HMA Inspector’s Tips and Tricks

What to look for in a quality Asphalt paving project.

What will we discuss?

• Pre-paving Meeting
• Project Inspection
• Production/Placement
• Compaction
• Testing
Pre-paving Meeting

• Items for discussion
  • Unusual items in the plans and specifications
    – Special provisions within the plans
  • Coordination with the public
  • Traffic Control
    – Has the traffic control plan been approved?
    – Any expected additions to the TCP?

Pre-paving Meeting

• Items for discussion
  • Expected equipment to be on site (This is a general list not specific pieces of equipment)
    – Paver
    – Rollers
    – Tack Truck
    – Miscellaneous
  • Weather issues/requirements
    – Temperature restrictions
    – Moisture restrictions
Pre-paving Meeting

• Items for discussion
  • Proof Roll requirements
    – What will be available to apply loading for a proof roll?
      » Single axle water truck is best
    – What is the acceptable amount of deflection during the proof roll?
      » Make this a known number and be consistent during the actual proof roll procedures
  • Release agent to be used?
    – Who will supply the release agent?
  • Expected minimum production/placement in a normal day
    – It is generally better to place material in a large quantity than small quantities for a more consistent product.

Pre-paving Meeting

• Items for discussion
  – What specification book will be referenced for this project?
    • Field Materials Manual
    • Laboratory Manual of Test procedures
    • CDOT Highway Specifications
    • Local Specifications
Pre-paving Meeting

- Items for discussion
  - Any special Provisions which should be discussed during the Pre-Con?
  - Testing sequence discussed
    - All labs performing tests in a similar time frame?

Project Inspection

- Plant visit/Check
  - Plant visit/Check
    - Distance from project
    - Loading procedure for aggregates
      - Fines on the bottom/ fines on the top?
    - Loading procedure for HMA for transport
      - Single dump, multi dump, Etc.?
Project Inspection

– Introduction of additives
  • Lime
  • RAP
  • Warm mix additives
  • Fillers, fibers, or other products

Project Inspection

– Binder storage
  • Horizontal tanks?
  • Vertical tanks?
– Where are the QC/QA labs related to the plant and project?
  • This will be important when production and placement begin
Project Inspection

– Site visit

– Review plans
– Understand obstacles (The contractor will know all of them)
– Check signage
  » Does it match the approved Traffic Control Plan
    • If not, has the plan been changed?
  » Have signs been added, removed or altered?
  » Signs covered/down when not being used?

Project Inspection

• Subsurface preparation
  – Has the subsurface been properly prepared
    » Milling completed?
      • Surface one consistent condition?
      • No rips, tears or scabbing?
    » Concrete rubblized?
    » Density tests performed (if necessary) on soil/aggregate base course?
Project Inspection

• Subsurface preparation (Continued)
  – Test results relayed from the QC/QA testers prior to placement?
  – Proof roll observed (If required) (should have been discussed in the pre-paving meeting what is acceptable)?
  – If placement is going to be delayed, what is the contractor proposing to due to protect the surface to be paved. This is especially important for soil or ABC surfaces.
  – What is allowable time between acceptance for placement and actual placement of HMA?

Production/Placement

  – Equipment on site as expected from the pre-paving meeting?
  – Trucks scheduled?
    • Type of trucks proposed for the haul (general, Tandem, Trailers, Bellies, Conveyor, etc)
      – Expected production for the day
    • Tack coat placed
    • Proper grade
    • Proper application rate per plans and specifications
      – Trucks should avoid driving on tack if at all possible until needed?
        » Trucks driving on the tack may pick up the tack coat material. The recommended film coating may not be left in place. Contaminates, dirt or other foreign products may left on the surface and cause the layers to not bond.
Production/Placement

– What release agent is being used in the trucks? Ask the driver, smell, and check for slime on tail gate and box area.
  • Diesel and release agents don’t mix the release agent will encapsulate the diesel fuel

– Are the trucks charging the tailgate prior to discharge?
  • The HMA should be up against the tailgate prior to the driver releasing the HMA from the truck. This will help to eliminate truck caused segregation.

