CHAPTER 1
SURFACE PREPARATION

Preparation of a New Base

Subgrade

If the asphalt pavement is to be placed directly on the subgrade soil, that subgrade material should meet all applicable requirements for moisture content, density, and smoothness. The subgrade should be able to support the weight of the haul traffic. If distortion of the subgrade soil occurs during the paving operation, the placement of the mix should be stopped until the condition of the soil can be corrected.

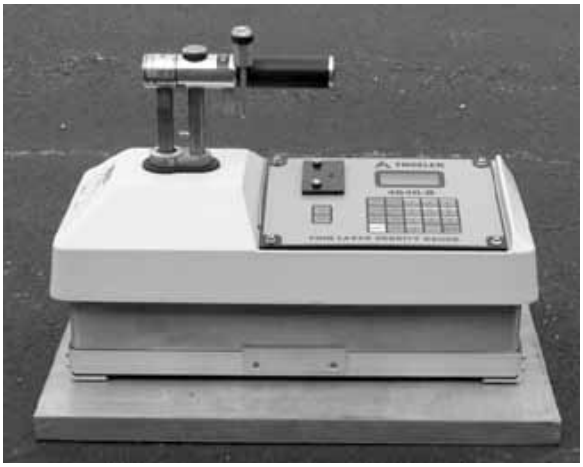
Base Course

If the asphalt layer is to be constructed directly on a new or existing untreated granular base layer, that material should meet all requirements for moisture content, density, and smoothness.

Proof Rolling

Proof rolling should be done on top of the granular base material and the amount of deflection of the base and the amount of indentation of the truck wheels into the granular base course material should be noted. If the base material is stable and dry, does not deflect or indent significantly under the wheels of a loaded tandem axle truck, placement of the prime coat and/or the new asphalt mix should be permitted to start. If the condition of the granular material is not satisfactory, rework or stabilize the base course.

Density Checks



Pavement materials; subgrade, aggregate base or HMA must be compacted for performance. Make density testing standard practice before placing the next lift. This testing, coupled with proof rolling will tell you whether you are ready to pave or not.

Prime Coat

There are differences of opinion as to the benefits of a prime coat on a granular base course layer. Some feel that it acts as a temporary waterproofing layer, allows the base course to be used for light traffic, binds together any dust, promotes bonding between the base and new asphalt overlay, and prevents slipping of thin pavement layers. However, VDOT does not require priming with asphalt material on aggregate subbase or base material prior to the placement of asphalt base, intermediate or surface layers, unless otherwise specified in the contract documents.

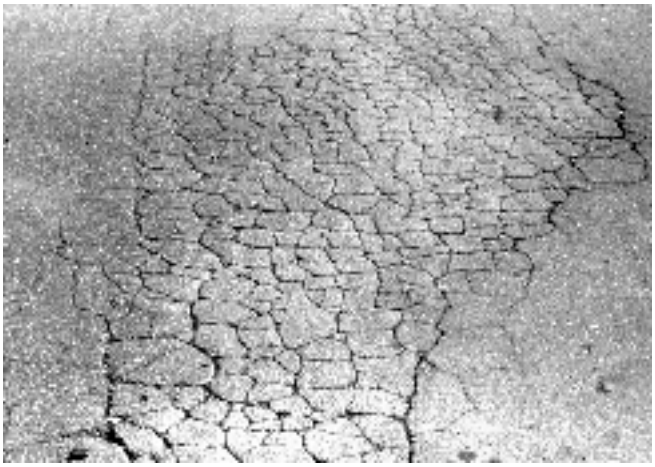
Use cutbacks carefully because they pose an environamental risk. These materials are primarily composed of different fractions of petroleum oil, and can be washed into nearby creeks and streams if applied before a heavy rain.

Application rates for prime range from 0.15 gal/ yd^2 for a tight surface to 0.40 gal/ yd^2 for an open surface. Apply no more prime than can be absorbed completely by the granular base course in 24 hours. Blot the excess with sand and remove.

Preparation of an Existing Surface

Prepare the existing surface properly before any mix is laid on an existing asphalt pavement. At a minimum, remove and replace the failed areas, patch the potholes, clean out and seal the cracks, and fill in the ruts or preferably remove by cold milling.

Pavement Repair and Patching Techniques



Don't attempt to bridge failed areas with the new overlay material unless a very thick overlay is to be constructed. The construction team needs to work together on pavement repairs to make sure the repairs will perform properly. This includes marking, verifying depth where a stable base is reached, patching, compacting, testing and working under traffic. The plans will detail the amount and type of patching called for on a project.

Cleaning

Clean the existing surface before the tack coat is placed. Usually this is accomplished with a power broom, street sweeper or some combination of the same. Remove dried, caked mud and other foreign material. Spilled asphalt should be shoveled or picked up (especially if placing a thin overlay) .

Tack Coat

The purpose of tack coat is to ensure a bond between the existing pavement surface and the new asphalt overlay. A good bond can increase the overall structural strength of the pavement structure and has the potential to prevent intrusion of water between the layers, thus minimizing stripping near the interface. If a good bond is not formed between the existing surface and the new overlay, a slippage or sliding-type failure can easily occur.

Clean the pavement surface completely before the tack coat is applied. The tack coat material is which is normally an asphalt emulsion can also be asphalt cement or cutback asphalt. Heat it to the proper temperature so it is fluid enough to spray from the nozzles instead of coming out in strings. If the correct amount of tack coat is sprayed on the surface, some of the existing surface will still be visible through the tack coat – not all of the existing pavement surface will be covered.

Tack coat application is essential when an overlay is being constructed on an existing pavement surface, either Portland cement concrete, hot-mix asphalt or surface treatment.

