

PROJECT SPECIAL PROVISIONS**ROADWAY****SHOULDER RECONSTRUCTION:**

(1-18-00) (Rev.7-18-06)

RR 07

Description

The work covered by this provision consists of reconstructing earth shoulders, including median shoulder in accordance with the *Roadway Standard Drawing Nos. 560.01 and 560.02*, from the edge of pavement to the existing shoulder point as directed by the Engineer. Perform this work immediately after the resurfacing operations are completed as directed by the Engineer.

Materials

On any map that contains widening, use all suitable material generated from the widening operation to construct the shoulder. Furnish any other earth material necessary for the construction of the shoulders. Provide earth material meeting the approval of the Engineer. No testing will be necessary.

Perform shoulder reconstruction in the following order: scarify the existing shoulder to provide the proper bond; add the earth material to the shoulder; and compact the reconstructed shoulder to the satisfaction of the Engineer.

The Contractor shall dispose of any excess material generated by the shoulder reconstruction in an approved disposal site.

Measurement and Payment

Shoulder Reconstruction will be measured and paid for as the actual number of shoulder miles that have been constructed. Measurement will be made along the edge of each shoulder. Measurement will be made to the nearest 0.01 of a mile. Such price and payment will be full compensation for furnishing earth material, hauling, placing, compaction, and all incidentals necessary to complete construction of the shoulders.

Incidental Stone Base will be measured and paid for as provided in Article 545-6 of the *Standard Specifications*.

Seeding and Mulching will be measured and paid for as provided elsewhere in this contract.

Payment will be made under:

| Pay Item | Pay Unit |
|-------------------------|-----------------|
| Shoulder Reconstruction | Shoulder Mile |

SHOULDER CONSTRUCTION PROCEDURE:

(7-1-95)

RR 10

Perform shoulder construction immediately following paving operations and in no case allow paving operations to exceed shoulder operations by more than two weeks without written permission of the Engineer. Failure to meet this requirement shall be cause to cease paving operations until it can be met. Place final pavement marking after shoulder construction.

Upon completion of shoulder construction, remove construction signs and use on other projects or store at the county maintenance installation or as directed by the Engineer.

FINAL ACCEPTANCE AND FOURTEEN DAY OBSERVATION PERIOD:

(7-1-95)

RR 13

Upon completion of construction as shown on each map, a 14 day observation period is required before acceptance. During the 14-day period, warrant the resurfaced area against failure.

No payment will be made for replacing failed pavement, as the cost of it will be considered incidental to the work initially paid for under the various items in the contract.

Completion and final acceptance of the project is contingent upon successful completion of the Observation Period. The observation period will be considered a part of the work required to be completed by the final completion date specified herein.

PRICE ADJUSTMENT - ASPHALT BINDER FOR PLANT MIX:

(11-21-00)

RR 19

Price adjustments for asphalt binder for plant mix will be made in accordance with Section 620 of the *Standard Specifications*.

The base price index for asphalt binder for plant mix is \$ 307.86 per ton.

This base price index represents an average of F.O.B. selling prices of asphalt binder at supplier's terminals on **February 1, 2007**.

INCIDENTAL STONE BASE:

(7-1-95) (Rev.7-18-06)

RR 28

Description

Place incidental stone base on driveways, mailboxes, etc. immediately after paving and do not have the paving operations exceed stone base placement by more than one week without written permission of the Engineer.

Materials and Construction

Provide and place incidental stone base in accordance with the requirements of Section 545 of the *Standard Specifications*.

Measurement and Payment

Incidental Stone Base will be measured and paid for in accordance with Article 545-6 of the *Standard Specifications*.

ASPHALT PAVEMENTS - SUPERPAVE:

(7-18-06) (Rev 9-19-06)

RR 31

Revise the *2006 Standard Specifications* as follows:

Page 6-2, Article 600-9 Measurement and Payment

Delete the second paragraph.

Page 6-12, 609-5(C)2(c) add after (AASHTO T 209):

or ASTM D 2041

Page 6-13, last line on page & Page 6-14, Subarticle 609-5(C)(2)(e), delete and substitute the following:

(e) Retained Tensile Strength (TSR) - (AASHTO T 283 Modified), add subarticle (1) Option 1 before the first paragraph.

(1) Option 1

Add subarticle (2) Option 2 and the following sentence as the first sentence of the second paragraph:

(2) Option 2

Mix sampled from truck at plant with one set of specimens prepared by the Contractor and then tested jointly by QA and QC at a mutually agreed upon lab site within the first 7 calendar days after beginning production of each new mix design.

Page 6-28, 610-3(A) Mix Design-General, third sentence of the fourth paragraph:

Substitute 20% for 15%

First, second and third sentences of the fifth paragraph:

Substitute 20% for 15%

Page 6-44, 610-8, third full paragraph, replace the first sentence with the following:

Use the 30 foot minimum length mobile grade reference system or the non-contacting laser or sonar type ski *with at least four referencing stations mounted on the paver at a minimum length of 24 feet* to control the longitudinal profile when placing the initial lanes and all adjacent lanes of all layers, including resurfacing and asphalt in-lays, unless otherwise specified or approved.

Page 6-54, Article 620-4, add the following pay item:

| Pay Item | Pay Unit |
|--|-----------------|
| Asphalt Binder for Plant Mix, Grade PG 70-28 | Ton |

Page 6-69, Table 660-1 **Material Application Rates and Temperatures**, add the following:

| Type of Coat | Grade of Asphalt | Asphalt Rate gal/yd ² | Application Temperature °F | Aggregate Size | Aggregate Rate lb./sq. yd. Total |
|--------------|------------------|-------------------------------------|-------------------------------|----------------|-------------------------------------|
| Sand Seal | CRS-2 or CRS-2P | 0.22-0.30 | 150-175 | Blotting Sand | 12-15 |

Page 6-75, 660-9(B), add the following as sub-item (5)

(5) Sand Seal

Place the fully required amount of asphalt material in one application and immediately cover with the seal coat aggregate. Uniformly spread the fully required amount of aggregate in one application and correct all non-uniform areas prior to rolling.

Immediately after the aggregate has been uniformly spread, perform rolling.

When directed, broom excess aggregate material from the surface of the seal coat.

