

Just for street and road workers

Seal coats and full-depth repair of asphalt pavements

Editor's note: This article is the third in a series based on information in Iowa's new Local Roads Maintenance Workers' Manual. The manual was developed by CTRE and sponsored by the Iowa Highway Research Board (TR-514).

Previous topics included maintaining gravel roads, identifying asphalt pavement distresses, and conducting routine asphalt maintenance activities. See Technology News, July–Aug and Sept–Oct 2006.

As described in the previous issue of *Technology News*, effective asphalt pavement maintenance begins with identifying the pavement distresses, then determining the most effective treatment. See table 1.

This article summarizes two treatments: seal coats and full-depth repairs.

Seal coats should be applied before structural distresses have occurred. Seal coats fill cracks and low spots, waterproof the surface, and provide a wearing course for traffic. They consist of an application of asphalt binder followed by an application of aggregate.

Full-depth repairs are permanent solutions for ruts, washboards, and potholes. They involve removing and replacing the distressed slab section, from top to bottom.

The following instructions are general guidelines. Always check with your supervisor and follow your local policy.

Seal coat repair guidelines

A good seal coat will have the following characteristics:

- An adequate crown (slope) on the roadway for good drainage.
- Few unsealed cracks, alligator cracking, potholes, or ruts.
- A smooth tight surface with little or no bleeding (asphalt binder rising to surface), raveling (a rough, pitted surface due to loss of aggregate), or dust.

Materials. Two materials used for seal coats are binder (asphalt) and aggregate. Binders consist of asphalt cutbacks or asphalt emulsions. Aggregates normally used for seal coats are quartzite, limestone, and pea gravel.

Table 1. Select maintenance activities based on level of distress

Distresses	Maintenance Activities				
	Routine Maintenance		Full-Depth Repair	Seal Coat Repair	HMA Overlay
	Crack Sealing	Surface Patching			
Ruts			X		X
Cracks	X			X	X
Washboards			X		X
Potholes		X	X		

Optimum timing/conditions for seal coating. Seal coats should be applied during the hottest, driest months of the summer, when binders cure quickly, normally not later than mid September in Iowa.

Delay a seal coating project if wind speeds are high. Wind affects the spray pattern from the distributor truck, blows debris on the uncovered binder, and can cause the binder to cure before aggregate is applied.

Preparing for seal coating.

1. Seal cracks and place surface patches as appropriate.
2. Ensure all equipment is on site and functioning properly:
 - Street sweeper
 - Distributor truck
 - Chip spreader
 - Pneumatic tire roller
 - Dump trucks for aggregate hauling
3. Ensure materials are on site and the aggregate is clean.
4. Sweep and clean the pavement. Remove vegetation from cracks.
5. Cover utility access lids with construction paper so the seal coat does not adhere to them.

Placing a seal coat.

1. Spray the pavement with binder.
 - Use roofing paper to make a sharp line across the pavement when starting and stopping application.
 - Align the binder application with the center line of the road. Align the nozzles and set the spray bar height as appropriate. See figure 1.
 - If using a slow setting emulsion, spray approaches or intersection radii first. If using a rapid setting emulsion, spray approaches and radii after the main road.
 - Apply only as much emulsion as the chip spreader will be able to cover with a load of aggregate. Calibrate this distance by measuring the distance the chip spreader travels on one load of aggregate.
2. In general, apply aggregate before the binder has set, usually within two to three minutes after the binder has been applied or before its surface has turned black.
3. Roll the aggregate with a pneumatic tire roller closely behind the chip (aggregate) spreader.
 - Make two to four passes on a 24-foot wide roadway.

- Do not start and stop the roller quickly. This will cause diffraction of the surface.
4. The following day, sweep up excess unbound aggregate.

Application rates. Application rates will vary, depending on materials used and the condition of the surface. Excessive aggregate fly rock (unbound aggregate) will be kicked up by traffic and may damage vehicles. Excessive fly rock leads to additional cleanup, dust, and haul-away costs.

The following rates are guidelines:

Binder: 0.25–0.3 gal/yd² (less for smooth pavement with few voids, more for rough pavement with many voids).

Aggregate: 15–30 lb/yd² (enough to cover the binder without excess).

Cleaning up.

1. Remove all construction signs the next work day after the seal coat has been installed.
2. Remove debris from the work zone and all affected driveways and parking areas.

Full-depth repair guidelines

Preparing for full-depth asphalt repair.

1. Make sure the warning lights attached to vehicles are on and in proper working order.
2. Clean and dry the surface before removing deformed pavement material.

Placing a full-depth repair.