– Trucks not bumping the paver
  • Trucks bumping the paver may cause the mat to deviate from plane

Production/Placement

– MTV/MTD being used?
– Paver starting and stopping quickly if no MTV/MTD being used?
– Wings not dumped on paver during day (Best Practice)
Compaction

- Roller pattern established by the paving contractor
  - Roller pattern documented
    - Types of rollers being used on the project to establish the roller pattern
    - Number of passes with each roller
    - Temperatures during each phase of compaction
    - Distance between pieces of equipment when establishing the roller pattern and during production/placement
    - Mat texture during each phase of rolling
  - Note any areas which are exhibiting differences, i.e. check cracking, shoving, tenderness, etc.

Testing

- Samples obtained by QC and split for testing and secured by QC/QA technicians?
  - Testing sequence and processes similar by all labs (Discussed in the pre-paving meeting)?
  - In-place density tests being performed as described in the QC plan and pre-paving meeting, according to the random schedule?
  - Coring, if required, being done and results being reported in a timely manner?
  - Test results being reported by both labs in a timely manner. Results should be reported the same day if obtained before noon and by 8:30 am the next day if sampled after noon at minimum for all labs involved.
More Training?

• RMAEC Webinars
  – Subjects will be varied and vast
  – Check out the training opportunities at
  – www.co-asphalt.com/education/webinar-home.htm

More information?

• www.co-asphalt.com
• tomclayton@co-asphalt.com
• 303-741-6148
Asphalt Inspectors Checklist:

- PREPAVING CONFERENCE SCHEDULED/HELD?
- PLANS/SPECIFICATIONS OBTAINED?
- ASPHALT PLANT INSPECTION COMPLETED (IF APPLICABLE)?
- APPROVED MIX DESIGNS OBTAINED?
- TRAFFIC CONTROL PLAN SUBMITTED (IF REQUIRED)?

- SUBGRADE PREPARATION COMPLETED
  1. Grading complete and compaction tests performed?
  2. Soft/Yielding spots identified?
  3. Corrections made if necessary?
  4. Proof Roll observed or completed?
  5. Grade and alignment verified for proper asphalt placement depths?
  6. Subgrade conditions acceptable (Not frozen/wet or soft)?
  7. Approved?

- OVERLAYS
  1. Areas identified which need repair?
  2. Patching or other repairs completed?
  3. Crack sealing completed?
  4. Surface clean, dry, and ready for placement of new asphalt?

- PAVING OPERATIONS
  1. Traffic control in place?
  2. Weather conditions acceptable for placement of HMA, Ambient and surface temperature?
  3. Area of placement identified and approximate quantities of placement known?
  4. Random sampling/testing information available and ready for use?

- PLACEMENT
  a) Is the Paving equipment clean, warmed and suitable to begin placement?
  b) Is the screed “True” and in proper working condition?
  c) Equipped with full width augers?
  d) Equipped with full width vibratory screed?
  e) Automatic grade controls in place or available?
  f) Automation screed sensor in place and operable to keep mix at 2/3rds full?
  g) Material Transfer Vehicle (MTV) available?
  h) Is the material being delivered to the site as approved?
i) Is the material being delivered to the site in appropriate truck transports?

j) Material being delivered at the proper and required temperatures?

k) Truck transports “releasing or breaking” the loads prior to opening the tail gates for end dump trucks or trailers?

l) Is the hopper being kept at least half full at all times?

m) Is material filled to the end of the auger extensions?

n) Is the mat being placed with an acceptable finish without segregation?

o) Is the material being placed at the specified thickness?

☐ **LONGITUDINAL JOINT CONSTRUCTION**

a) Are the joints being located in the correct location relative to lane lines?

b) Is the contractor attacking (Compacting the joints while the material is hot) to get a good joint seal and compaction?

☐ **Transverse Joints**

a) Is the joint matched and smooth?

☐ **COMPACCTION EQUIPMENT**

1. Does the equipment appear to be in proper operating condition, ie: Are the COCO mats in place and capable of keeping the drums/wheels clean? Is the water system operating with all sprayers operating? Does the contractor have a release agent to use on the rubber tires (not a petroleum product)?

