

**SEAL COAT INSPECTOR'S  
FIELD GUIDE**

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# CONTRACT ADMINISTRATION

## Inspection Team

A seal coat project should have minimum 3 people in inspection team to able to keep up with the Contractor's equipment and ensure that the project benefits from close inspection. The duty of the inspectors in the inspection team will be as follows;

- Inspector 1 (Chief Inspector): Ranges along the whole length of the job and adjusts the asphalt and aggregate rates.
- Inspector 2: Follows the asphalt distributor, controls the distribution rates based on the instructions from chief inspector.
- Inspector 3: Follows the aggregate spreader and controls the distribution of spread rate of aggregates. Monitors the performance of the roller team.

## Duties of the Inspector

As an Inspector, you are responsible for verifying that all materials and construction procedures meet the requirements of the specifications, Special Provisions, and Plans, as required by the Department. You report to the Project Engineer, usually through the Chief Inspector, concerning the progress of the work and the manner in which it is being performed. Any deviation from the Specifications or Plans must be brought to the attention of the Chief Inspector, Resident (or Project) Engineer, and the Contractor. If you receive a complaint from the public, you should immediately refer it to the Chief Inspector and if he/she is not available, to the Project Engineer. The same routine applies for disputes that may arise in the field with the contractor.

In general terms, when assigned to inspect Seal Coat projects, you are responsible for:

- Becoming thoroughly familiar with Specifications, Special Provisions, and Plans prior to the beginning of the project.
- Ensuring that aggregate stockpiles are adequate and conveniently located.
- Ensuring that asphalt storage heating facilities are adequate.
- Inspecting all equipment to be used on the job.
- Sampling both aggregate and asphaltic materials as required.
- Monitoring the temperature of the surface, air, and asphalt.
- Ensuring that the amount of aggregate and asphalt used on the project are accurately recorded.
- Inspecting the quality of the finished project and bringing any deficiencies to the attention of the Contractor or his representative, for correction.
- Ensuring that all reasonable precautions are taken to provide for the safety of the motoring public and all personnel involved in the project.
- Establishing and maintaining a harmonious working relationship with the Contractor's personnel, while maintaining the highest possible professional image.
- Performing other duties as directed by the Chief Inspector, Resident Engineer, or their designated representatives.

## Specifications

All work performed and all materials furnished to the Department shall comply with the following:

- Standard Specifications
- Special Specifications
- General Notes
- Plans

Standard Specifications contain the majority of the Department's regulations covering:

- Quality of most of the materials furnished to the Department by the Contractor or Supplier.
- Method and manner of the work to be performed for the Department by the Contractor or Fabricator.

Special Specifications describe the Department's regulations covering a special project or a new type or material or structure that is not covered by the Standard Specifications. General Notes supplement the Standard or Special Specifications for the districts where the project will take place. The general notes are almost the same for same type of projects in same district. Plans (also called Contract Drawings) describe in detail the work to be accomplished by the Contractor. In cases of disagreement, Plans govern over all Specifications, and Special Provisions govern over both Specifications and Plans. Actual dimensions shall govern over scale dimensions.

All work is done under the supervision of the Engineer, to his satisfaction, and in accordance with the Contract, Plans, and Specifications. The Engineer is the State Highway Engineer of Texas, or his authorized representatives. The Engineer decides all questions which may arise as to the quality or acceptability of materials furnished and work performed; the manner of performance and rate of progress of the work, the interpretations of the Plans and Specifications; and the acceptable fulfillment of the contract on the part of the Contractor. The inspector has authority to act in behalf of the engineer in the absence of the engineer.

The 1993 Standard Specifications for Construction of Highways, Streets, and Bridges (referred to hereafter as Standard Specifications) contain the following items that pertain to Seal Coats and Surface Treatments:

- Items 1-9: General Requirements
- Item 210: Rolling (Flat Wheel)
- Item 213: Rolling (Pneumatic Tire)
- Item 300: Asphalts, Oils and Emulsions
- Item 302: Aggregate for Surface Treatments
- Item 303: Aggregate for Surface Treatments (Lightweight)
- Item 316: Seal Coat
- Item 352: Cleaning and/or sealing joints and cracks (Asphaltic Concrete)

## **Safety**

Project Site safety is everyone's responsibility. Bring any unsafe condition you spot to the immediate attention of the Chief Inspector or the Contractor's foreman.

### Material Handling

Heating asphalt always presents a hazard, with the exception perhaps of emulsions. The most hazardous are the cutbacks. Because of the highly volatile solvents used in cutbacks, these binders are subject to explosion if not handled carefully. Extreme care must be taken not to allow open flames to come in contact with the asphalt or the gases from hot asphalt. When working with asphalt cement (AC), remember also that extreme care must be taken to avoid contact with the hot material and subsequent burn injuries as a result of the high temperatures (300°F or greater) involved.

