



Best Practices for Cold Weather Paving!

Often times specifications will require thinner lifts to be placed (1.5") as the owner/specifier feels the compaction may be better achieved with thinner lifts. In cold weather conditions this may actually work against the contractor, and end result user. The cold weather will cool the mat before a contractor has the opportunity to complete compaction. Compaction of a mat happens from the bottom up and not the top down. If a thin lift of asphalt is placed on cool or cold surfaces the temperature is drawn out very quickly when placing thin lifts. By increasing the lift thickness from 1.5" to 3", the mat will cool slower as not as much heat is drawn out into the subsurface area and the invective action of the asphalt will hold heat longer, thus allowing the contractor the opportunity to achieve the required compaction

What factors affect the time it takes for the HMA to cool below 175 degrees F? All weather factors affect this time: air temperature, wind speed and the presence or absence of sunlight. The type and temperature of the surface on which the HMA is to be placed is a factor too. But, the two most important factors are the temperature of the mix and the thickness of the course being placed. It is generally accepted that, if conditions do not permit 10 minutes of time for compaction, adequate density can probably not be achieved.

Time for Compaction

Cold weather compaction depends upon having enough time and enough rollers to obtain adequate density while the temperature of the HMA mix being placed is still within the compaction temperature range, approximately, 275 to 175 degrees F.

Example: At a Mix temperature of 275 degrees F, Course thickness 1.25 inches. The time available for compaction is 7 minutes, too short to realistically achieve density. If the mix temperature is raised to 325 degrees F and all others factors are the same, the time available for compaction is 12 minutes. Now you have a chance of getting it compacted before it cools. If the mix temperature is held at 275 degrees F, but the course thickness is increased to 2 inches, the time available for compaction is 17 minutes. It can be readily demonstrated using *PaveCool* that for any cold weather temperature there is a combination of mix temperature and course thickness that will provide adequate time for compaction. (down load *PaveCool* at www.mrr.dot.state.mn.us/research/mnroad_project/restools/cooltool.asp) With the *PaveCool* software one can quickly determine the time available for compaction for any set of conditions and quickly compare the effects of changes in course thickness and mix temperature.

Summary and Conclusions: Hot Mix Asphalt paving can be successfully accomplished in cold weather without compromising the performance of the pavement, but costs will be higher. The goal is to obtain adequate time to finish compacting the mix, while it is still in the compaction

temperature range (275 to 175 degrees F). Time available for compaction is most dependent upon the temperature of the mix and the thickness of the layer being placed and less dependent upon the environmental conditions. Making adequate time available for compaction can be accomplished by taking steps to alter these dependent variables and to minimize the time of exposure of the mix between mixing and compaction. ***Specific actions may include any or all of the following as necessary:***

- ***Increase the mix temperature***
- ***Increase the layer thickness***
- ***Minimize the time/length of haul***
- ***Work the rollers as close to the paver as possible***
- ***Use more and/or higher capacity rollers***
- ***Use warm mix asphalt***

Handwork and feathering can probably not be adequately performed in cold weather and, so, these operations should be avoided or, if necessary, the results should be considered as temporary surfaces to be replaced in suitable conditions. Of course, placing a thin HMA course in cold weather should be avoided, if possible. Placing a relatively thick intermediate course, that can be used as the temporary wearing surface until proper conditions return for placing a thin surface course, will involve little change to construction procedures and little additional risk of poor performance.