2. Rubber tire pressure checked and at the right pressure?

3. Are the vibrators working properly on the steel wheel rollers?

4. Has the compaction test section area been identified?

5. Contractor beginning rolling while temperatures are acceptable, and completing rolling with in the acceptable range?

6. Roller pattern established and compaction test section complete?

7. Rollers traveling at an appropriate speed (less than 3 mph)?

8. Rollers not stopped and idling on a newly placed mat?

☐ **DENSITY TESTING**

1. Compaction tests being performed, recorded and contractor/QA/Agency notified of results?

2. Compaction test submitted for approval, reviewed by a licensed engineer and submitted to the owner/agency in a timely manner?
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GUIDELINE FOR HOT MIX ASPHALT
PAVEMENT PRE-PAVING MEETING AGENDA

January 2006
This document was developed by the Colorado Asphalt Pavement Association (CAPA). It is intended to be used as a resource in the design and construction of asphalt parking lots in Colorado. CAPA can not accept any responsibility for the inappropriate use of these documents. Engineering judgment and experience must be used to properly utilize the principles and guidelines contained in this document, taking into account available equipment, local materials and conditions. All reasonable care has been taken in the preparation of this guideline; however, the Colorado Asphalt Pavement Association can not accept any responsibility for the consequences of any inaccuracies which it may contain.

For more information, contact ..... 

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Centennial, Colorado 80112  
P: (303) 741-6150 F: (303) 741-6146  
e-mail: office@co-asphalt.com  
website: www.co-asphalt.com

The following is an agenda which can be used for a Hot Mix Asphalt Pavement Pre-Paving Meeting. The guideline can be used to facilitate a productive and meaningful pre-paving meeting. This guideline presents a minimum set of topics that should be discussed during the meeting; however, not all topics will be covered for every project. Prior to its use, thoroughly read the Agenda’s content and consider the special needs of the particular
HOT MIX ASPHALT PRE-PAVING CONFERENCE AGENDA

The items in the following agenda are minimum requirements that should be covered during the conference. The agenda may be used as is or as a base to develop a customized agenda.

<table>
<thead>
<tr>
<th>Project Number:</th>
<th>Owners Rep:</th>
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<tbody>
<tr>
<td>Project Code (SA):</td>
<td>Project Engineer:</td>
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<tr>
<td>Location:</td>
<td>Contractor:</td>
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<tr>
<td>Date:</td>
<td>Superintendent:</td>
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<td>Time:</td>
<td>Foreman:</td>
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I. Attendance Roster

<table>
<thead>
<tr>
<th>Name:</th>
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<tr>
<td>Representing:</td>
<td>Fax Number:</td>
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<tr>
<td>Responsibilities:</td>
<td>Cell Number:</td>
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<tr>
<td>City, State, Zip:</td>
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HOT MIX ASPHALT PRE-PAVING CONFERENCE AGENDA (continued)

II. Project Organization and Status

A. OWNER/AGENCY Personnel:

1. Personnel in Charge at Paving Site:

<table>
<thead>
<tr>
<th>Name/Title:</th>
<th>Fax Number:</th>
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<tbody>
<tr>
<td>Office Number:</td>
<td>Home Number:</td>
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2. Alternate Contact (when personnel identified in A.1 is not present):

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3. Quality Assurance Supervisor:

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4. Inspector/Duties:

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Comments:
### B. Contractor Personnel:

1. **Quality Control Supervisor:**
   - Name/Title:
   - Fax Number:
   - Office Number:
   - Home Number:
   - Mobile Number:
   - E-Mail Address:

2. **Personnel to Notify at Paving Site**
   - Name/Title:
   - Fax Number:
   - Office Number:
   - Home Number:
   - Mobile Number:
   - E-Mail Address:

3. **Other:**
   - Name/Title:
   - Fax Number:
   - Office Number:
   - Home Number:
   - Mobile Number:
   - E-Mail Address:

   Comments:

---

**HOT MIX ASPHALT PRE-PAVING CONFERENCE AGENDA (continued)**

### II. Project Organization and Status

**C. Testing Information:** (Compaction Test Results, acceptance tests to be performed, frequency)

1. Test locations determined by?

2. Frequency of tests to be performed?

3. Are Quality Assurance tests to be performed in addition to Quality control tests?
   - If Yes how often and who will be responsible to schedule the QA tests?