When the sand seal is to be constructed for temporary sealing purposes only and will not be used by traffic, other grades of asphalt material meeting the requirements of Articles 1020-6 and 1020-7 may be used in lieu of the grade of asphalt required by Table 660-1 when approved.

Page 10-41, Table 1012-1, add the following:

| Mix Type | Course Aggregate Angularity ^(b) ASTM D5821 | Fine Aggregate Angularity % Minimum AASHTO T304 Method A | Sand Equivalent % Minimum AASHTO T176 | Flat & Elongated 5:1 Ratio % Maximum ASTM D4791 Section 8.4 |
|----------|---|--|---------------------------------------|---|
| S 9.5 D | 100/100 | 45 | 50 | 10 |

Page 10-45, Replace Table 1012-2 with the following:

TABLE 1012-2
NEW SOURCE RAP GRADATION and BINDER TOLERANCES
 (Apply Tolerances to Mix Design Data)

| Mix Type | 0-20% RAP | | | 21-25% RAP | | | 26%+ RAP | | |
|--------------------|-----------|--------|-------|------------|--------|-------|----------|--------|-------|
| | Base | Inter. | Surf. | Base | Inter. | Surf. | Base | Inter. | Surf. |
| Sieve (mm) | | | | | | | | | |
| P _b , % | | ± 0.7% | | | ± 0.4% | | | ± 0.3% | |
| 1 1/2" (37.5) | ±10 | - | - | ±7 | - | - | ±5 | - | - |
| 3/4" (19.0) | ±10 | ±10 | - | ±7 | ±7 | - | ±5 | ±5 | - |
| 1/2" (12.5) | - | ±10 | ±6 | - | ±7 | ±3 | - | ±5 | ±2 |
| 3/8" (9.5) | - | - | ±8 | - | - | ±5 | - | - | ±4 |
| No. 4 (4.75) | ±10 | - | ±10 | ±7 | - | ±7 | ±5 | - | ±5 |
| No. 8 (2.36) | ±8 | ±8 | ±8 | ±5 | ±5 | ±5 | ±4 | ±4 | ±4 |
| No.16 (1.18) | ±8 | ±8 | ±8 | ±5 | ±5 | ±5 | ±4 | ±4 | ±4 |
| No. 30 (0.600) | ±8 | ±8 | ±8 | ±5 | ±5 | ±5 | ±4 | ±4 | ±4 |
| No. 50 (0.300) | - | - | ±8 | - | - | ±5 | - | - | ±4 |
| No. 200 (0.075) | ±4 | ±4 | ±4 | ±2 | ±2 | ±2 | ±1.5 | ±1.5 | ±1.5 |

QUALITY MANAGEMENT SYSTEM FOR ASPHALT PAVEMENTS: 08-12-02
 (Hot In-Place Recycled Asphalt Concrete-SUPERPAVE)

1.0 DESCRIPTION:

The work covered by this provision consists of the production and placement of hot in-place asphalt recycled mixtures in accordance with a quality management system as described in these specifications. All provisions of Division 6 of the Standard Specifications, except as modified herein, shall apply.

2.0 DESCRIPTION OF RESPONSIBILITIES:**2.1 Quality Control:**

The Contractor shall provide and conduct a quality control program. A quality control program is defined as all activities, including mix design, process control inspection, sampling and testing, and necessary adjustments in the process that are related to production of a pavement which meets all requirements of the Specifications.

2.2 Quality Assurance:

The Department will conduct a quality assurance program. A quality assurance program is defined as all activities, including inspection, sampling, and testing related to determining that the quality of the completed pavement conforms to specification requirements.

3.0 MIX DESIGN/JOB MIX FORMULA REQUIREMENTS:

All mix design and job mix formula requirements of the Project Special Provision titled "Hot In-Place Recycled Asphalt Concrete" shall apply.

4.0 FIELD VERIFICATION OF MIXTURE AND JOB MIX FORMULA ADJUSTMENTS:

The Contractor shall conduct field verification of the hot in-place mix at the beginning of production of each new mix design. Beginning production shall be limited to a maximum of 2500 linear feet of laydown width for performing the field verification tests. In addition to the required sampling and testing, all preliminary checks and equipment calibrations shall be performed. Records of these checks and calibrations shall be maintained by the Contractor for the Engineer's review and approval.

Field verification testing shall consist of a minimum of one (1) set of samples tested according to "Required Sampling and Testing" specified in Section 5.4. The field verification mix sample shall be obtained from the completed hot in-place recycled mix prior to laydown and compaction and split in accordance with current procedures in the HMA/QMS Manual. Normal production shall not begin until all field verification test results have been completed and approved by the Engineer. Verification is considered satisfactory when all volumetric properties except %Gmm@Nini are within the applicable mix design criteria and the gradation, binder content, and %Gmm@Nini are within the individual limits for the mix type being produced, unless otherwise approved by the Engineer.

Retain records of these calibrations and mix verification tests at the QC laboratory. In addition, furnish copies to the Engineer for review and approval within one working day after beginning production of the mix.

If the Contractor and/or the Engineer determine from results of quality control tests conducted during mix verification that adjustments to the JMF are necessary to achieve specified mix properties, adjustments to the JMF may be made within tolerances permitted by specifications for the mix type being produced. All JMF adjustments will be approved by the Engineer and documented in writing.

Failure by the Contractor to fully comply with the above mix verification requirements shall result in immediate production stoppage by the Engineer. Normal production shall not resume until all mix verification sampling and testing, and calibrations have been performed and approved by the Engineer.

5.0 CONTRACTOR'S QUALITY CONTROL SYSTEM:

5.1 Personnel Requirements:

The Contractor shall provide a certified Hot-In-Place Asphalt Recycling Plant Technician Level I to perform quality control operations and activities at all times during production of hot in-place recycled mix on the project.

In addition, a certified Plant Technician Level I shall be provided at the asphalt plant during production of the hot mix asphalt admixture, if required. A plant operator who is a certified Asphalt Plant Technician Level I may be utilized to meet this requirement when daily production for the admixture is less than 100 tons, provided the randomly scheduled increment sample as defined in Section 5.4 herein, is not due. When performing in this capacity, the plant operator will be responsible for all quality control activities which are necessary and required. Any absence of either Level I Technician, other than those for normal breaks and emergencies must be pre-approved by the appropriate QA Supervisor or his designated representative. Any extended absence of the Technician that has not been approved will result in immediate suspension of production by the Engineer. The Contractor shall also have a certified Asphalt Plant Technician Level II readily available to supervise, coordinate, and make any necessary process adjustments. A plant technician may serve in more than one of the above capacities; however, all specification requirements shall still apply.