# SEAL COAT MATERIALS

## Classification of Asphalts

As an Inspector, you must know and understand the materials that are going to be used in your project. Seal coats essentially are constructed out of two primary materials: asphalt binder and aggregate.

Asphalts used in highway pavements are classified into three broad classes:

- Asphalt cement
- Cutback asphalt
- Emulsified asphalt

### Asphalt Cement

Asphalt cement is asphalt specially prepared as to quality and consistency for direct use in the manufacture of asphaltic pavements. It is used in its pure form; not mixed with other chemical substances.

### Cutback Asphalt

Cutback asphalt is asphalt cement, which has been liquefied ("cut back") by blending with petroleum solvents. This makes the asphalt more workable and easier to spray. Upon exposure to the atmosphere, the solvents evaporate, leaving the pure asphalt cement to harden. The type of solvent used determines how quickly the asphalt hardens, since some solvents evaporate much quicker than others do.

### Emulsified Asphalt

Emulsified asphalt (also called "emulsions") is asphalt cement combined with water to make the asphalt more liquefied. Since asphalt cement and water do not naturally mix, a small amount of emulsifying agent is used. This mixture is further categorized as either anionic or cationic, depending upon the emulsifying agent used. The important point about this difference that you must know as an Inspector, is cationic and anionic emulsions must never be mixed. Upon exposure to the air, the water and emulsifying agent evaporate, leaving pure asphalt cement which hardens to bind the aggregate in place. The point when the water evaporates is known as when the "emulsion breaks." This is visible on the roadway. The asphalt's color suddenly turns from a muddy brown to a clear black.

### Additives

Another compound may be added to the basic asphalt type to produce desirable properties or characteristics not abundant in the basic asphalt. For instance, latex has been successfully combined with asphalt cement, and is fairly common in seal coats.

Asphalt must be stored at specific temperatures, which are usually somewhat higher than the temperatures at which the asphalt is applied. The asphalts used in seal coat work are stored and applied at the following approximate temperatures.

<b>Type of Binder</b>	<b>Storage Temperature Range</b>	<b>Application Temperature Range</b>
Asphalt cement	325 <sup>0</sup> - 400 <sup>0</sup> F	275 <sup>0</sup> - 350 <sup>0</sup> F
Cutback asphalt	150 <sup>0</sup> - 200 <sup>0</sup> F	125 <sup>0</sup> - 200 <sup>0</sup> F
Emulsions	150 <sup>0</sup> - 170 <sup>0</sup> F	110 <sup>0</sup> - 160 <sup>0</sup> F

## **SEAL COAT APPLICATION**

Before a seal coat project can begin, the road's surface must be prepared for the new seal. The District Maintenance force generally accomplishes this at least six months in advance of the new seal. The main preparatory stages for a seal coat project that the Inspector would be involved in are:

- Repairs and Patching
- Stockpiling aggregate
- Preconstruction meeting

### **Repairs and Patching**

Any repair work that the pavement needs must be done well ahead of the beginning of seal coat work. Repair work is normally accomplished by the State's Maintenance Construction forces. The different types of repairs, that may be required, include ( For more information you can check the Seal Coat Field Manual.):

- Planing
- Patching
- Potholes
- Crack Sealing
- Cleaning

As Inspector, you need to make sure that binder and aggregate rates are adjusted to account for localized variations in road surface characteristics. New patches, level-ups, and crack seals may absorb seal coat binder at a different rate than the surrounding pavement. Areas that are heavily patched need to be identified in advance of the arrival of the asphalt distributor so that the Chief Inspector and the contractor's foreman or superintendent can confer and decide on the appropriate rate of binder and rock for these areas. Additionally, you must ensure that the road's surface ahead of the distributor is clean of mud and other foreign materials that might inhibit the bonding of the seal to the road's surface. If you find an area that needs to be cleaned, you should immediately notify the contractor so that remedial action can be taken without delaying production if possible. The contractor's responsibility for repair work includes only the cleaning of all animal carcasses or other foreign matter that might contaminate the seal coat

### **Stockpiling Aggregate**

Our Standard Specifications allow the Contractor to stockpile aggregate to be used on the project, at locations approved by the Engineer. Normally, the Contractor proposes the stockpile locations to the project. Engineer, who either approves or disapproves. Item 316.4 of the Standard Specifications gives broad restrictions on stockpile locations. It is also important for stockpiles to be situated so that they are not contaminated. Make sure that clay and mud do not pose a problem. Stockpiling should not be situated where there is likelihood that roadway drainage will cause the aggregate to remain excessively wet.