4. Turn around time of test results?
   - Preliminary?
   - Final?

5. Is the mix design(s) approved by the Owner/Agency?

---

### III. Scheduling

**A. Materials:**

Materials will be available for sampling on:

**B. Asphalt Plant:**

The asphalt plant will be ready to be checked on:

**C. Paving Equipment:**

The paving equipment will be set up and ready to be checked on:

**D. Paving Sequence:**

1. The Contractor will commence paving on:

2. Hot Bituminous Pavement will be delivered at:

3. The Contractor proposes to work the following hours:

4. How many days per week does the Contractor intend to work?

5. What paving sequence will the Contractor follow?
B. Where will paving start?

E. A quality control plan shall provide information to control the quality of the following:

1. Segregation:

2. Longitudinal Joint Construction:

3. Transverse Joint Construction:

4. Smoothness:

III. Scheduling

5. Other:

F. Scales and Certified Weigher:

1. Scales shall be checked and sealed. Comments:

2. Weigh tickets shall contain information required by the owner. Comments:

3. Are truck weigh ticket required to be delivered on site? How will the weight tickets be collected? Comments:

IV. Preparation

A. Method of Approval Sub-Surface Materials?
   Comments:

B. Has the Subsurface Been Approved for Paving?
   - Approved By Who?

C. Tack Coat:

1. Material type, Application Rate?

V. Production and Placement

A. Compaction Test Section:

The following procedures should be observed and documented:

1. The Contractor must establish a roller pattern and carefully record the following information:

   a. Type, size, amplitude, frequency, and speed of roller:
b. Tire pressure for rubber tire rollers and if the pass for vibratory rollers is vibratory or static:

c. Surface temperature of mixture behind the lay-down machine and subsequent temperatures and densities after each roller pass:

d. Sequence and distance from lay-down machine for each roller and total number of passes of each roller to obtain specified density:

2. When the Compaction Test Section has been completed, the Contractor shall furnish a complete copy of this data to the person in charge (II.A.1) before continuing to pave. Comments:

HOT MIX ASPHALT PRE-PAVING CONFERENCE AGENDA (continued)

V. Production and Placement

3. When a successful Compaction Test Section has been completed, the Contractor is required to maintain the roller pattern established during the Compaction Test Section for the balance of the Hot Bituminous Pavement construction (i.e., the Contractor must use the same number and type of rollers and operate them at the same speed, frequency, and amplitude and in the same position, relative to the lay-down machine, as was performed during the Compaction Test Section). If the Contractor wants to change the roller pattern that was established during the Compaction Test Section, the Contractor must construct a new Compaction Test Section and demonstrate that the density can be obtained with the new roller pattern before proceeding with the paving operation. Comments:

4. The Contractor is responsible for compaction testing of the Compaction Test Section. Comments:
5. Cores are required to calibrate the nuclear density gauge. The Contractor can continue to pave under the following conditions:

- The period that the Contractor continues to pave without test results from cores shall not exceed one working day.
- Construction proceeds at the Contractor’s risk.

Comments:

6. A new Compaction Test Section will be required whenever there is a change in the compaction process. Comments:

7. Striping plan: Sub Contractor or contractor to do striping?
   When will striping occur?
   What material will be used?
   Have Materials Data Sheets been submitted? Approved? If Not when?

A. Laydown Equipment:
1. Does the paving equipment meet the requirement detailed in the specifications? Comments:

VIII. Traffic Control

A. Method of Handling Traffic:
Has the Method of Handling Traffic been submitted for the Mix Asphalt Pavement placement operation?
If not, when will it be submitted?
Is the traffic control plan approved?

IX. Follow Up Items

Items discussed during the meeting, which will need follow up.

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Suggested Best Practices for PAVER OPERATORS

Safety operates the paver using "Best Practices" procedures, to produce the highest-quality pavement possible.

1. Select a paving speed that balances delivery, paver capacity and the compaction process and pave with few if any extended stops.

2. Work with screed operator in establishing and maintaining the head of material within a plus or minus one inch tolerance.

