate and/or mineral filler per week when a batch plant is utilized. Minimum of one (1) gradation for each aggregate per day of production or every 1,000 tons when a drum plant is used, and one (1) gradation per week for mineral filler when a drum plant is used.

C. A certification from the quarry for the total quantity of aggregate listing the source, gradation type, and quality designation of aggregate shipped. In lieu of a certification, the contractor may complete and submit an "Aggregate Certification of Compliance" form which may be obtained from IDA or found on the I.D.O.T. website.

D. Original asphalt shipping tickets listing the source and type of asphalt shipped.

E. One mix sample per 1,000 tons of mix. The sample shall be split in half. One half shall be reserved for testing by the Engineer. The other half shall be split and tested by the Contractor for Extraction, Gradation, Maximum Specific Gravity, and Air Void tests in accordance with the appropriate ASTM standard referenced herein. [See Appendix B.]

1. In place of the extraction test, the Contractor may provide the asphalt content by a calibrated ignition oven test using the IDOT Division of Highways' latest procedure. The correction (calibration) factor for aggregate type shall be clearly indicated in the reported test results.

From these tests, the Contractor shall interpret the test data and make necessary adjustments to the production process only in order to comply with the approved JMF.

V. QUALITY CONTROL

A. Control Limits

Target values shall be determined from the approved JMF. The target values shall be plotted on the control charts within the following control limits:

	Control Limits	
Parameter	Individual Test	Moving Avg. of 4
% Passing		
1/2 in.	± 7 %	±4 %
No. 4	±7 %	±4 %
No. 8	±5 %	±3 %
No. 30	±4 %	±2.5 %
No. 200 *	±2.0 % *	±1.0 % *
Asphalt Content	±0.45 %	±0.2 %

* No. 200 material percents shall be based on washed samples. Dry sieve gradations (-200) shall be adjusted based on anticipated degradation in the mixing process.

B. Control Charts

Standardized control charts shall be maintained by the Contractor at the field laboratory. The control charts shall be displayed and be accessible at the field laboratory at all times for review by the Engineer. The individual required test results obtained by the Contractor shall be recorded on the control chart immediately upon completion of a test, but no later than 24 hours after sampling. Only the required plant tests and resamples shall be recorded on the control chart. Any additional testing of check samples may be used for controlling the Contractor's processes, but shall be documented in the plant diary.

The results of assurance tests performed by the Engineer will be posted as soon as available.

The following parameters shall be recorded on control charts:

1. Combined Gradation of Hot-Bin (Batch Plant) or Combined Belt Aggregate Samples (Drier Drum Plant). (% Passing 1/2 in., No. 4., No. 8, No. 30, and No. 200 Sieves)

2. Asphalt Content

3. Bulk Specific Gravity (G_{mb})

4. Maximum Specific Gravity of Mixture (G_{mm})

C. Corrective Action for Required Plant Tests

Control Limits for each required parameter, both individual tests and the average of four tests, shall be exhibited on control charts. Test results shall be posted within the time limits previously outlined.

1. Individual Test Result. When an individual test result exceeds its control limit, the Contractor shall immediately resample and retest. If at the end of the day no material remains from which to resample, the first sample taken the following day shall serve as the resample as well as the first sample of the day. This result shall be recorded as a retest. If the retest passes, the Contractor may continue the required plant test frequency. Additional check samples should be taken to verify mix compliance.

2. Asphalt Content. If the retest for asphalt content exceeds control limits, mix production shall cease and immediate corrective action shall be instituted by the Contractor. After corrective action, mix production shall be restarted, the mix production shall be stabilized, and the Contractor shall immediately resample and retest. Mix production may continue when approved by the Engineer. The corrective action shall be documented.

   Inability to control mix production is cause for the Engineer to stop the operation until the Contractor completes the investigation identifying the problems causing failing test results.

3. Combined Aggregate/Hot-Bin. For combined aggregate/hot-bin retest failures, immediate corrective action shall be instituted by the Contractor. After corrective action, the Contractor shall immediately resample and retest. The corrective action shall be documented.

   a. Moving Average. When the moving average values trend toward the moving average control limits, the Contractor shall take corrective action and increase the sampling and testing frequency. The corrective action shall be documented.