If necessary, the Contractor may be required to prepare a stockpile area before the aggregate is placed on it. He may be required to level it with a bulldozer or motor grader, and to clear it of any debris, such as vegetation, rocks, and sticks. Stockpiles should be placed in a manner that will minimize (or prevent) segregation (the separation of the different sized aggregate particles) and degradation (the breaking apart of the aggregate particle). In a proper aggregate stockpile the loads should be placed adjacent to each other to form a "chain." Stockpiles should not be placed in one high cone-shaped heap. It is the contractor's responsibility to remove and clean up the aggregate stockpile after the job is over. So you must make sure that the contractor removes and cleans up the aggregate stockpile after the job is over and special care must given not to get aggregate on private property.

It will probably be necessary to take samples of the stockpiled aggregate before completing the design process. When sampling from a stockpile, be certain that samples are taken from various sections of the pile. Proper sampling procedures are specified in TxDOT Manual of Testing Procedures TEX 400-A on sampling and testing procedures.

## **Weather**

Seal coat is best applied during hot, dry weather. A sudden change of weather, such as a cloudburst, can have an undesirable effect on the subsequent performance of a newly applied seal coat. It is your responsibility to ensure that the seal coat work is done in weather specified by the standard specifications. The ideal conditions for applying a seal coat are hot temperatures with relatively low humidity, and little or no wind. For most parts of the State, the period from June through September tends to be the best time for seal coat work.

The Standard Specifications require that seal coats be applied when the roadway surface is 60<sup>0</sup> F or higher. During the summer months, roadway temperatures are commonly 100<sup>0</sup> F or higher by 9:00 or 10:00 A.M. It is best if the humidity is 50 percent or lower when the asphalt is shot, especially if you are shooting emulsions surface.

Wind may work partially in your favor and against you at the same time. A gentle wind may work in favor. On the other hand, if the wind is too strong, it causes problems. You have to be very careful of wind direction especially when spraying AC with Latex. It is a very sticky substance, and as it is sprayed, small "cobwebs" of the mixture are blown around. They are almost invisible until they land on a light-colored automobile, at which time they become very obvious. Wind may, in fact, force a change in plans, as to which lane is shot first, and the direction of work, in order to minimize the effects of blowing asphalt.

Asphalt should never be shot during rain. If rains are in the vicinity and predicted for the area, you should suspend operations until it clears. Sudden, unexpected showers are common in Texas. Sometimes they appear with no hint of rain and pass very quickly. In this case, it is probably wise to shut off the asphalt distributor immediately, and wait until the shower is gone and the pavement dries. But it is usually best to continue operation of the aggregate spreader until the asphalt already shot is completely covered. After a rain, always suspend operations until the pavement has had ample opportunity to dry completely.

## **Traffic Control**

We have said repeatedly that safety is one of the Inspector's many concerns, and probably the most important one. The Contractor must supply all of the barricades, signs, and other traffic control devices specified in the plans. You must ensure that he has all the correct required devices, and that they are installed properly.

### Traffic Control

It is the responsibility of the Contractor to ensure the safety and convenience of the public. As agents of the State Government, however, we are also responsible for ensuring the safety of fellow human beings. Traffic control is covered by the Texas Manual on Uniform Traffic Control Devices for Streets and Highways (TMUTCD). Part VI covers traffic controls for construction and maintenance operations. Additionally, there will be a Traffic Control Plan (TCP) included in the project plans that must be followed.

For the operation to begin efficiently the Contractor should have the required barricades and signs in their proper locations no later than the night before the sealing begins. An efficient Contractor will have one person in charge of a crew whose sole responsibility is traffic control. Their duties include erecting signs and barricades; placing traffic cones; serving as flaggers; and moving the traffic control devices down the roadway in a timely manner following the seal coat equipment as closely as possible. When the signs and barricades are pre-positioned for the next day's the seal coat, make sure that they are turned away from approaching traffic, covered, or laid flat on the ground until needed for seal coat operations on the next day.

### Exposing Signs

The first thing that occurs on the morning of start-up should be the correct positioning of signs and barricades. The timing is critical, because motorists should come under control of the warning signs before any equipment is moved onto the highway. You must check the signs as soon as they are exposed. Check to ensure that all barricades and signs specified in the plans and the TCP are:

- In the proper sequence
- The correct distance apart
- Clearly visible to motorists
- Positioned correctly, so the devices themselves do not pose a hazard to traffic.

### Traffic Cones

If required by the TCP, traffic cones are used to keep traffic routed around the seal coat equipment. As soon as the signs and barricades are exposed, the traffic cones should be put in place. You should make sure that the cones are placed in accordance with the TCP.