1. Saw cut around the area.
2. Remove material with a jack hammer, picks, shovels, broom, air hose, or mechanical sweeper.
3. Apply a tack coat to the edges of the existing pavement.
4. Replace in lifts, or layers, of 2½ inches maximum.
5. Compact with a vibratory roller.
6. Reapply pavement markings if appropriate.
7. Allow traffic to drive on repair when the new asphalt is cool enough to touch.

For more information

To borrow a copy of Iowa's manual, contact Jim Hogan, Iowa LTAP librarian, 515-294-9481, hoganj@iastate.edu. You can download a printable copy, www.ctr.e.iastate.edu/pubs/maint_worker. ■

Rule of Thumb

Everyone is responsible for quality control.

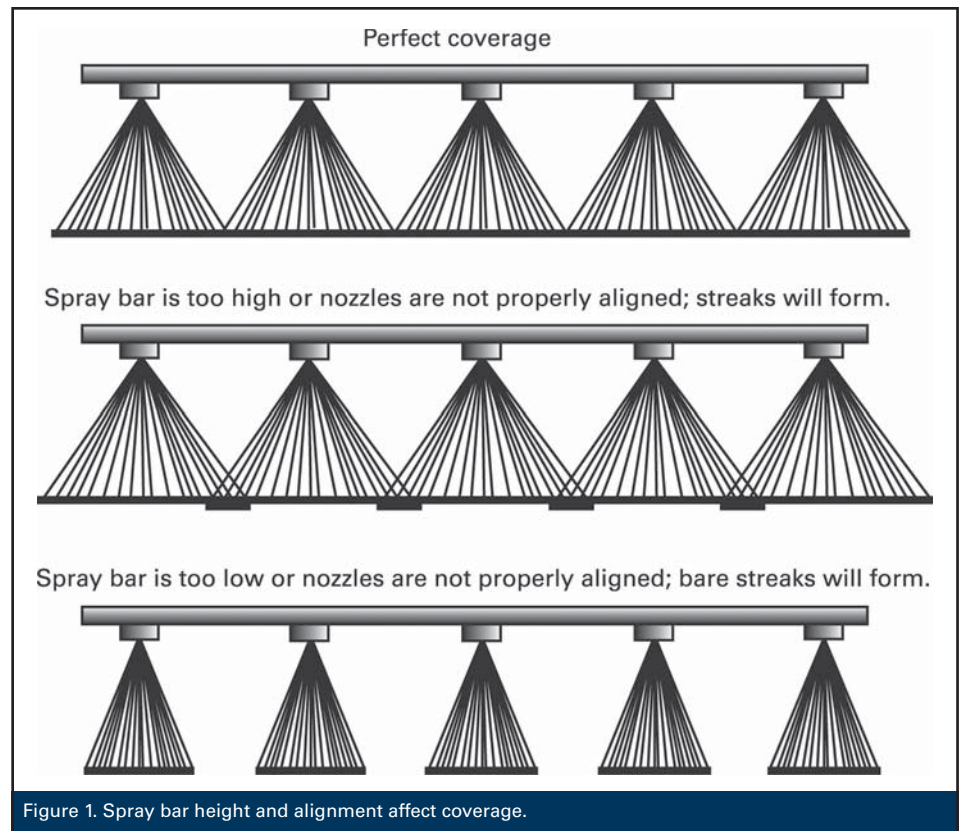


Figure 1. Spray bar height and alignment affect coverage.

Rule of Thumb

To check for proper binder application rate, remove a few stones that have been embedded in the binder by the pneumatic roller. About 50–70 percent of the aggregate should be covered with the binder. See figure 2.

If tires on the chip spreader or roller are picking up aggregate, there's too much binder for the amount of aggregate.

Binder application rate

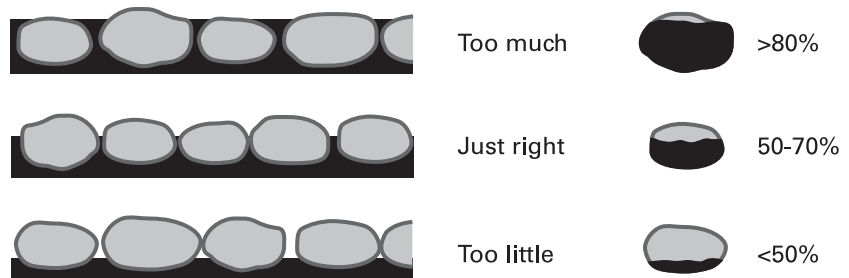


Figure 2. Visual check of application rate.