3. Steer the paver holding to a pre-determined reference.

4. Direct the truck driver to raise bed and exit when empty.

5. Utilize rapid, but smooth start and stops to help prevent end-of-load roughness (if stopping is necessary.)

6. Observe HMA being discharged into paver hopper or insert for changes in characteristics of the mix.

7. Monitor paver for unusual noise or vibration (notify the proper person to take corrective actions).

8. Work with dump person to make sure truck does not bump paver, or let hopper run low.

9. Work as a team member.

For more information contact:

The Colorado Asphalt Pavement Association

(303) 741-6150

www.co-asphalt.com
Suggested Best Practices For Screed Operators

SCREED OPERATIONS – BEST PRACTICES and INNOVATIONS

Must understand the basic principles of paving with the free-floating screed. Should be knowledgeable of each individual paver manufacturers’ screed design, operation and adjustments. Must be aware of mix design characteristics and what might change if mix varies throughout the day. Use the knowledge to produce high quality pavements consistently.

1. Set up the screed and paving reference to match given specification (width, crown, slope and depth).

2. Heat the screed properly.

3. Work closely with the paver operator in establishing and maintaining the head of material within a plus or minus one-inch tolerance.

4. Operate the grade and slope system, utilizing the designated references. Check occasionally that mat being laid is being held to the established reference and meets job specifications.

5. Make screed adjustments to produce a consistent textured mat.


7. Work as a team.

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Suggested Best Practice for Minimizing Segregation

1. **Aggregate Stockpiles:**
   - Build in Layers
   - Avoid any procedure that will allow the aggregate to be pushed or dumped over the side of a stockpile
   - Separate to prevent intermingling

2. **Aggregate Handling:**
   - Loader operator works full face of stockpile
   - Install dividers on the “cold feed” bins to prevent the material from flowing into an adjacent bin
   - DO NOT pile the aggregate so high it flows over the dividers

3. **Loading the Surge Silo:** (if the plant has a “batcher or “Gob Hopper” at the top of the silo)
   - Adjust the conveying devise to deposit the material in the center of the batcher or gob hopper
   - Keep the gates on the batcher or gob hopper closed unless dropping a load of mix
   - Close the gate on the batcher or gob hopper before it is empty to prevent the material from dribbling into the silo

4. **Loading Trucks:**
   - Keep the gates on the bottom of the silo closed so the material does not dribble into the trucks
   - Take care to center the trucks (left to right) when loading
   - Consider loading trucks in multiple drops with the first drop at the rear, second at the front and then alternate dumps
   - If the mix is prone to segregation, you should avoid loading the trucks by “slowly” driving forward while dropping the mix from the silo

5. **Dumping Trucks:**
   - To provide as surge of material to the paver, when using end dump type trucks, the box should be raised until the mix moves to the rear of the bed charging the tail gate prior to releasing the load
   - If any mix is spilled on the roadway, in front of the paver while dumping the truck, the spilled mix should be removed from the roadway before the paver moves forward across the mixture on the grade
5. **Laydown Operations:**

- Only dump the wings on the paver hopper at the end of the paving day and utilize this material in the night taper joint or waste the material.
- To provide consistent flow of material to the screed and avoid gradual deceleration/acceleration, the paver should be started and stopped quickly at normal operating speed.
- Keep the hopper more than half full at all times and maintain the height within 1 inch the entire paving day.
- The auger height should be adjusted so the bottom of the auger is at least two (2) inches above the finished surface of the HMA mat.
- Adjust the feed sensors to keep the material near the center of the auger at all times.
- Correctly adjust the lead and tail crown of the screed so that the surface of the HMA behind the paver is uniform in appearance and texture.
- Install or verify the material management kits are installed and functioning properly. This includes the “kick back” paddles under the gear box and outer edges of the auger.
- Adjust the flow control; gates at the rear of the hopper so that:
  - The slat conveyors run continuously.
  - The amount of material being presented to the augers allows for them to run almost continually, (minimum of 80% of the time).

6. **Windrow Elevators:**

- When using pickup machines they should be adjusted so that all of the HMA is removed from the surface.

7. **Troubleshooting:**

- If segregation is observed behind the paver, check the trucks as they arrive and are dumping to see if the mix in the truck is segregated.
- The risk of causing thermal segregation is increased when paving in cooler temperatures.