## Flaggers

As soon as the first traffic cones are placed in position, a flagger should also be in position. Flaggers must be used to warn motorists of the hazards and control the flow of traffic through the work area. Flaggers shall be English speaking, courteous, well informed, physically and mentally able to effectively perform their duties in safeguarding and directing traffic and protecting the work, and shall be neatly attired and groomed at all times when on duty. When directing traffic, flaggers shall use standard attire, flags and signals and follow the flagging procedures set forth in the Texas Manual on Uniform Traffic Control Devices for Streets and Highways. The TMUTCD requires the wearing of an orange colored safety vest, and recommends the wearing of a white safety helmet or orange cap. Flaggers must be given a break occasionally, at least after a few hours. If necessary, remind the Contractor to give the flagger a break and ensure that whoever substitutes for the regular flagger is doing the job correctly.

You should watch to ensure the flagger is using the correct signals. If the flagger is required to verbally explain the situation to vehicle operators, listen to what he or she tells a few of the drivers, to make certain it is clear and accurate. If a two-lane road uses flaggers at both ends of the project, , make certain they have the necessary means to communicate. If they are not performing some element of their duties properly, they must be corrected promptly.

## Moving Control Devices

After some length of road has been sealed, the flaggers and cones will need to be moved closer to the operations and the newly sealed road opened to traffic. The project barriers and signs will not be moved. Check that the flagging and cones are properly placed and that proper procedures are again in use after repositioning.

If the seal coat operation crosses numerous intersections, extreme care must be taken. The TCP must be followed carefully. Care must be taken to prevent vehicles from crossing the wet asphalt between the asphalt distributor and the aggregate spreader. This may require positioning an additional member of the traffic control crew at the intersection and keeping that person in place until it is safe for traffic to cross at that point.

## **Setting The Rock Lands**

A rock land is the area covered by one predetermined size truckload of aggregate. The area of the rock land is calculated in advance and marked either on the pavement with paint, or on the side of the road with flags. They are usually set at the start of a project to help the contractor to calibrate the spreader box spreader box and assure that the correct rock rate is being applied. In the following example, the assumption that each truck is carrying the precise amount of material is made. That is, a 14-yard truck would contain exactly 14 cubic yards of aggregate.

## Calculating the Length of a Rock Land

Aggregate Rock Rate      125 Syd/Cyd (From Plans or Design)

Width of Road                      12 feet  
Capacity of Dump Trucks 14 Cyd

$$\begin{aligned}\text{Area of Rock Land} &= 125 \text{ Syd/Cyd} \times 14 \text{ Cyd} \\ &= 1750 \text{ Syd}\end{aligned}$$

$$\text{Length of Rock Land} = (1750 \text{ Syd} \times 9 \text{ ft}^2/\text{syd}) / 12 \text{ feet} = 1313 \text{ feet}$$

Make certain that the markings for rock lands are either a different color or are distinguishable from the markers used for asphalt shots.

### **Marking the Asphalt Shots**

During the period that the Contractor is repositioning traffic control devices for the next shot, one or two of the Inspectors may be assigned the task of marking the next series of asphalt shots. An asphalt shot is the length one distributor load of binder can cover leaving about 200 gallons in the tank. **An asphalt shot must be a multiple of full Rock Lands (i.e. 1 Asphalt shot should equal 1, 2, or 3 Rock lands, not 1.7 rocklands).** Not all Districts use the method described below, and this is not the only way to accomplish this task. It is merely one method that may have certain advantages over others.

#### Calculating Shot Length

Design Asphalt Rate	0.45 gal/syd	(From Plans or Design)
Distributor Capacity	2000 gal	(From Calibration papers)
Area of Rockland	1750 syd	(Calculated above)

$$\begin{aligned}\text{Gallons per rockland} &= .45 \text{ gal/syd} \times 1750 \text{ syd} \\ &= 787 \text{ gal/rockland}\end{aligned}$$

$$\begin{aligned}\text{Number of Rocklands per shot} &= 2000 \text{ gal (capacity of distributor)} / 787 \text{ gal} \\ &= 2.5\end{aligned}$$

Note: Shot length must be in whole rock lands and should leave approx 200 gal in distributor  
gallons / shot =  $2 \times 787 = 1574$   
gallons left in distributor =  $2000 - 1574 = 426 \text{ gal.}$ )

$$\begin{aligned}\text{Length of shot} &= 2 \text{ (rocklands)} \times 1313 \text{ feet (length of rockland)} \\ &= 2626 \text{ feet}\end{aligned}$$

#### Marking the shot

When you are assigned to mark the shots you shall be equipped with a vehicle with a properly calibrated Distance Measuring Instrument (DMI). You should mark each shot so that the spot is clearly visible. It can be done with a fluorescent shade of spray paint from an aerosol can, or with a small, bright-colored wire flag stuck in the earth next to the pavement surface.