The Contractor shall provide a certified QMS Roadway Technician with each hot in-place recycling operation at all times during production and placement of asphalt. This person shall be responsible for and directly supervise all roadway paving operations and roadway quality control processes.

Provide a certified nuclear gauge operator when nuclear density control is being utilized.

All certifications shall be in accordance with the Department's current asphalt technician certification program.

5.2 Field Laboratory Requirements:

The Contractor shall furnish and maintain a Department certified laboratory for quality control testing of the hot in-place recycled mix. The laboratory shall be located either at or near the project site. In either case, all other requirements of these specifications shall apply. The laboratory may be either stationary or portable and shall include all necessary equipment and supplies for performing required Contractor quality control testing. The Contractor shall also furnish a certified laboratory for the quality control testing of the hot mix asphalt admixture. This laboratory may be located at the plant site or may be the laboratory provided at the project site for testing of the hot in-place recycled mix. Convenient telephone and fax machine access for QMS personnel shall be provided by the Contractor at the plant laboratory site producing the admixture and the laboratory site testing the completed mix from the roadway.

5.3 Field Laboratory Equipment:

The laboratory testing equipment shall meet the requirements of the test methods herein identified in Section 5.4 - "Required Sampling and Testing."

Laboratory equipment furnished by the Contractor or his representative shall be properly calibrated and maintained. The Engineer shall be allowed to inspect measuring and testing devices to confirm both calibration and condition. If at any time the Engineer determines that the equipment is not operating properly or is not within the limits of dimensions or calibration described in the applicable test method, the Engineer may stop production until corrective action is taken. The Contractor shall maintain a record of calibration results at the laboratory.

5.4 Required Sampling and Testing (Mixtures):

All mix sampling, testing, data analysis and data posting shall be performed or directly supervised by a certified HIP QMS Asphalt Plant Technician.

The Contractor's quality control process shall include, at a minimum but not limited to, the sampling and testing of all parameters outlined in these provisions using test methods and frequencies as specified herein. The Contractor shall obtain randomly selected samples of hot in-place recycled mix prior to the laydown and compaction processes. A minimum of one random mix sample of 180 pounds shall be taken from each 5000 linear foot test section. The Contractor shall also obtain a minimum of one randomly selected 25 pound sample of the hot mix asphalt admixture, when required, from each 200 ton increment of admixture production. The admixture samples shall be taken from the truck at either the plant site or project site. The random samples shall be obtained and at location(s) determined in accordance with procedures specified in AASHTO T 168. All samples shall be split in accordance with the procedures in the most current edition of the Department's "HMA/QMS Manual" and shall be logged on forms provided by the Engineer. All samples taken shall be split and retained in accordance with these procedures.

The untested split portion of the hot in-place recycled mix sample and hot mix asphalt admixture sample shall be retained for 5 calendar days at the appropriate laboratory site by the Contractor commencing the day the samples are tested. The QC SUPERPAVE Gyratory Compactor (SGC) specimens shall be retained for 2 calendar days commencing the day the specimens are prepared. Disposal permission may be given by Quality Assurance personnel prior to these maximum storage periods. The split portion of the Contractor's mix verification sample shall be retained until disposal permission is given by QA personnel. All retained samples shall be stored in a dry and protected location.

The Contractor shall maintain minimum test frequencies as established above. All tests shall be completed within 24 hours of the time the sample was taken, unless specified otherwise in these provisions. Should the specified tests not be completed within the required time frame, production will cease at that point until such time the tests are completed.

The Contractor may utilize innovative equipment or techniques not addressed by these specifications to produce and/or monitor the production of the mix, subject to approval by the Engineer.

Should the Contractor's testing frequency for hot in-place recycled mix fail to meet the minimum frequency requirement, all mix without the specified test representation shall be considered unsatisfactory. If the Engineer allows the mix to remain in place, payment will be made at 50 percent of the contract unit bid price for the hot in-place recycling.

Should the Contractor's testing frequency for the hot mix asphalt admixture fail to meet the minimum requirements, all admixture without test representation shall be considered unsatisfactory, and will be paid for at 50 percent of the contract unit bid price for the admixture.

QUALITY CONTROL SAMPLING AND TESTING SCHEDULE (MIXTURES)

A. Hot In-Place Recycled Mix:

1. Blended aggregate recovered from hot in-place recycled mix sample (AASHTO T-30 and T-11) (Shall be graded on all sieves specified on the job mix formula.)
2. Binder Content, % (Contractor may select any option below)
 - a. Extraction (AASHTO T-164)
 - b. Ignition Furnace (AASHTO T 308 Modified)
 - c. OTHER: Contractor may request to use other means of checking Binder Content subject to approval by the Engineer.
3. Maximum Specific Gravity (AASHTO T 209)
4. Bulk Specific Gravity of Compacted Specimens (AASHTO T 166, Average of 3 specimens at N_{des} gyrations (AASHTO PP 28 and AASHTO TP 4))
5. Air Voids (VTM), Average of 3 specimens at N_{des} gyrations
6. Voids in Mineral Aggregate (VMA) (calculation)
7. Voids Filled with Asphalt (VFA) (calculation)
8. $P_{0.075}/P_{be}$ Ratio
9. % Maximum Specific Gravity at N_{ini} (calculation)

- B. Hot Mix Asphalt Admixture (if required):
1. Binder Content, % (Contractor may select any option below)
 - a. Extraction (AASHTO T-164)
 - b. Ignition Furnace (AASHTO T 308 Modified)
 - c. OTHER: Contractor may request to use other means of checking AC Content subject to approval by the Engineer
 2. Blended aggregate recovered from admixture sample (AASHTO T-30 and T-11) (Shall be graded on all sieves specified on the job mix formula.)

In addition to the above sampling and testing program, the following test shall be conducted as indicated:

Penetration Test (AASHTO T 49) from Absorb Recovery (AASHTO T 170).