      The Contractor shall notify the Engineer whenever the moving average values exceed the moving average control limits. If two consecutive moving average values fall outside the moving average control limits, the Contractor shall cease operations. Corrective action shall be immediately instituted by the Contractor. Operations shall not be reinstated without the approval of the Engineer. Failure to cease operations shall subject all subsequently produced material to be considered unacceptable.

   b. Mix Production Control. If the Contractor is not controlling the production process and is making no effort to take corrective action, the operation shall stop.

VI. TEST SECTION AND DENSITY ACCEPTANCE **(Note: Applies only when specified.)**

A. The purpose of the test section is to determine if the mix is acceptable and can be compacted to a consistent passing density.

A quick way to determine the compactibility of the mix is by the use of a nuclear density gauge in the construction of a growth curve. An easy way to construct a growth curve is to use a good vibratory roller. To construct the curve, an area the width of the roller in the middle of the mat is chosen and the roller is allowed to make one compactive pass. With the roller stopped some 30 feet away, a nuclear reading is taken and the outline of the gauge is marked on the pavement. The roller then makes a compaction pass in the opposite direction and another reading is taken. This scenario is continued until at least two (2) passes are made past the maximum density obtained.

The maximum laboratory density potential of a given mix is a direct function of the mix design air voids. Whereas, the actual maximum field density is a function of the type of coarse aggregates, natural or manufactured sands, lift thickness, roller type (static or vibratory), roller and paver speed, base condition, mix variation, etc. All of these items are taken into consideration with the growth curve.

1. High Density in the Growth Curve. If the growth curve indicates a maximum achievable field density of between 95 to 98 percent of the Theoretical Maximum Density (D), you can proceed with the Rolling Pattern. On the other hand, if the maximum achievable density is greater than 98 percent, a quick evaluation (by use of an extractor, hot bin gradations, nuclear asphalt determinator, etc.) must be made of the mix. When adjustments are made in the mix, a new growth curve shall be constructed.

2. Low Density in the Growth Curve. If the growth curve indicates the maximum achievable density is below 94 percent, a thorough evaluation of the mix, rollers, and laydown operations should be made. After a thorough evaluation of all factors (mix, rollers, etc.), asphalt or gradation changes may be in order as directed by the Engineer. Again, any changes in the mix will require a new growth curve. Note that the nuclear density test is a quality control tool and not an acceptance test. All acceptance testing is to be conducted by the use of cores, unless otherwise specified.

3. Acceptance of Test Section. The Contractor may proceed with paving the day after the test section provided the following criteria have been met:

   a. Four random locations (2 cores per location cut longitudinally and cored by the Contractor) will be selected by the Engineer within the test strip. All the cores must show a minimum of 94% density.

   b. All Superpave and extraction test results from mix produced for the test section must be within the tolerances required by specification.

   c. The Contractor shall correlate his nuclear gauge to the cores taken in the test section. Additional cores may be taken at the Contractor's expense for this purpose within the test section area, when approved by the Engineer.

4. Density Acceptance under Production Paving. The responsibility for obtaining the specified density lies with the Contractor. Therefore, it is important that the nuclear density gauge operator communicate with the roller operators to maintain the specified density requirements. The Contractor shall provide a Bituminous Concrete Density Tester who has successfully completed the Department's "Bituminous Concrete Nuclear Density Testing Course" to run all required density tests on the job site. Density acceptance testing, unless otherwise specified, is described as follows:

a. The Contractor shall cut cores at random locations within 500 ton sublots as directed by the Resident Engineer.

b. The cores should be extracted so as not to damage them, since they are used to calculate the Contractor's pay.

c. The Engineer will run preliminary G_{mb} tests on the cores to give the Contractor an indication of how compaction is running for the next day's paving.

d. A running average of four (4) Maximum Theoretical Gravities (G_{mm}) will be used for calculating percent compaction.

e. Final core density tests and pay calculations will be performed by the Resident Engineer and delivered to the Contractor.

f. Should the contractor wish to resample the pavement as a result of pay calculations resulting in less than 100% payment, the request must be made within 48 hours of receipt of the original payment calculations.

