Illinois Department of Transportation
Division of Highways / Bureau of Construction
2300 South Dirksen Parkway, Springfield, Illinois 62764

Subject:
Placement of
Hot Mix Asphalt
Article 406.06

CONSTRUCTION MEMORANDUM 08-55

Effective: **January 1, 2008**

Expires: **Indefinite**

This Construction Memorandum supersedes Construction Memorandum No. 02-55, dated May 31, 2002.

Quality in Hot Mix Asphalt (HMA) construction can be achieved if field personnel have a full understanding of the mixtures being produced, the specification requirements for each mixture, the tests that are required to be taken, and how to identify and correct problems as they develop.

The purpose of this memorandum is to present to District field personnel many of the tools and procedures with which they need to be familiar to properly supervise the placement of HMA.

REFERENCES

Prior to the start of work, the Resident and staff should review the following documents:

- HMA pay item references in the Standard and Supplemental Specifications, special provisions, plan details and Construction Manual
- Manual of Test Procedures for Materials
- Bureau of Materials and Physical Research Policy Memoranda:

  Storage of Hot Mix Asphalt
  Approval of Hot Mix Asphalt Plants and Equipment

ASPHALT CONTENT & DENSITY

It is important that the Contractor, Resident, and Proportioning Technician know the percentage of asphalt to be used in each HMA mixture included in any particular project.

START-UP TEAM

The day prior to the HMA laydown, a meeting should be held with the Supervising Field Engineer, Resident and Contractor to discuss the procedures, guidelines and equipment to be used and to ensure that the rollers meet contract requirements.

If the test strip evaluation indicates changes need to be made in the mix, another test strip may be required. If the evaluation shows the mix to be satisfactory, the roller pattern will then be established.

Less compactive effort is not a proper answer to too much density. A mix with excess density potential, as identified by a growth curve, should not be used. Data associated with development of the growth curve should be clearly documented.

PAVER SPEED

The asphalt construction industry has recognized that continuous paver speed is essential to a smooth riding surface. Paver speed must be coordinated with both roller speed and plant production. Frequent start-stop operation of the paver should not be permitted. The Resident should check the speed of the paver and limit its maximum speed to that which is allowed by the Standard Specifications.

Bursts of paver speed to empty waiting truckloads of material makes it difficult to cover the mat with the established roller pattern. Usually, the faster the paver runs the lower the mat density will be behind the paver with a given rolling pattern/speed. Therefore, if a paver is permitted to run faster, additional compactive effort will be needed to achieve density.

AUTOMATIC GRADE CONTROL

The present Specifications (Article 406.06) for automatic grade control for asphalt pavers are based upon research which shows that a 30-foot (9 m) or longer ski provides a riding quality superior to that of the reference surface, a 10 ft (3 m) ski provides a riding quality equal to that of the reference surface, and a 6 in (150 mm) joint matching shoe provides a riding quality substantially poorer than that of the reference surface.

The Specifications reflect the results of the research data by requiring a minimum 30 ft (9 m) long ski on all lifts and passes except a 10 ft (3 m) long ski is permitted when placing HMA where traffic interference or sharp curves make the minimum 30-foot (9 m) ski impractical. While the use of a ski is mandatory, there are areas where it is impractical and/or impossible to use a ski. The Contractor may then be permitted to use manual grade control or a matching shoe. Such areas would include short-length low-speed intersection improvements, side street returns, entrances, and other miscellaneous areas where the Resident determines that neither length ski can be practically used.

When placing HMA within 200 ft (60 m) of a bridge abutment, Article 406.06 requires that the automatic grade control be operated from a present grade control stringline. This requirement should be strictly followed to ensure a smooth transition between pavement and bridge deck.

ROLLERS

Prior to the start of laydown operations, each roller shall be checked for compliance with the Specifications. Roller patterns shall be established during start-up operations on all HMA mixtures. The breakdown roller should be kept reasonably close to the paver. When HMA shoulders are placed simultaneously with the adjacent lane compaction on both the pavement and shoulder must be considered when establishing the rolling pattern. An additional roller may be required on the shoulder to obtain density at the paver's operating speed.

Vibratory roller speed and frequency of vibration must be matched to prevent transverse ridges which result from widely-spaced impacts. A vibratory roller operated at excessive speeds, producing impacts less than l0 blows per foot (30 blows per meter), results in a rough choppy surface.

Maximum vibratory roller speed can be calculated using the following formula:

$$\text{Max. Roller Speed= ft/min (m/min)} = \frac{\text{V.P.M.}}{\text{10 impacts/foot (30 impacts/meter)}}$$

V.P.M. = vibrations per minute (measured in field by reed tachometer)

Pneumatic-tired rollers should have a uniform tire pressure of not less than 80 p.s.i. (550 kPa)

DENSITY TESTS

We now recognize that over densification is one major cause of HMA problems. Mixtures that are over compacted will likely result in channeling and flushing under traffic. Fortunately, a nuclear density device can give us a quick indication of mix problems. The proper density for a given mixture is dependant on the gradation and Ndesign used. These are listed in Section 1030 of the Standard Specifications.

HMA SHOULDERS

The top lift of HMA shoulders does not receive the kneading action of wheel loads to keep them "live." The durability of the top lift of the mixture is increased by adding 0.5% additional asphalt as that required by the approved mix design.

If a flushed condition is observed after the increase in asphalt content, the asphalt content shall be promptly lowered by 0.2% from the flushed condition. Coordination between the Resident and QC/QA personnel is needed to assure the top lift contains the required amount of asphalt.

The Contractor has the option of using HMA binder and surface course mixtures used for the mainline paving in lieu of HMA shoulder mixture for resurfacing of shoulders. If this option is used, the 0.5% increase in asphalt content for the top lift is not required.

Shoulder resurfacing widths of 6 ft (2 m) or less may be placed, at the Contractor's option, simultaneously with the adjacent traffic lane for both the binder and surface courses provided the specified density, thickness and cross slope can be satisfactorily constructed. The paver shall operate with both tracks/drive wheels on the traffic lane.

Shoulder resurfacing widths greater than 6 ft (2 m) shall be placed in a separate operation.

The quantity of HMA placed on the traffic lane will be limited to a calculated tonnage based upon actual mat width and length, plan thickness and design mix weight per inch (millimeter) of thickness. The difference between the total actual tonnage placed and the calculated tonnage used on the traffic lane will be paid for as HMA Shoulders.

Roger L. Driskell
Engineer of Construction

SAMPLE NOTIFICATION LETTER

Example Construction Company
101 Example Street
Example, Illinois 00000

Gentlemen:

On_____, the Hot Mix Asphalt (HMA) produced by your company had an asphalt content of _____ percent and/or a density of _____percent. This does not meet the specification requirements contained in the contract.

Please bring this matter to the attention of the supervisory personnel of your company who are involved in the manufacture or placement of this material. Compliance with the contract requirements is the responsibility of your company and it is therefore important that your company take corrective action at the earliest possible moment.

Failure to take corrective action could result in suspension of the work, removal of the deficient material, or a reduction in contract price for the material in accordance with Article 105.03 of the Standard Specifications for Road and Bridge Construction.

We will cooperate with you in every way possible to eliminate this problem.

Very truly yours,

REGIONAL ENGINEER

By: _____

cc: (As applicable):
District Construction Engineer
Resident Engineer
Proportioning Technician
Supervising Field Engineer
District Materials Engineer
District Mixtures Control Engineer
District Laboratory Technician