Test performed on hot in-place mix sampled from roadway during field verification and at a minimum of weekly thereafter; however, penetration results are not required for approval of the field verification. Recovery and Penetration Test may be performed at an off-site laboratory. Results must be furnished to the Engineer within 3 working days of obtaining the sample.

5.5 Documentation (Records):

The Contractor shall document all observations, records of inspection, samples taken, adjustments to the mix, and test results on a daily basis. Results of observations and records of inspection shall be noted as they occur in a permanent field record. Adjustment to mix production and test results shall be recorded on forms provided by the Engineer.

All such records shall be made available to the Engineer, upon request, at any time during project construction. All QC records and forms shall be completed and distributed in accordance with the most current edition of the Department's "HMA/QMS Manual". At the completion of the project, a copy of the control charts (with the moving average shown in red) shall be provided to the Engineer in a neat and orderly manner. The QC testing forms shall be maintained by the Contractor for 1 year after completion of the form.

Failure to maintain QC records and forms as required, or to provide these records and forms to the Engineer upon request, may result in production stoppage until the problem is resolved.

Falsification of test results, documentation of observations, records of inspection, adjustments to the process, discarding of samples and/or test results, or any other deliberate misrepresentation of the facts will result in the revocation of the applicable person's QMS certification. The Engineer will determine acceptability of the mix and/or pavement represented by the falsified results or documentation. If the mix and/or pavement in question is determined to be acceptable, the Engineer may allow the mix to remain in place at no pay for mix processing, admixture, asphalt binder, rejuvenating agent and/or other mix components. If the mix and/or pavement represented by the falsified results are determined not to be acceptable, reprocess or remove and replace with mix which complies with the Specifications as approved by the Engineer. Payment will be made

for the actual quantities of materials required to reprocess or replace the falsified quantities, not to exceed the original amounts.

5.6 Documentation (Control Charts):

Standardized control charts furnished by the Department shall be maintained by the Contractor at the appropriate field laboratory. All test results obtained by the Contractor shall be recorded on control charts the same day tests are conducted.

Results of quality assurance tests performed by the Engineer will be posted on the Contractor's control charts as data becomes available.

The following data shall be recorded on standardized control charts:

Hot In-Place Recycled Mix:

1. Aggregate Gradation Test Results:
 - a. For each mix type: one sieve size smaller than the mix nominal maximum size.
 - b. For all mix types: 2.36 mm and 0.075 mm sieves
2. Binder Content, %, P_b
3. Bulk Specific Gravity of Compacted Specimens at N_{des} (measured)
4. Maximum Specific Gravity Determined by AASHTO T 209
5. Percent Voids in Total Mix at N_{des} Gyration
6. Percent Voids in Mineral Aggregate at N_{des} Gyration

Hot Mix Asphalt Admixture, if required:

1. Binder Content, %, P_b
2. 0.075 mm sieve

Both the individual test value and the moving average of the last four (4) data points will be plotted on each chart. The Contractor's test data will be shown in black and the moving average in red. The Engineer's assurance data will be plotted in blue. The warning control limits shall be drawn with a dash green line, the JMF control limits with a dash blue line, and individual test limits with a dash red line.

Once a moving average has been established for a given JMF, the moving average shall be continuous with the following exceptions. A new moving average shall be re-established when a change in the asphalt cement percentage or aggregate blend is made in the JMF or when the Contractor elects or is required to stop production after one or two moving average values, respectively, fall outside the warning limits as outlined in Section 5.9. In addition, if the Contractor fails to stop production after two consecutive moving averages exceed the warning limits, but does stop production at a subsequent time, a new moving average shall be re-established beginning at the actual production stop point. The moving averages for all other mix properties shall also be re-established. Moving averages will not be re-established when

production stoppage occurs due to an individual test result exceeding the Specification requirements.

All individual test results shall be part of the quality control record and shall be included in moving average calculations with the following exception. When the Contractor's testing data has been proven incorrect, the correct data as determined by the Engineer shall be used in lieu of the Contractor's data to determine acceptance of the mix in question. In this case, only the data in question shall be replaced.

5.7 Control Limits:

The following shall be considered control limits for mix production. For each criteria, the warning and moving average control limits are based on a moving average of the last four (4) data points. All control limits will be applied to target data given on the current JMF except VMA limits. VMA control limits will be based against the minimum specification requirement for that mix type.

| Hot In-Place Recycled Mix (Control Criteria) | Warning | Control Limits | |
|---|---------|-------------------|-----------------|
| | | Moving Average | Individual Test |
| 2.36 mm Sieve | ± 4.0 | ± 5.0 | ± 8.0 |
| 0.075 mm Sieve | ± 1.5 | ± 2.0 | ± 2.5 |
| Binder Content, % | ± 0.3 | ± 0.5 | ± 0.7 |
| Air Voids(VTM)% @ N _{des} | ± 1.0 | ± 1.5 | ± 2.0 |
| VMA, % @ N _{des} | - 0.5 | -0.8 | - 1.0 |

Hot Mix Asphalt Admixture, if required:

| | | | |
|-------------------|-------|-------|-------|
| Binder Content, % | ± 0.3 | ± 0.5 | ± 0.7 |
| 0.075 mm sieve | ± 1.5 | ± 2.0 | ± 2.5 |

5.8 Warning Bands:

Warning bands are defined as the area between the Warning limits and Moving Average Limits.

5.9 Corrective Action:

All required corrective actions are based upon initial test results and should be taken immediately upon obtaining those results.

When an individual test result for a mix control criteria exceeds both the individual test control limits and the applicable specification mix design limits, production of that mix shall cease immediately. Normal production of the mix in question shall not resume until approval is given by the Engineer.

Acceptance of all mix failing to meet the individual test control limits as described above will be determined in accordance with Article 105-3. In addition, any mix that is obviously unacceptable will be rejected for use in the work.

Failure to stop production and make adjustments when required due to an individual test not meeting the specified requirements shall subject all mix from the stop point tonnage to the point when the next individual test is back on or within the warning limits, or to the tonnage point when production is actually stopped, whichever occurs first, to be considered unacceptable. This material shall be remilled and reprocessed to comply with the specifications, unless otherwise approved by the Engineer.