For more information contact:
The Colorado Asphalt Pavement Association
(303) 741-6150
www.co-asphalt.com
Suggested Best Practices for
BREAK DOWN ROLLER OPERATORS

1. Communicate – with paving crew and foreman for job requirements prior to the arrival of asphalt.

2. Confirm maintenance and water system checks – done on a daily basis to rollers.

3. Determine lift thickness – base or surface riding course.

4. Be aware of material temperature – at delivery to paver and behind screed.

5. Determine rolling drum mode – vibratory or static.

6. Make required amplitude adjustments both roller drums – depending on mix design, material thickness, and temperature zone.

7. Optimize water system controls – to avoid material pick-up and eliminate excessive water usage.

8. Establish proper rolling pattern – determined by paving width, roller drum width, unsupported edges, and drum overlap.

9. Determine rolling speed – to achieve proper impact spacing and meet smoothness requirements.

10. Monitor rolling temperature – and work within optimum temperature zones.

11. Make required rolling coverages – to achieve density requirements.

12. Adjust rolling operations – to satisfy density, smoothness, and production rates.

13. Maintain consistency throughout the entire shift.

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Suggested Best Practices for Finish Roller Operation

1. Communicate – with paving crew, foreman and breakdown roller operator for job requirements.

2. Confirm maintenance and water system checks – done on a daily basis to rollers.

3. Be aware of material temperature – avoid “tender zone.”

4. Determine rolling drum mode – vibratory or static depending upon requirements to achieve density and smoothness.

5. Optimize water system controls – to avoid material pick-up and eliminate excessive water usage.


7. Coordinate final rolling process with QA / QC personnel.


9. Make required rolling coverage’s – to achieve density requirements and to remove drum edge marks.

10. Maintain consistency throughout the entire shift.

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Suggested Best Practices for
LONGITUDINAL JOINT CONSTRUCTION

Developed by: The Joint CAPA/CDOT Longitudinal Joint Task Force

1. BE CONSISTANT: Decide on a plan and stick with it.

2. COMMIT TO A GOOD JOINT: Quality contractors build quality joints.

3. MAINTAIN A PROPER TAPER: Tapers range from near vertical to 12:1. Regardless of what taper is used, keep it consistent. Vertical edges and notches as vertical as possible. Keep edges confined as long as possible. Maintain a Proper “Head of Material”

4. MAINTAIN PROPER OVERLAP: Keep overlap consistent typically from 0-1.5 inches. Place proper amount of HMA at the joint: Too little will allow water to enter the joint. Too much will cause a ridge which will carry water and interfere with compaction. DO NOT RAKE THE JOINT! If raking to correct improper amount of material, just bump the joint, DO NOT BROADCAST loose material across the mat.

5. USE PROPER ROLLING TECHNIQUES!

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Suggested Best Practices For Pavement Smoothness

PAVER OPERATIONS – BEST PRACTICES and INNOVATIONS

Keep the hopper full: If you are not using a hopper insert leave as much surge as possible between truck exchanges and do not run the hopper empty. This will minimize “truck fans” by allowing hot, uniform material from the next truck to blend with mix from the previous dump. Keeping your mat as thermally uniform as possible will result in better densities.

Controlled hopper wing cycling: The wings are where the large, cooler stone tends to collect if not properly reintroduced back to the mix. Regular cycling, where allowed by spec, will reduce large buildups of this segregated material. Don’t wait until you are “out of material” to cycle the wings.

Use a hopper insert

If you are using pick up machines and windrow paving use a hopper insert. It will reduce or eliminate segregation

Keep a constant head of material at the spreading augers: A consistent flow of material to the spreading augers will prevent them from spinning too fast or too slow, which can cause longitudinal segregation. As a rule of thumb a proper head of material is ½ up the spreading auger. Constant changes in the head of material make waves in the mat. If allowed to rotate too fast, longitudinal stripes will occur in line with the reversing augers; too low a rate and the larger stone will drop and collect at the bearing support

Time the conveying and spreading systems: Ensure the ratio pots or flow gates are set to deliver enough material to the spreading augers to keep them running continuously. Set your sonic feeds and leave them there.

