Internal Memo

Date: October 15, 2024

To: Resident Engineers, Project Engineers, District Materials Engineers

From: John Garrity, Bituminous Engineer

RE: Cold Weather Bituminous Paving Guidance

Cold weather bituminous paving presents many challenges that can affect the long-term performance and durability of the pavement. But there are things that can be done to help ensure the work performed is the best possible and will result in a long-lasting pavement. Some of the items listed below are specification items that should be required of the Contractor other items are discussion items you can have with the Contractor. You can always discuss alternate ways for the Contractor to do things, but you want to be careful not to direct the Contractor in their operations; otherwise, you accept a certain amount of liability. The following is a list (in no particular order) of things to do and keep an eye on or discuss with the Contractor during late fall paving projects.

1. Require loads be tarped. Section 2360.3 B.2.b, gives the Inspector the ability to require loads be tarped. Tarping of the load will help protect the mix from the elements and keep the wind from forming a "cold crust" on the top of the load.

2. Enforce Table 2360.3-4, Minimum Temperature Control Table when using Ordinary Compaction. This section of the specification says no paving is allowed when temperature is below 32F, and density requirement is by Ordinary Compaction. The table specifies minimum laydown temperatures in cooler weather based on air temperature and compacted lift thickness.

3. Watch for mix pick-up when using Pneumatic Roller. 2360.3 E, Surface Requirements, states that after compaction the finished surface of each lift must be reasonably free of segregated, open and torn sections. Pneumatic tired rollers have a tendency to pick up the fines on the surface of the mixture in cold weather, especially when a modified binder is used.
   The Contractor can help minimize mixture pick-up by keeping the tires clean and warm. Spraying the tires with non-petroleum based release agent should help reduce pick-up. Driving the pneumatic roller on the existing pavement for 15 minutes, or so, to generate some heat within the tires before it is placed in the rolling train helps minimize pick-up. Once there is no pick-up it is important to keep the pneumatic rollers moving on the hot or warm mat, that means no stopping. Otherwise, the tires will

cool and will start picking up mix again. Keeping the rollers tightly skirted to retain heat helps too. In some cases, it may be best for the Contractor to remove (their decision) the pneumatic roller from the rolling train if it is making more of a mess than helping get density.

4. Pave thicker lifts. Thicker lifts retain heat longer and will improve the ability to get density. There may be some situations where you can modify the typical section to allow a thicker lift to be placed on the project.

5. Watch for Inadequate/improper rolling. It is harder to get density on cold fall days than warm summer days, but it can be done. Difficulty in getting density can be the result of inadequate and/or improper rolling. Inadequate rolling might be caused by too few rollers or too few roller passes. Improper rolling can include rollers being too far behind the screed or rollers starting the initial compaction process too late. On a cold, windy fall day mix loses temperature quickly which makes it tough to get density. As the mix is placed on the cold ground heat is drawn from the mix, this, coupled with wind which will quickly draw heat from the surface of the mix greatly reduces the amount of time for compaction. Additional rollers may have to be brought in to compensate for cold, windy conditions. Sometimes two rollers may have to run in echelon directly behind the screed in order to get density.

6. Keep the mix en-masse. The mixture will lose heat quickly if the entire load is windrowed in front of the paver when using a pick-up machine. Rather than dumping the entire load in front of the paver, dump the load at the same rate as the paver is moving and picking the material up. If the paver stops for any reason discontinue dumping and only resume dumping when the paver is moving.

7. Mixing Temperatures. Typically, the Contractor will increase plant mixing temperatures as the ambient temperatures drop. Additional heating of the mixture will aid in getting density. However, make sure the Contractor is not overheating the mix. Specification 2360.3 A.5 states, “Unless authorized by the Engineer, do not produce the mixture more than 30°F above the recommended maximum mixing temperature.” Contact the Bituminous Office if you see mixture temperatures either at the plant or behind the paver over 330F.

8. Paving Restrictions. Specification 2360.3 A.4 discusses Weather Limitations and Paving Dates.

9. PaveCool: Software gives you the time available for compaction.
http://www.dot.state.mn.us/app/pavecool/index.html

10. Communication. Good communication is critical to the success of any project any time of the year. In cold weather, stress the need to maintain the balance between the street and the plant operations. If placement operations are slowed down for some reason or if the paver needs to be brought back to the day’s start so that lanes can be matched-up the Contractor should make sure the plant stops loading trucks. Otherwise, trucks will be sitting on the grade with mix cooling in their boxes.

Additional Best Practice Items

- Do not load trucks at the plant until they are needed on the project and the paver is ready to go.
- Heat the tack to a higher temperature to aid breaking (closer to the 160°F limit)
- Make sure all the equipment is ready to go when the paving process is started.
- At the start of paving each morning unload the third or fourth truck first and then unload the earlier arriving trucks. This is because the first couple of truckloads are usually cooler from plant startup and the cooler silo. Hotter mix will heat up the screed faster and will help minimize tearing of the mat due to a cold screed.
- The paver speed may need to be reduced so that the rollers are able to keep up.
- The paver hopper should be kept full between truck rounds. Keeping the hopper full will keep both the mix and the hopper hot.
- 2360.3.A.4, Weather Limitations and Paving Date states, "Do not place asphalt mixtures when weather or roadbed conditions or moisture conditions of the roadway surface are judged unfavorable by the Engineer."
- Density and other specification items are not waived when paving is performed after October 15, north of the east-west line between Browns Valley and Holyoke or south of that line after November 1.

Miscellaneous Questions to the Bituminous Office:

- Do we pave on tack that hasn't broken?
    - Answer: Sometimes yes. Tack breaks more quickly in the summer with warm air temp, low humidity, and wind. In late fall paving the chance for warm air temp is almost non-existent. You could wait many hours on the project for tack to break during late fall paving and find it never breaks. When air temps are 35F and below it might make more sense to have the Contractor heat the tack to a higher temperature to aid breaking (closer to the 160°F limit) and give the tack an hour to break and then pave regardless of whether the tack has broken or not. Try to keep the mix delivery trucks off the tack until it is their turn to pull in front of the paver.
- The Contractor may ask if they can use a Warm Mix Asphalt (WMA) compaction aid such as Evotherm to help them get density. Should I allow them to use the product?
    - Answer: Yes. Most compaction aids such as Evotherm fall into the Warm Mix Asphalt category. 2360.2 C.4, Warm Mix Asphalt, allows WMA on a permissive basis. If you have questions about a specific product the Contractor intends on using, please contact the Bituminous Office.
- **How long does the bituminous need to cure before cutting a recess for pavement markings, 10 days?**
    - No. Per Pavement Markings, 2582.3 B.7b, Recessing Details, "Do not construct a recess in new bituminous pavement unless the pavement is cured enough to handle the weight of the Equipment."