If two consecutive moving average values for any one of the mix control criteria fall outside the warning limits, the Contractor shall cease production of that mix and make adjustments. The Contractor may elect to stop production after only one moving average value falls outside the warning limits. In either case, a new moving average shall not be determined until the fourth test after the elective or mandatory stop in production. Normal production of the mix in question shall not be resumed until approved by the Engineer.

If the process adjustment improves the property in question such that the moving average after four additional tests is on or within the warning limits, the Contractor may continue production with no reduction in payment.

If the adjustment does not improve the property in question such that the moving average after four additional tests is not on or within the warning limits, the applicable mix shall be accepted in accordance with Article 105-3. The quantity of mix in question will be determined by the Engineer. Any mix which is obviously unacceptable will be rejected for use in the work.

Failure to stop production and make adjustments as described above due to two consecutive moving average values falling outside the warning limits shall subject all mix produced from the stop point tonnage to the tonnage point when the moving average is back on or within the warning limits, or to the tonnage point when production is actually stopped, whichever occurs first, to be considered unacceptable. This material shall be remilled and reprocessed to comply with the specifications, unless otherwise approved by the Engineer.

5.10 Allowable Retesting for Mix Deficiencies:

The Contractor may elect to resample and retest for hot in-place recycled mix deficiencies when individual QC test(s) exceed one or more of the mix property target(s) by more than the tolerances indicated below. The retesting shall be performed within 10 days of the initial test results. Retesting shall be approved by the Engineer prior to being performed and shall be in accordance with the Department's "Guidelines For Retests Of Plant Mix Deficiencies" as outlined in the HMA/QMS Manual except will based on equivalent linear feet in lieu of tonnage. Retests for any mix deficiency other than as listed below will not be allowed unless otherwise permitted by the Engineer. Acceptance of the mix in question will be based on the retest data in

accordance with Article 105-3. The Department reserves the right to direct the Contractor to resample and retest at any time or location as directed by the Engineer.

| | |
|-----------------|---|
| Air Voids (VTM) | -- by more than +/- 2.5% |
| Binder Content | -- by more than +/- 1.0% |
| VMA | -- by more than - 2.0% |
| 0.075 mm sieve | -- by more than +/- 3.0% |
| 2.36 mm sieve | -- exceeds Specification Mix Design Limits and one or more of the above tolerances are also exceeded. |

6.0 QUALITY ASSURANCE OF MIX:

Quality assurance will be accomplished in the following ways:

1. By conducting assurance testing of split samples obtained by the Contractor at a frequency equal to or greater than 10% of the frequency required of the Contractor;
2. By periodically observing tests performed by the Contractor;
3. By monitoring required control charts exhibiting test results of control parameters;
4. By directing the Contractor to take additional samples at any time and any location during production (in lieu of the next scheduled random sample) and;
5. By conducting verification sampling and testing on samples taken independently of the Contractor's quality control samples at a frequency equal to or greater than 5% of the required QC sample frequency; and
6. By any combination of the above

In all cases, the Engineer's quality assurance and verification testing will be independent of the Contractor's tests. The Department's quality assurance program will be conducted by a certified QMS technician(s).

The Engineer will conduct assurance tests on split samples taken by the Contractor for quality control testing. These samples may be the regular quality control samples or a sample selected by the Engineer from any location in the process. The frequency will be equal to or greater than 10% of that required of the Contractor as stated in Section 5.4 - "Required Sampling and Testing". The Engineer may select any or all split samples for assurance testing. Results of quality assurance tests will be provided to the Contractor within 3 working days after the sample has been obtained. Differences between the Contractor's and the Department's split sample test results will be considered acceptable if within the following limits:

| Test Parameter | Acceptable Limits of Precision |
|----------------|--------------------------------|
| 12.5 mm Sieve | ±6.0 |
| 9.5 mm Sieve | ±5.0 |
| 4.75 mm Sieve | ±5.0 |

| | |
|--|--------|
| 2.36 mm Sieve | ±5.0 |
| 0.075 mm Sieve | ±2.0 |
| Binder Content, % | ±0.5 |
| Maximum Specific Gravity Mix, G_{mm} | ±0.020 |
| SGC Bulk Specific Gravity, G_{mb} | ±0.030 |

In the event comparison test results are outside the above acceptable limits of precision, or the quality assurance test results are either outside the individual test control limits or fail to meet Specification requirements, the Engineer will immediately investigate the reason for the difference. If the potential for a pavement failure is present, the Engineer may suspend production, wholly or in part, in accordance with Article 108-7 while the investigation is in progress. The Engineer's investigation may include joint testing of any remaining split samples, review and observation of the Contractor technician's sampling and testing procedures and equipment, and a comparison of split sample test results on mix currently being produced. If reasons for the difference cannot be determined, payment for the mix in question will be determined in accordance with Article 105-3.

The Engineer will periodically witness the sampling and testing being performed by the Contractor. If the Engineer observes that the sampling and quality control tests are not being performed in accordance with the applicable test procedures, the Engineer may stop production until corrective action is taken. The Engineer will promptly notify the Contractor of observed deficiencies, both verbally and in writing. The Engineer will document all witnessed samples and tests.

The Engineer will elect to obtain verification samples for testing independent of the Contractor's quality control process. These samples will be split for testing by the Engineer and the Contractor.

7.0 ACCEPTANCE of MIX:

The Engineer will base final acceptance of the mix on the results of random testing made on split samples during the assurance process and validation of the Contractor's quality control process as outlined in Sections 5.9 and 6.0.

8.0 MILLING DEPTH QUALITY MANAGEMENT:

8.1 Quality Control of Milling Depth:

The Contractor shall perform quality control of the milling process in accordance with applicable provisions of Section 607 of the Standard Specifications, except as modified herein.

The minimum frequency of checking the milling depth shall be at least one set of measurements for each 500 feet of milled pavement length. These measurements shall be taken by either

stretching a stringline transversely across the milled area or by extending a straightedge from the existing pavement transversely over the milled area and taking measurements at the approximate quarter points of the milled pavement. When the average depth of milling is less than the depth specified on the plans by more than $\frac{1}{4}$ inch, corrective action shall be initiated. When two consecutive averages from the above sets of measurements exceed the tolerance specified, work shall be stopped until the process can be corrected.