## Constructing Paper Joints

To ensure an even, straight, and sharp beginning and end of each shot, paper joints should be constructed. The joint is placed exactly on the spot where the shots have been measured.

**Step 1: Starting point:** Lay a strip of the paper across the full width of the lane being sealed, and anchor it down with a thin layer of aggregate spread over the paper. If a hydrostatic distributor is used on the project, or if the distributor spray operator is inexperienced you may want to have a wider mask. Simply lay a second or third sheet of paper beside the first, overlapping each one by at least two or three inches. Anchor the paper securely in place by spreading a few shovels full of aggregate on top of the paper. Sweep away any aggregate that has spilled on the surface to be sealed, and the starting joint is complete. As soon as the distributor has started the shot, the paper should be removed. Figure 1 shows a typical paper joint on a recent project.



**Figure 1.** Paper Joint Image

**Step 2: End of shot:** At the end of the shot, another joint exactly like the first must be constructed. It is constructed just like the first, except that the rear edge of the paper is placed on the marker for the end of the shot. Always make sure, there is a paper joint constructed at the end of each shot, as well as at the beginning.



**Figure 2.** End of Shot Image

Repeat Steps 1 & 2 as required: As soon as the distributor has moved away, the paper is removed. It should be pulled to the side of the road, out of the way, and disposed of later. Aggregate is spread over the asphalt. Then, another layer of the joint paper is placed over the end to form a starting joint for the second shot. Care must be taken to clean all excess aggregate off the unsealed pavement, to preserve the clean, sharp end. The edge of the paper should be positioned exactly above the end of the asphalt shot.

### **Shooting the Asphalt**

You must observe that the below listed tasks have been properly performed before allowing the contractor to start shooting the asphalt (For more detailed information you can refer to the Seal Coat Construction Field Manual section entitled: “Shooting the Asphalt.”)

- Prepare the distributor.
- Blow the nozzles.
- Recheck bar height.
- Final equipment checks.
- Check Paper Joints.
- Check transverse alignment.
- Check binder application temperature.

As soon as all the preceding checks have been made, you can give the operator the signal to begin. Make sure you are in position to be able to closely observe the early part of each shot. Check to see that all nozzles are spraying correctly. The desired fan pattern should be easily visible. Closely inspect the asphalt film on the roadway to detect any variation. It should appear

as a uniform sheet of asphalt across the entire width of the shot. Look for any visible signs of streaking or skipping.

Watch the spray pattern as long as you can clearly see it on the shot. If anything goes wrong, such as a nozzle clog, you will need to make a rapid decision whether to stop the spraying or to allow it to continue. If you continue, the defect will need to be patched later, but at times, it is the only logical decision. These decisions can only be made on the basis of good judgment, evaluation of the consequences, experience, and the specific situation. If you have questions, immediately refer them to the Chief Inspector for guidance.

The best rule of thumb is to put the aggregate on the asphalt as soon as possible without causing problems. If the rock begins to turn or asphalt is being picked up on spreader box or roller tires, you need to ensure that the contractor makes a change in his construction sequence to correct these problems.

Emulsions remain dark brown until the emulsion breaks, at which time, they begin to turn black. As the shade begins to turn black on the surface, you can check for readiness to spread the aggregate. It is better to spread the aggregate before emulsions start to break. One way to check it is to use a small stick or rock, and scratch a line in the surface of the asphalt. If the asphalt under the surface is a lighter, muddy brown and the mark begins to fill in immediately, the emulsion has not completely broken. If the asphalt under the surface is already dark brown or black and the edges of the scratched line are holding firm and not filling in rapidly, it is ready for the aggregate to be applied.

If two distributors are used on the project, the first one will be strapped and refilled after the first shot. The second distributor will be brought up for the second shot. Make certain that the same checks are performed on the second distributor that was performed on the first. It is also desirable that they be numbered on the rear, so that they can be easily distinguished later in the job

During binder application, the condition of the road's surface will affect the required binder application rate and necessitates adjustments be made as the distributor moves along the shot. The rule of thumb is to look at the unsprayed surface ahead of the distributor and compare it to the surface that was been seal coated. If the surface appears to be leaner (less asphaltic material: shelled or oxidized) ahead of the distributor, the binder application rate will need to be increased. If the surface ahead appears to be richer (more asphaltic material: flushed), the rate should be reduced. The amount of adjustment will be based on experience. Finally, no traffic of any type should be allowed on the fresh asphalt

### **Strapping the Distributor**

Before and after each distributor load of asphalt is sprayed, the asphalt distributor must be strapped. This term means that the amount of asphalt remaining in the tank is measured to determine precisely how much asphalt was used on every shot. Each distributor must have a calibrated measuring stick or "strap stick." The strap stick should be marked upon calibration and only used with the distributor for which it was calibrated. The stick is used to measure the

quantity of asphalt in the tank after the shot. This quantity is subtracted from the total amount that was in the tank at the beginning of the shot.