Leveling Courses

Common practice in the past has been to place a leveling course on the existing pavement surface in order to improve the rideability of the pavement structure. This leveling course sometimes called a wedge or a scratch course, was designed to fill in the low spots on the pavement surface. This leveling action was accomplished through the principle of the floating screed on the paver.

Normally the area to be leveled is marked out and a determination is made as to the amount of the leveling course to be placed in the area, routinely measured in pounds per square yard. The material is placed either by machine or hand and then compacted. Rubber tire rollers are recommended for use on leveling courses because they compact variable leveling courses more uniformly than steel wheel rollers. Density is difficult to measure on variable depth leveling courses.

Overlays on Portland Concrete Cement Pavements

Cut out and remove any severely distressed areas in the PCC slabs. Replace these areas using full-depth slab-repair techniques with PCC or HMA. Complete the corrective work on the underlying subbase or subgrade material. Repair any severely spalled area at joints, using partial-depth slab replacement methods. Stabilize rocking slabs. Clean poorly sealed joints and reseal after drying with appropriate joint seal material. After patching and resealing, clean the surface of the pavement using mechanical brooms, air blowing and/or water flushing where needed. If the PCC pavement is in extremely poor condition, repair using rubberization or crack and seat method to provide stabilization for the asphalt overlay.

Preparation of a Milled Surface

Milling Equipment and Techniques

Milling, also called cold planing, can be used in lieu of placing a leveling course to remove the high points in the exiting surface. Milling can be accomplished in any width necessary, from 6 inches to more than 13 feet.

Advantages

The milling machine is equipped with automatic grade and slope controls. It has the capacity of producing a level grooved surface in one pass over the existing roadway. A milled surface promotes a good bond with the new mat and may reduce the possibility of slippage of the new overlay. The RAP produced by the milling process can be hauled back to the asphalt plant for future recycling.

By milling and putting back the same lift thickness, bridge and guardrail clearances are properly maintained as well as providing the necessary interface with adjoining curb and gutter.

Disadvantages

Watch for “scabbing or “scaling” where the milling machine leaves patches of uneven pavement. These areas may pop loose under traffic and take part of the new overlay with it.

Cleaning

Factors Affecting Adhesion

- Cleanliness
- Tack Coat
- Unsound Material

A milled surface is usually very dusty and dirty and needs to be cleaned to enable the asphalt overlay to bond with the existing pavement. The surface to be overlayed must be clean, have a uniform surface and be properly tacked. Once the pavement dries, several sweepings may be needed with a mechanical broom . In some cases, it may be necessary to dampen the milled surface before sweeping or to air blow and/or flush the milled surface with water.

Drainage Considerations

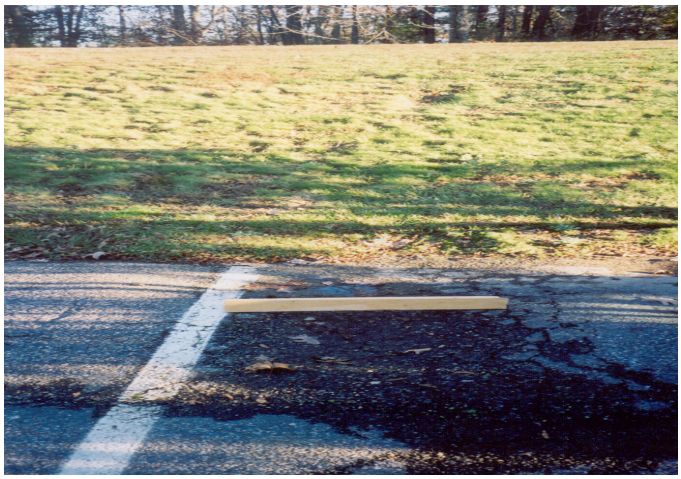
Drainage is an important part of the process of placng a long-lasting, high-quality pavement. Water is the enemy of all good pavement structures. It can weaken the subase and/or base materials causing them to lose their structural stability and can result in failure of the overlying asphalt layers. Similarly, if water is able to enter the asphalt pavement itself either due to poor density or other factors, it will strip away the binder that provides the stone-to-stone bond. Aggregate particles that lose their asphalt coating will no longer be able to hold together and the asphalt mix falls apart, a phenomenon called raveling.

Maintenance of Drainage Systems

Keep roadside drainage systems clear of vegetation and other foreign material to allow rainfall to quickly be carried away from the pavement structure.

Proper Crown and Slope

Avoid creating “birdbaths” or low spots on the asphalt surface. This prevents water from quickly moving to drainage systems such as curb and gutter or roadside ditches. Give pavement an effective crown and an adequate slope to assure rapid transit of water off of the pavement surface.



Pavements built adjacent to a hillside that slopes toward the pavement structure should have a ditch or buried interception trench to keep water from working its way under the pavement layers. Signifcant damage can result from such water intrusion.

Proper design carries water away from the pavement structure.

Curb and Gutter Elevations

Gutter systems that are higher than the adjoining asphalt surface serve little purpose. Water is allowed to collect on the asphalt surface and at the gutter joint instead of being conveyed away from the pavement to drop inlets or other parts of the drainage system.

Significant damage can result from failures to properly match the asphalt pavement to the curb and gutter system.

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Study Questions

1. A prime coat on aggregate base courses is required on all state jobs regardless of the thickness of the asphalt mat to be put down.

   A. True
   B. False

2. The purpose of a tack coat is to ensure a bond between the existing pavement surface and the new asphalt overlay.

   A. True
   B. False

3. Milling can be accomplished in widths ranging from:

   A. 6 inches to more than 13 feet
   B. 1 foot to 15 feet
   C. 3 feet to 15 feet

4. The only problem with milling is that the material taken off the roadway may not be used again.

   A. True
   B. False