A permanent field record of these milled depths shall be maintained by the Contractor and made available to the Engineer anytime upon request and upon completion of the project.

8.2 Quality Assurance of Milling Depth:

The Departments quality assurance program for milling depth will consist of the following:

1. By re-measuring randomly selected quality control measurements at a frequency equal to or greater than 10% of the frequency required of the Contractor;
2. By periodically observing measurements performed by the Contractor; and
3. By conducting verification measurements independently of the Contractor's quality control measurements at a frequency equal to or greater than 5% of the required QC sample frequency;

8.3 Quality Acceptance of Milling Depth:

The Department will evaluate the finished asphalt pavement for milling depth compliance using the Contractor's milling depth quality control test results, the Department's quality assurance test results, and by observation of the Contractor's depth quality control process as outlined in Subarticle 8.1 and Subarticle 8.2. Any pavement found to be deficient in milled depth shall be evaluated for acceptance in accordance with Article 105-3 of the Standard Specifications.

9.0 FIELD COMPACTION QUALITY MANAGEMENT:

9.1 Contractor Quality Control of Density:

The Contractor shall perform quality control of the compaction process in accordance with applicable provisions of Article 609-5(D) of the Standard Specifications, except as modified herein. The Contractor may elect to use either cored sample density procedures or nuclear gauge density procedures. The method of density quality control shall be provided to the Engineer by the Contractor at the preconstruction conference.

The minimum frequency of sampling and testing by either method shall be based on test sections consisting of not more than 2000 linear feet of laydown width.

Nuclear density control procedures shall be in accordance with the Department's most current Nuclear Gauge Operator's Manual. This manual may be obtained through the Department's M&T Soils Section. Density shall be determined by the backscatter method of testing using a thin-lift nuclear gauge, with printer, which has been approved by the Department. The

Contractor shall furnish, maintain, and operate the nuclear gauge. The gauge operator shall have been certified by the Department. The gauge shall have been calibrated within the previous 12 months by an approved calibration service. The Contractor shall maintain documentation of such calibration service for a 12 month period.

The Contractor shall establish acceptable control strips at locations approved by the Engineer. Control strip shall be 300 feet in length at the laydown width of the paver. Nuclear density control strips shall be placed at the frequencies specified in the Department's most current Nuclear Gauge Operators Manual. Core sample control strips shall be placed anytime the Contractor is proceeding on limited production due to failing densities. In addition, control strips shall be placed anytime deemed necessary by the Engineer.

When cored sample control is being utilized the testing frequency shall consist of a minimum of one random 6 inch (152 millimeters) core sample taken from each test section, except that not less than three cored samples shall be taken from each mix type and/or lot placed on a given day. The Contractor may elect to take full depth cores instead of placing a separator beneath the layer to be tested. Should full depth cores be taken, he is responsible to separate the layer of mix to be tested in a manner such that it is not damaged.

When cored sample control is being utilized and a core sample appears not to be representative in comparison with other cores from the same lot and is more than 2.0 percent below the average of all core samples from the same lot, check samples may be taken by the Contractor. For each core sample that is in question, there shall be three check samples taken: one adjacent to the initial sample and one ten feet to each side, longitudinally, of the initial sample. The results of these 3 check samples will be averaged and this average will be used instead of the initial core results in question. The initial core sample results will not be used if check samples are taken. Check samples must be taken within 2 calendar days of the date of the initial sample. Only one set of check samples per sample location will be allowed. If full depth cores are necessary at these check sample locations, separation of the layer to be tested will be the responsibility of the Contractor. All check samples shall be taken in the presence of a representative of the Engineer. In addition, a QA comparison core sample(s) may be taken adjacent to one or more of these check samples.

When nuclear gauge control is being utilized, the testing frequency shall consist of five random gauge readings (one from each of five equally spaced increments) from each test section.

The Contractor shall maintain minimum test frequencies as established above. Should the Contractor's density testing frequency fail to meet the minimum frequency as specified above, all mix without required density test representation shall be considered unsatisfactory and if allowed to remain in place, will be paid for at 50 percent of the contract unit bid price for the mixture.

All QC nuclear density tests shall be conducted the same day that the mix being tested was placed and compacted. All core samples shall be cored no later than the beginning of the next production day, not to exceed three (3) calendar days. QC core samples shall be tested and test results submitted to the Engineer within one working day of the time the samples were taken.

Should the specified density tests not be completed within the applicable time frame, production will cease at that point until such time the required tests are completed.

The Contractor's quality control density core samples shall be retained for 5 calendar days, commencing the day the samples are tested, at the laboratory located on or near the project, or until disposal permission is granted by the Quality Assurance personnel, whichever occurs first. The Department's comparison quality assurance core samples shall be retained in a sealed container at the above laboratory site until obtained by quality assurance personnel. All retained density samples shall be stored on a smooth, flat surface in a cool, dry protected location.

Proceed on limited production when three failing density lots occur, not to exceed two production days or two consecutive failing nuclear control strips occur for the same mix type.

Limited production is defined as the production, placement, and compaction of a sufficient quantity of hot in-place recycled mix to construct a 300 feet control strip plus 100 feet of pavement adjacent to each end of the control strip. The Contractor shall remain on limited production until such time as satisfactory density results are attained or two control strips have been attempted without achieving acceptable density test results, whichever occurs first.

If the Contractor fails to achieve satisfactory density at this point, production of the asphalt mix shall cease until the cause of the failing density test results can be determined. Should the Contractor not operate by the limited production procedures as specified above, the two consecutive failing production days and all mix produced thereafter will be considered unacceptable. This material shall be reprocessed or removed and replaced with material that complies with the Specifications, unless otherwise approved by the Engineer.

9.2 Quality Assurance of Density:

The Departments quality assurance program for density will consist of the following:

1. By retesting randomly selected quality control test sections (either cores or nuclear);
2. By periodically observing tests performed by the Contractor;
3. By testing randomly selected comparison core samples taken adjacent to the Contractor's quality control core samples (8" (200 mm) center-to-center) at a frequency equal to or greater than 10% of the frequency required of the Contractor;
4. By conducting verification sampling and testing on test sections (either core or nuclear) independently of the Contractor's quality control test sections at a frequency equal to or greater than 5% of the required QC sample frequency;

Comparison and verification core samples will be taken in the presence of a DOT technician, and either delivered directly to the appropriate QA Lab by a DOT technician or placed in a sealed container and delivered to the Contractor's QC Lab for QA testing.