Steven J. Long, P.E.
Acting Chief Engineer

Supersedes Policy Memorandum 2003-1 dated July 1, 2004

APPENDIX A

BITUMINOUS WORKSHEET

Airport: _____ Project No.: _____ AIP No.: _____

Mix Design # : _____ Material Code: _____ Producer: _____
Prod. #: _____

AGGREGATE

Mat'l. Code:					
Producer #:					
Prod. Name					
Location:					

Percent Passing

Sieve Size					
1 inch					
3/4 inch					
½ inch					
3/8 inch					
No. 4					
No. 8					
No. 16					
No. 30					
No. 50					
No. 100					
No. 200					
Washed (y/n)					
O.D. Gravity					
App. Gravity					
Absorption					

Asphalt Gravity_____Asphalt Source_____Asphalt Producer No._____

MARSHALL DATA

% Asphalt					
M. Stability					
Flow					
D					
0					
% Air Voids					

Q.C. Manager Name: _____ Phone number: _____

Laboratory Location: _____ Fax Number: _____

Remarks: _____

Bituminous Mixture Daily Plant Output

Date: _____
Airport: _____
Ill. Project: _____
AIP Project _____
Consultant: _____
Contractor: _____
Producer _____

Tons/Hr.	Batch Wt.	Batches	Loads	Tons	Mix No.
AC Prod.	Material	% Mix	Add Prod	Material	% AC
Temp. (F)	Agg Drier	Agg Bin	Asphalt	Bit. Mix	Bit. Mix
Max					(RE/RT)
Min					
Wtd. Avg.					

Mix Time	Dry	Wet	Total	Plant Oper.	Start	Stop	Delays	Hrs
Contract		Job No.	Qnty	Contract		Job No.	Qnty.	

Remarks _____

Bin		RAP	Bin 5	Bin 4	Bin 3	Bin 2	Bin 1	M.F.	New Bit	Wash	Changed
Mix %											
Lb/Bt-Rev										Mix	Spec
Agg %									% Pass	Form	Range
1.5	Wt %										
	% Bin										
1	Wt %										
	% Bin										
3/4	Wt %										
	% Bin										
1/2	Wt %										
	% Bin										
3/8	Wt %										
	% Bin										
4	Wt %										
	% Bin										
8	Wt %										
	% Bin										
16	Wt %										
	% Bin										
30	Wt %										
	% Bin										
50	Wt %										
	% Bin										
100	Wt %										
	% Bin										
200	Wt %										
	% Bin										
Bit.											

AC - Prod	Ac-Code	Ticket	Date	Qnty	AC-Prod	AC-Code	Ticket	Date	Qnty	

Bituminous Mixtures Extraction

Airport: _____ Consultant: _____ Date: _____

Illinois Project: _____ Contractor: _____

AIP Project No.: _____ Producer: _____

Mix #: _____ Dry Time: _____ Lot: _____ Sublot: _____

Type: _____ Washed: _____

Sieve	Wt.	Accum. Wt.	% Passing	Mix Formula	Tolerance	Spec Range
1.5						
1						
3/4						
1/2						
3/8						
4						
8						
16						
30						
50						
100						
200						
Tot Agg						
Bit						

Extraction Data		
Pan, New Filter & Sample	g	
Pan & New Filter	g	
Sample	g	
Pan, Used Filter, Aggregate	g	
Pan & New Filter	g	
Aggregate	g	
Pan & Used Filter	g	
Pan & New Filter	g	
Dust in Filter	g	
Sample	g	
Aggregate	g	
Bitumen	g	

New Bit:	Marshall Stab:	Blows:	Gyro:	Flow:	TSR:
Bulk SPGR:	Max SPGR:	% Voids:	DEN (PCF):		

Remarks: _____

CC: _____ Tested by: _____

AERM-11

Bituminous Testing Summary

Project: ____________________ Illinois Project: ____________________ Airport: ____________________

AIP Proj.: ____________________ Mix Design No.: ____________________ Contractor: ____________________

Producer: ____________________ Remarks: ____

Extraction Data

Marshall Data

Date Placed	Lot/ Sublot	Sieve JMF	1"	3/4"	1/2"	3/8"	#4	#8	#16	#30	#50	#100	#200	% AC	Stab.	Flow	d'	D'	Voids
	Test Section																		

APPENDIX B

QUALITY CONTROL TESTING (PLANT)