To strap the distributor, the following procedure is used.

- Immediately before and after the shot, have the operator stop the distributor on a level spot.
- The tank must be as level as possible. Some distributors have a level attached to the tank. If not, use a 3- or 4- foot carpenter's level.
- Have the spray operator make certain the dipstick is wiped clean before it is put in the tank.
- Open the manhole cover at the top of the tank and put the dipstick in the tank, making certain it is held as nearly vertical as possible.
- Push the stick down into the asphalt until it touches the bottom of the tank.
- Pull the stick out and read the number of gallons at the top of the line covered by asphalt, or, on other models, hold the stick up against the scale mounted on the side of the tank as seen here.
- Subtract the gallons remaining from the number of gallons at the beginning.

Strapping the distributor allows us to determine what our average application rate was over each shot applied. An example of calculating application rate is shown below.

Given:

Shot Width in linear feet = 12 LF

Shot Length in linear feet = 468.75 LF

Calculate:

$$\text{Total Shot Area} = \frac{12 \text{ LF} (468.75 \text{ LF})}{9 \text{ SF/SY}} = 5,625 \text{ SY}$$

$$\text{Application Rate} = \frac{1,775 \text{ gallons used for the total area}}{5,625 \text{ total area shot in square yards}} = .315 \text{ GAL/SY}$$

### **Spreading the Aggregate**

Before the distributor begins to spray the first shot of the project, the aggregate spreader must be in position and ready to begin. In your last-minute equipment check, be certain to check with the spreader operator to make certain his machine is ready. Also be certain that his assistant, who controls the aggregate flow and gate adjustment, is present and ready. Make sure that there is one haul truck behind the aggregate spreader loaded with aggregate with which to fill the spreader and also two or three more trucks loaded and standing by.

The operator must start his forward roll and maintain alignment of the spreader while reaching the correct forward speed. An instant before reaching the asphalt strip, he opens all the discharge gates. If any gates are not functioning correctly, he must immediately signal the operator to stop, unless the assistant can correct the problem immediately. If the problem can be corrected within the first few feet, the patching crew can fill in the bare spot easily.

If the spreader passes the rock land marker before the first truck separates, the aggregate is being applied too thinly. If the spreader does not pass the marker within about 25 feet from where the second truck was picked up, the aggregate is being applied too heavily. In either case, gate openings must be adjusted accordingly.

The Inspector that is assigned to watch the aggregate application should have a good view of the aggregate as it leaves the discharge hopper. He or she should watch closely to see that there is a thin "curtain" of aggregate dropping through the gates. The curtain should be uniform across the entire width of the discharge hopper. If the curtain of aggregate is only one aggregate thick, as it should be, light can easily be seen through the curtain. Any dark stream suggests a gate that is open too widely. Any unusual light streak means that not enough aggregate is being released. You should also watch the aggregate as it hits the fresh asphalt. There should be only a small bouncing action visible in front of the curtain of aggregate. If a "wave" of aggregate forms in front of the curtain, the aggregate is being applied too heavily.

Keep an eye on the scalping grate on top of the discharge hopper. If everything is going well, there should only be a steady flow of aggregate passing through it. An accumulation of clay balls, grass, or rocks on top of the grate indicates that the loader operator is picking up contaminating materials. The Chief Inspector or Contractor's foreman should be notified immediately. Also look closely behind the spreader to check for contaminants and streaking of thin or thick rows of aggregate. Check for a ripple effect, as well. If there is evidence of thick and thin alternating streaks running transversely (across the pavement), it indicates that the spreader speed is too high and should be slowed down.

The best way to keep records of the number of truckloads of aggregate placed on the roadway is to write down the identification numbers of each truck on the project. Each time the truck finishes emptying a load into the spreader, put a mark beside that truck's number. Where load tickets are issued for each truckload, you will have your own copy of the ticket.