Results of all density quality assurance tests will be provided to the Contractor within 3 working days after the samples have been obtained by the QA personnel.

Differences between the Contractor's quality control and the Department's quality assurance test results will be considered acceptable if within the following limits.

| Test | Acceptable Limits of Precision |
|---|--------------------------------|
| Retest of QC Core Sample | ±1.2% (% Compaction) |
| Comparison QA Core Sample | ±2.0% (% Compaction) |
| QA Verification Core Sample | ±2.0% (% Compaction) |
| Nuclear Comparison of QC Test Section (Average of 5 Tests in Test Section) | ±2.0 %(% Compaction) |
| QA Nuclear Verification Test | ±2.0% (% Compaction) |

In the event test results are outside the above acceptable limits of precision or the quality assurance test results are below the minimum specification requirements, the Engineer will immediately investigate the reason for the difference. If the potential for a pavement failure is present, the Engineer may suspend production, wholly or in part, as stated in Article 108-7 of the Standard Specifications while the investigation is in progress. The Engineer's investigation may include checking of the Contractor's testing equipment, comparison testing of other retained quality control samples, or additional core sample testing of the roadway pavement in question. If additional core samples are necessary to resolve the difference, the Contractor shall core these samples at the direction of the Engineer and these will be tested jointly by the Contractor's quality control and Department's quality assurance personnel. If the reason for the difference cannot be determined, payment for the mix in question will be determined in accordance with Article 105-3 of the Standard Specifications. If the reason for the difference is determined to be an error or other discrepancy in the quality control test results, the applicable quality assurance test results will be used to determine compliance with the Specification density requirements.

9.3 Acceptance of Density:

The Department will evaluate the asphalt pavement for density compliance after the asphalt mix has been placed and compacted using the Contractor's quality control test results, the Department's quality assurance test results, and by observation of the Contractor's density quality control process. Minimum density requirements will be as specified for each mix type in the project special provision titled Hot In-Place Recycled Asphalt Concrete. Density compliance for nuclear gauge control will be as provided in the Department's Nuclear Gauge Operator's Manual. Density compliance for core samples will be determined by use of the average Marshall lab specific gravity until a moving average of four lab specific gravities is attained. Once a moving average is established for the lab specific gravity, the last moving average in effect at the end of the same day's production will then be used to determine density compliance.

The pavement will be accepted for density on a lot by lot basis. A lot will consist of one (1) day's production of a given mix type on the project except that individual map sections will be evaluated as separate lots, unless otherwise approved by the Engineer. The Engineer will determine the final quantity of each lot.

A failing lot for density purposes is defined as a lot for which the average of all test sections fails to meet the minimum specification requirement. In addition, any lot or portion of a lot that is obviously unacceptable will be rejected for use in the work.

Acceptance of all failing lots will be made under the provisions of Article 105-3 of the Standard Specifications.

Any reduction in pay due to failing densities will be in addition to any reduction in pay due to failing mix property test results on the same mix.

10.0 COMPENSATION:

The production and construction of all hot in-place recycled asphalt mixtures and pavements shall be performed in accordance with these provisions. There will be no direct payment for the quality control work required herein. Payment at the contract unit prices for the various asphalt related items will be full compensation for all work covered by this provision.

CONSTRUCTION SEQUENCE:

(7-1-95)

RR 34

Pave each section of roadway begun in a continuous operation. Do not begin work on another section of roadway unless satisfactory progress is being made toward completion of intersections and all other required incidental work by satisfactorily furnishing additional paving equipment and personnel, except for milling and patching operations.

GLASS BEADS:

(7-18-06)

RR 35

Revise the *2006 Standard Specifications* as follows:

Page 10-223, 1087-4(C) Gradation & Roundness

Replace the second sentence of the first paragraph with the following:

All Drop-On and Intermixed Glass Beads shall be tested in accordance with ASTM D1155.

Delete the last paragraph.

ASPHALT BINDER CONTENT OF ASPHALT PLANT MIXES:

(1-1-02)

RR 43

The approximate asphalt binder content of the asphalt concrete plant mixtures used on this project will be as follows:

| | | |
|--------------------------------------|--------------|-------|
| Asphalt Concrete Base Course | Type B 25.0 | 4.3 % |
| Asphalt Concrete Intermediate Course | Type I 19.0 | 4.7 % |
| Asphalt Concrete Surface Course | Type S 4.75A | 7.0 % |

| | | |
|---------------------------------|-----------------|-------|
| Asphalt Concrete Surface Course | Type SF 9.5A | 6.5 % |
| Asphalt Concrete Surface Course | Type S 9.5 ___ | 6.0 % |
| Asphalt Concrete Surface Course | Type S 12.5 ___ | 5.5 % |

The actual asphalt binder content will be established during construction by the Engineer within the limits established in the *Standard Specifications*.

ASPHALT PLANT MIXTURES:

(7-1-95)

RR 46

Place asphalt concrete base course material in trench sections with asphalt pavement spreaders made for the purpose or with other equipment approved by the Engineer.

RESURFACING EXISTING BRIDGES:

(7-1-95)

RR 61

The Contractor's attention is directed to the fact that he will be required to resurface the bridges on this project if directed by the Engineer.

Place the surface so as to follow a grade line set by the Engineer with the minimum thickness as shown on the sketch herein or as directed by the Engineer. State Forces will make all necessary repairs to the bridge floors prior to the time that the Contractor places the proposed surfacing. Give the Engineer at least 15 days notice prior to the expected time to begin operations so that State Forces will have sufficient time to complete their work.

At all bridges that are not to be resurfaced, **mill a taper into existing pavement for a length of 25' per inch of final surface. A temporary asphalt wedge will be required immediately after milling to ensure smooth travel if the final layer of surface course is not placed on the same day as milling.**

PAVING INTERSECTIONS:

(7-1-95)

RR 67

Surface all unpaved intersections back from the edge of the pavement on the main line of the project at least 50 feet. The pavement placed in the intersection shall be of the same material and thickness placed on the main line of the project.

Resurface all paved intersections back to the ends of the radii, or as directed by the Engineer.