PARAMETER	FREQUENCY	SAMPLE SIZE	TEST METHOD	REPORT FORM
Aggregate Gradations: Hot bins for batch and continuous plants--- Individual cold-feeds or combined belt-feeds for drier drum plants.	Minimum 1 per day of production and at least 1 per 1000 tons.	CA07/11: 5000 gm CA13: 2000 gm CA16: 1500 gm Fine agg: 500 gm 1 gallon asphalt cement	ASTM C 136	AER M-9
Aggregate gradations: Stockpiles	Minimum 1 per aggregate per week per stockpile.	CA07/11: 5000 gm CA13: 2000 gm CA16: 1500 gm Fine agg: 500 gm *Note: The above test sample sizes are to be obtained from splitting down a larger sample from the stockpiles.	ASTM C 136	AER M-9
Maximum Specific Gravity	Minimum 1 per 1000 tons	1200 gm per test	ASTM D 2041	AER M-11 and AERM-14
Bulk Specific Gravity	Minimum 1 per 1000 tons	1250 gm per briquette	ASTM D 2726	AER M-11 and AERM-14
Marshall Stability and Flow	Minimum 1 per 1000 tons	1250 gm per briquette	ASTM D 1559	AER M-11 and AERM-14
% Air Voids	Minimum 1 per 1000 tons		ASTM D 3203	AER M-11 and AERM-14
Extraction	Minimum 1 per 1000 tons	1000 gm (surface) 1500 gm (base)	ASTM D 2172	AER M-11 and AERM-14
Ignition Oven Test	Minimum 1 per 1000 tons	1500 gm		AER M-14
Nuclear Asphalt Gauge	Minimum 1 per 1000 tons	1000-1100 gm	ASTM D 2145	AER M-14
Gyratory Brix	Minimum 1 per 1000 tons	4700-4800 gm 115 mm +/- 5 mm	AASHTO TP4-99	

MIX DESIGN TESTING

PARAMETER	FREQUENCY	SAMPLE SIZE	TEST METHOD	REPORT FORM
Representative samples of each aggregate and asphalt cement.	1 per aggregate and 1 asphalt cement.	280 lb. (coarse) 150 lb. (fine) 15 lb. (min. filler) 1 gallon asphalt cement	ASTM D 75	N/A
Aggregate Gradation	1 per aggregate	CA07/11: 5000 gm CA13: 2000 gm CA16: 1500 gm Fine agg: 500 gm	ASTM C 136	Bituminous Worksheet (Appendix A)
Maximum Specific Gravity	2 per specified asphalt content	1200 gm per test	ASTM D 2041	Bituminous Worksheet (Appendix A)
Bulk Specific Gravity	3 briquettes per specified asphalt content	1250 gm per briquette	ASTM D 2726	Bituminous Worksheet (Appendix A)
Marshall Stability and Flow	3 briquettes	1250 gm per briquette	ASTM D 1559	Bituminous Worksheet (Appendix A)
% Air Voids	1 per specified asphalt content (Avg. of G_{sb}/G_{mm})		ASTM D 3203	Bituminous Worksheet (Appendix A)
Gyratory Brix	Minimum 1 per 1000 tons	4700-4800 gm 115 mm +/- 5 mm	AASHTO TP4-99	

QUALITY CONTROL TESTING (PAVER)

PARAMETER	FREQUENCY	SAMPLE SIZE	TEST METHOD	REPORT FORM
Nuclear Density Test	As required by the Contractor to amintain consistent passing density	Various locations	ASTM D 2950	

APPENDIX C

AGGREGATE BITUMINOUS BASE COURSE

Percentage by Weight Passing Sieves Job Mix Formula (JMF)		
Sieve Size	Gradation B Range 1" Maximum	Ideal Target
1-1/4 in.	---	---
1 in.	100	100
3/4 in.	93 – 97	95
1/2 in.	75 – 79	77
3/8 in.	64 – 68	66
No. 4	45 – 51	48
No. 8	34 – 40	37
No. 16	27 – 33	30
No. 30	19 – 23	21
No. 100	6 – 10	8
No. 200	4 – 6	5
Bitumen %: Stone	4.5 – 7.0	5.5

AGGREGATE BITUMINOUS SURFACE COURSE

Percentage by Weight Passing Sieves Job Mix Formula (JMF)		
Sieve Size	Gradation B Range ¾" Maximum	Ideal Target
1 in.	100	---
3/4 in.	100	100
1/2 in.	99 - 100	100
3/8 in.	91 - 97	94
No. 4	56 – 62	59
No. 8	36 - 42	39
No. 16	27 - 32	30
No. 30	19 - 25	22
No. 100	7 – 9	8
No. 200	5 – 7	6
Bitumen %: Stone	5.0 – 7.0	6.0