Keep your paver speed steady: Drag race paving may be entertaining but stops and starts cause the head of material to rise and fall changing the mat thickness. This not only affects ride but can detrimentally affect density

Correct lead crown setting and proper strike off adjustment: Equipment fine-tuning issues will help eliminate longitudinal segregation. String line your screed before every job and introduce the correct amount of lead crown; usually 1/8 - 1/4 inches. Make sure your strike offs are correctly aligned. Refer to your owner's manual for the recommended procedure.

Correct spread auger length: Once you have the job planned out if you need to build up the spreading augers then DO IT. Trying to compensate for spreading augers that are too short by running them faster will only result in segregation. This only gets worse with more gap graded mixes. If you have a 20’ screed and the job calls for wide paving then BUILD UP THE SCREED; use the auger extensions, wide mat grade supports and the outboard bearing supports. The finished jobs will more then compensate for the time involved in the build up. Then plan the layout so you can maximize the use of the built up screed.

Use Thermal guns: Equip your paver operator and roller hands with thermal (infrared) handheld thermometers and use them to monitor changes in the mat temperature.
Establishment of a thermal range during the test strip process gives you a working range to be used throughout the paving project.

**Don't broadcast material across the mat:** This just gives the appearance of a segregation problem. Don't rake material off the joint onto the new mat. Don’t walk on the fresh mat.

**Train your personnel:** not only in the operation of the equipment but in the art of reading mat defects. The sooner these defects are identified the sooner remedial action can be taken. Remember when the only tool you have is a hammer every problem looks like a nail.

**JOB SET UP – BEST PRACTICES**

**Partnering**
All personnel involved in the construction planning and design need to meet before the job so we can all “be on the same page” and resolve possible problems before they arise.

**Pre Paving Planning Meeting**
Meet with your crew every day to review the plan for the day’s construction and expectations
Plan the truck route, plan the job layout, assign people to required tasks

**Communication**
Constant communication with all the elements of the paving process from design engineers to the lute man. This keeps all phases of the job on schedule and free of “Uh Oh’s”

**Mix Selection**
Insure the mix is of an adequate design for both strength and workability
Mind your temperatures

**Machine Maintenance**
Not only does well maintained iron contribute to a more pleasant work environment it shows your people that you care enough about them to give them the best tools. It provides for a safer work environment and a more productive and profitable organization

**Smoothness-Thickness-Yield**
The inspectors and field personnel need to be aware of the paving fundamental that yield, minimum thickness, and smoothness can not be obtained at the same time.

**Crew Training**
not only in the operation of the equipment but in the art of reading mat defects. The sooner these defects are identified the sooner remedial action can be taken. Remember when the only tool you have is a hammer every problem looks like a nail.

**Know the Consequences**
of improperly operating the machines
Improper principles and techniques of paving, rolling and trucking
of poor safety awareness, designate a “job site safety man”
know the way to emergency medical care

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Suggested Best Practice
Lute Person Responsibilities

The lute person is the last person to touch the HMA surface before rolling. Any mat deficiencies that are present must be corrected.

1. Hand works any area of the mat which cannot be placed by the paver.

2. Repair all pavement imperfections.

3. Prepare transverse and longitudinal joints for compaction.

4. Prepare end-of-pass wedge or taper (for traffic run off) for compaction.

5. Assist in cleaning the paver at end of shift.

6. Must have an eye for quality and how the finished job must look. Communicate problems to responsible person when they arise.

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A PAVING FUNDAMENTAL: Thickness - Yield - Smoothness -- You Can't Have All Three!

Many contractors are faced with a very difficult decision--how to achieve yield, thickness, and smoothness at the same time. Unfortunately, it generally can not be done. The way a typical asphalt paver works has not changed since 1931 when the free-floating screed principle was introduced by the Barber-Greene Company. As everyone knows, the primary purpose of the paver is to level--to place more HMA mix in the low spots on the existing pavement surface and less mix on the high spots. For this reason, the amount of mix needed to resurface a state highway, county road, city street, or parking lot depends on the smoothness of the existing pavement surface.