## **Patching**

The patching crew may be required to make minor, on-the-spot repairs that will not interrupt the seal coat process. These repairs may include, but are not limited to:

- Removing and brooming smooth, small mounds of excess spilled aggregate on top of the sealed surface. The majority may be shoveled back into the truck and the remainder swept off to the side of the shoulder.
- Covering "fat" joints. Occasionally a double layer of asphalt may be sprayed on a joint. This usually happens because the joint paper was not exactly at the edge of the aggregate when a joint was made. Asphalt usually moves up through the aggregate at this point. For the moment, about all the patching crew can do is cover the asphalt with additional aggregate to prevent it from sticking to the roller tires. Later, it should be cleaned off and the section replaced. Otherwise, there will be a noticeable bump.
- Covering oversprayed asphalt on the lane edges. Quite often, asphalt splashes outside the coverage of the spreader. These streaks of asphalt must be covered with aggregate, or it will stick to roller tires.

- Removal of grass or clay balls. It is very difficult, if not impossible, to keep all grass and clay out of the aggregate. If the patching crew finds any that has passed through the spreader, it is their responsibility to remove it and replace it with aggregate, if necessary.
- If a spot has been missed by the asphalt distributor due to momentarily clogged nozzle or other reason, the patching crew should be called ahead of the aggregate spreader to manually swab asphalt onto the bare spot.

Some repairs are beyond the capability of the patching crew, and must be delayed until later. One example of this is: haul trucks bringing a load of aggregate to the spreader sometimes turn around to back into the spreader, and turn too sharply on the fresh seal coat. This scuffs the aggregate. Once the aggregate has been scuffed and turned over, the asphalt begins to stick to vehicle tires. It then tracks onto more aggregate, which also turns over. The more asphalt that comes to the top, the more aggregate will be picked up by tires.

The only way to adequately repair something this extensive is to clean it off and redo it. Sometimes, it is possible to broom it off, if the binder has not hardened yet. If it has hardened, it may be necessary to use a scraper to remove the aggregate that is left.

## SEAL COAT EQUIPMENT

The following types of equipment are used in a seal coat construction project.

- Asphalt distributor
- Aggregate spreader
- Haul trucks
- Rollers
- Rotary broom
- Asphalt Transporter
- Heater and storage unit
- Miscellaneous equipment

Every contractor should have a copy of the manufacturer's manual for each piece of equipment on the job. Consult the manufacturer's manual whenever specific questions arise on the job.

### **Asphalt Distributor**

Simply an asphalt distributor is a truck-mounted, insulated tank, with numerous special purpose components that are attached to it. The major components of an asphalt distributor are:

- Asphalt tank
- Heating system
- Circulation and pumping system
- Spray bar
- Hand sprayer
- Controls and gauges

### Asphalt Tank

Most of the asphalt distributor tank used for seal coat work hold from 2000 to 4000 gallons of liquefied asphalt.

### Heating System

According to the Standard Specifications the asphalt temperature should be within 15 °F of the temperature specified by the Engineer. To maintain these close tolerances, a heating system is necessary. Depending upon the make and size of distributor, either one or two gas or oil fired burners are used. These burners are mounted on the platform at the rear of the tank, and are positioned so the flame is directed into the flues that pass through the tank.

### Distributor Spray Bar

The spray bar and spray nozzles regulate the amount of asphalt sprayed on the road and regulate the spray pattern. Figure 3 shows the location and appearance of a typical distributor spray bar.

There are many different bar widths available: as narrow as 6 feet and as wide as 30 feet. Narrow bars are impractical. The bars mainly used in Texas seal coat projects are 12 feet wide.



**Figure 3.** Distributor Spray Bar

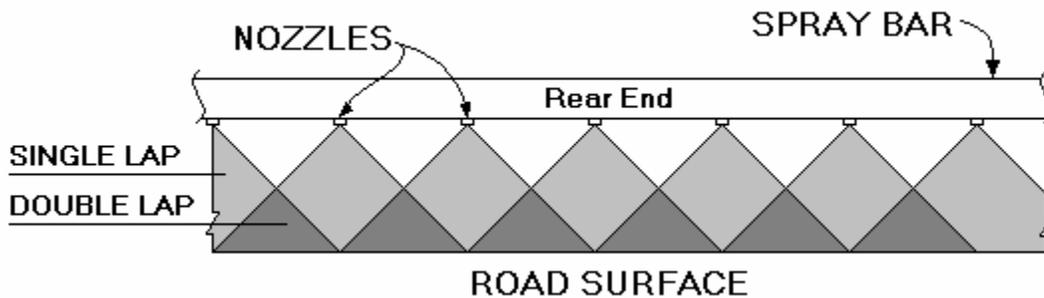
The spray bars are composed of a series of spray nozzles evenly spaced along the width of the bar. It contains a return line for continuous circulation of asphalt through the bar. Some models are equipped with shut-off valves on each nozzle to permit closing a few spray nozzles around curbs or narrow sections. This photo shows the nozzles on a typical spray bar. Nozzles are manufactured with different sized openings to permit different amounts of asphalt to pass through in a given time. Nozzles are designed to spray a fan-shaped pattern, rather than a circular spray.