The base on the unpaved intersections will be placed and prepared for surfacing by State Forces.

Widen the pavement on curves as directed by the Engineer.

TRENCHING FOR BASE COURSE:

(7-1-95)

RR 79

Perform all trenching necessary to place the asphalt concrete base course widening in accordance with the typical sections, at locations shown on the sketch maps, and as directed by the Engineer.

Perform the trenching for the base course on the same day that the base course is to be placed. If the base course cannot be placed on the same day the trench section is excavated, backfill the trench with earth material and compact it to the satisfaction of the Engineer. Once the trench is open, perform backfilling and re-opening of the trench at no cost to the Department.

The Contractor will be restricted to widening one side of the project at a time unless otherwise permitted by the Engineer. In widening, operate equipment and conduct operations in the same direction as the flow of traffic.

Density tests may be taken every 2000 feet in the widened areas as directed by the Engineer. Shape and compact the subgrade in the widened areas to the satisfaction of the Engineer. Compact the asphalt concrete base course in the widened areas in accordance with the provisions of Article 610-9 of the *Standard Specifications*.

Place the excavated material from trenching operation on the adjacent shoulder area as directed by the Engineer. Cut adequate weep holes in the excavated material to provide for adequate drainage as directed by the Engineer. Remove all excavated material from all drives to provide ingress and egress to abutting properties and from in front of mailboxes and paper boxes. Saw a neat edge and remove all asphalt and/or concrete driveways, and existing asphalt widening, as directed by the Engineer, to the width of the widening and dispose of any excavated concrete or asphalt materials. Properly reconnect driveways.

Upon completion of the paving operation, backfill the trench to the satisfaction of the Engineer. Properly dispose of any excess material remaining after this operation.

No direct payment will be made for trenching, sawing, and removal of driveways, depositing material on shoulder area, backfilling trench, or removal of spoil material, as the cost of this work shall be included in the contract unit price per ton for *Asphalt Concrete Base Course, Type ____*.

PATCHING EXISTING PAVEMENT:

(1-15-02) (Rev.7-18-06)

RR 88

Description

The Contractor's attention is directed to the fact that there are areas of existing pavement on this project that will require repair prior to resurfacing. Patch the areas that, in the opinion of the Engineer, need repairing. The areas to be patched will be delineated by the Engineer prior to the Contractor performing repairs.

Materials

The patching consists of Asphalt Concrete Base Course, Asphalt Concrete Intermediate Course, Asphalt Concrete Surface Course, or a combination of base, binder and surface course.

Construction Methods

Remove existing pavement at locations directed by the Engineer in accordance with Section 250 of the *Standard Specifications*.

Place Asphalt Concrete Base Course, in lifts not exceeding 5 1/2 inches. Utilize compaction equipment suitable for compacting patches as small as 3.5 feet by 6 feet on each lift. Use an approved compaction pattern to achieve proper compaction. If patched pavement is to be open to traffic for more than 48 hours prior to overlay, use Asphalt Surface Course in the top 1.25 inches of the patch.

Schedule operations so that all areas where pavement has been removed, will be repaired on the same day of the pavement removal and all lanes of traffic restored.

Measurement and Payment

Patching Existing Pavement will be measured and paid for as the actual number of tons of asphalt plant mix complete in place, that has been used to make completed and accepted repairs. The asphalt plant mixed material will be measured by being weighed in trucks on certified platform scales or other certified weighing devices. The above price and payment will be full compensation for all work covered by this provision, including but not limited to removal and disposal of pavement; furnishing and applying tack coat; furnishing, placing, and compacting of asphalt plant mix; furnishing of asphalt binder for the asphalt plant mix; and furnishing scales.

Patching Existing Pavement will be considered a minor item. In the event that the item of Patching Existing Pavement overruns the original bid quantity by more than 100 percent, the provisions of Article 104-5 of the *Standard Specifications* pertaining to revised contract unit price for overrunning minor items will not apply to this item. Any provisions included in the contract that provides for adjustments in compensation due to variations in the price of asphalt binder will not be applicable to payment for the work covered by this provision.

Payment will be made under:

| Pay Item | Pay Unit |
|----------------------------|-----------------|
| Patching Existing Pavement | Ton |

AGGREGATE PRODUCTION:

(11-20-01) (Rev. 11-21-06)

RR 109

Provide aggregate from a producer who uses the current Aggregate Quality Control/Quality Assurance Program which is in effect at the time of shipment.

No price adjustment is allowed to contractors or producers who use the program. Participation in the program does not relieve the producer of the responsibility of complying with all requirements of the *Standard Specifications*. Copies of this procedure are available upon request from the Materials and Test Unit.

CHANGEABLE MESSAGE SIGNS

(11-21-06)

RR 111

Revise the *2006 Standard Specifications* as follows:

Page 11-9, Article 1120-3, Replace the 3rd sentence with the following:

Sign operator will adjust flash rate so that no more than two messages will be displayed and be legible to a driver when approaching the sign at the posted speed.

CONCRETE BRICK AND BLOCK PRODUCTION:

(11-20-01) (Rev. 11-21-06)

RR 112

Provide concrete brick and block from a producer who uses the current Solid Concrete Masonry Brick/Unit Quality Control/Quality Assurance Program that is in effect on the date that material is received on the project.

No price adjustment is allowed to contractors or producers who use the program. Participation in the program does not relieve the producer of the responsibility of complying with all requirements of the *Standard Specifications*. Copies of this procedure are available upon request from the Materials and Test Unit.

REMOVAL OF EXISTING PAVEMENT MARKERS:

(7-1-95)

RR 118

The Contractor's attention is directed to the fact that there are pavement markers on this project.

Remove and dispose of these markers prior to the paving operation.

No direct payment will be made for this work, as it will be incidental to the paving operation and payment at the contract unit price for the various asphalt items in the contract will be full compensation for such work.

PAVEMENT MARKING LINES MEASUREMENT AND PAYMENT:

(11-21-06)

RR 120

Revise the *2006 Standard Specifications* as follows:

Page 12-14, Subarticle 1205-10, delete the first sentence of the first paragraph and replace with the following:

Pavement Marking Lines will be measured and paid for as the actual number of linear feet of pavement marking lines per application that has been satisfactorily placed and accepted by the Engineer.