Yield: In most cases the amount of mix needed to resurface a pavement is determined from a calculation of length times width times thickness, converted to a tonnage value. If the pavement is “out of shape”, the designer may add 2 to 4 percent more mix to allow for the depressions in the surface. Most pavements, however, require 5 to 15 percent more material so that proper smoothness can be obtained. In order to place a minimum thickness of mix on the high spots in the existing pavement surface, it is necessary to increase the thickness of the mix in the low spots. This situation results in the need for additional mix beyond what is normally calculated based on length, width, and thickness numbers. The contractor must be provided with enough mix to properly construct the pavement. In many instances, the amount of funds available to resurface the pavement is limited and thus the amount of mix included in the contract is also, incorrectly, minimized.

Thickness: Suppose the plans call for a surface course mix that is 1-1/2 inches thick. If the inspector on a paving project takes that to be a minimum thickness everywhere, there is going to be a problem with yield. Again, depending on the smoothness of the existing pavement surface, it is going to take “extra” mix to
fill in the low spots. Thus to achieve a minimum thickness on the high spots, the thickness of the mix in the low spots must be greater than the minimum. The thickness shown on the plans thus becomes an average thickness instead of a minimum thickness. If this is not done, the contractor will run out of mix before he runs out of roadway. Either that or his mix tonnage will significantly increase over the amount shown in the plans. This, of course, creates a problem with yield. Smoothness: The amount of smoothness obtained depends on two major factors. The first is the condition or smoothness of the existing pavement surface. The second is the number of layers of HMA mix that is to be placed on top of that existing surface.

Based on the free-floating screed principle, each layer of HMA mix improves the smoothness of the underlying pavement layer by a significant amount. If the present pavement surface is relatively smooth, any new layer placed will be smoother than the original surface since the paver will add more HMA mix in the low spots and thus level that original surface. If the existing pavement surface is rough and uneven, however, the surface of the new layer will be smoother than the original surface, but will still be rough to some extent. This is due to differential compaction.

A layer of dense graded HMA mix will typically compact 1/4 inch per inch of compacted thickness. That means that a layer of mix that is 1 inch thick, when compacted, must be placed 1-1/4 inches thick by the paver in order to allow for the densification that is going to occur under the compactive effort applied by the rollers. A HMA layer that is compacted to a 2 inch thickness needs to be placed 2-1/2 inches thick in order to achieve the proper amount of density. When mix is placed along a roadway in variable thicknesses, due to the condition of the existing pavement surface, the compacted new surface will still not be completely smooth since the thick areas of mix will compact more than the thinner areas. A second layer of mix will make the surface of that second layer smoother than the original pavement surface. This is because the amount of differential compaction between the thicker and thinner areas will be reduced. The placement of a third layer will make the new surface even smoother. The greater the number of layers constructed, the smoother the final pavement surface. The final smoothness is still dependent, however, on the smoothness of the original pavement surface.

Yield, Thickness, and Smoothness: There are three basis rules in the asphalt paving industry in regard to the resurfacing of an existing pavement surface. First, if yield is the primary consideration, the paver screed operator will have to continually adjust the angle of attack of the screed in order to reduce the amount of mix placed over the present pavement surface. This, of course, will affect both the minimum thickness of the mix over the high spots in the existing
surface and the smoothness of the new pavement layer. The amount of mix set up in the contract must be enough to allow the contractor to properly level the existing pavement surface. Second, if a minimum thickness of mix over the high spots in the existing surface is required, then the amount of mix needed will increase over the quantity shown on the plans. This will result in an increase in the cost to complete the project but will result in a smoother pavement surface. A minimum layer thickness can result in a very rough ride. Last, if smoothness is a primary consideration, several things must happen. First, the number of layers of mix placed must be increased--only one layer will not do the job, even if a “scratch course” of mix is placed. Second, enough quantity of mix must be available to properly level the surface--fill in the low spots and “shave off” the high spots. Third, the paver screed operator must allow the paver to do its job without continually adjusting the angle of attack of the screed. Yield, minimum thickness, and smoothness can not be obtained at the same time unless enough mix and number of pavement layers are set up for the project for the contractor to let the paver screed do its job--fill in the low spots and improve the smoothness of the pavement surface, one layer at a time.

This document was compiled from information collected by Mr. James Scherocman, P.E. for more information, contact Mr. Scherocman - jim@scherocman.com