**Figure 4.** Spray Bar Nozzle Image

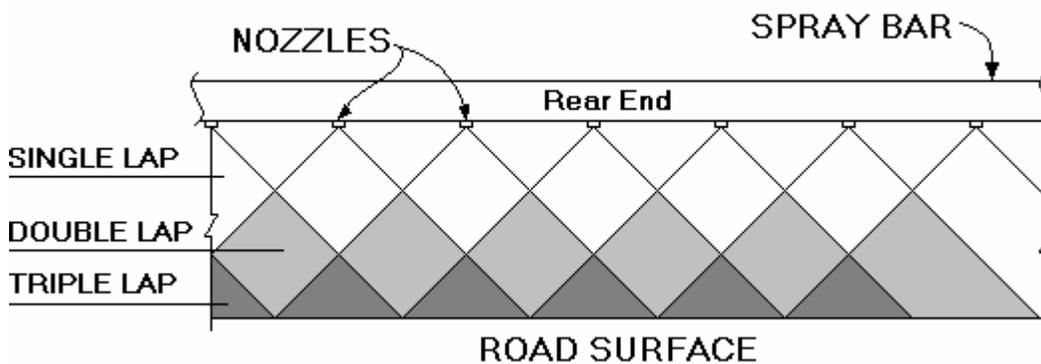
The nozzles are installed in the spray bar so that the fan-shaped spray is at an angle to the axis of the spray bar. The angle varies from one manufacturer to the next. The Contractor should have the manual for his machine, which contains the specification. This angle is usually from about  $15^{\circ}$  to  $30^{\circ}$ , depending on the manufacturer. All nozzles must be set at the same angle to avoid distortion of the spray pattern. Some operators turn the end nozzle perpendicular to the spray bar axis. A curtain or deflector plate installed on the end of the spray bar is preferable, with the end nozzle at the same angle as the others. A deflector nozzle may also be used.

Another important factor to attain the desired pattern of asphalt is the height of the spray bar. Seal coat jobs require either double or triple lap coverage; double lap being pattern from one nozzle overlaps half of the spray pattern of the nozzles on both sides of it.



**Figure 5. SINGLE LAP-DOUBLE LAP Image**

In a triple case, however, the pattern from one nozzle overlaps two thirds of the pattern of the nozzles on both sides of it plus one third of the pattern put out by the nozzles two positions away.



**Figure 6. SINGLE LAP-DOUBLE LAP-TRIPLE LAP Image**

The stabilization of the distributor's springs is very important. Most distributors of recent manufacture are equipped to either prevent the springs from compressing under a load or to

prevent them from arching back with a near-empty tank. The spray bar should remain at the same height whether the tank is full or empty. All distributors used in seal coat projects should be equipped with a hand sprayer. It would not be possible to shoot this area with the spray bar.



**Figure 7. Hand Spray Bar**

### Distributor Controls And Gauges

The distributor controls and gauges must be functioning accurately. Most tanks are equipped with a volume gauge. These should only be used as a convenience to the operator, to know when the tank is getting close to empty. It should never be used as a basis for payment due to low reliability of such devices. A calibrated dipstick for each distributor tank should be used to measure the volume. In order to meet State requirements, the stick or scale must show increments of every 20 gallons for distributors with a tank of 2000 gallons or less and 25 gallons for larger tanks.

The pressure under which asphalt is being sprayed will greatly influence the uniformity of the job. If the pressure is too low, the asphalt will streak and be applied unevenly. If the pressure is too high, the asphalt will atomize and the pattern will be distorted. The pump should be operated at the highest pressure without atomizing the asphalt.

At the beginning and end of a shot, the distributor passes over paper that masks the pavement to form a straight, sharp line. The distributor must pass over the masking paper on both ends at spraying speed. The operator must be able to turn all nozzles on in the split second that the distributor passes over the masking paper. It must be turned off in an equally short time.

### **Haul Trucks**

The aggregate have to be hauled from stockpiles to the spreader box. This is done by the haul trucks. The trucks used on nearly all seal coat work done in Texas are the end-dump variety. They are normally either single axle or tandem axle trucks. Ideally, all trucks in the fleet will be of the same capacity. If they are not, you must select the smallest truck as the standard load for

setting the rock lands and ensure that larger trucks are clearly marked so that the loader operator can fill each to the same capacity.

## Rollers

Once the asphalt has been sprayed and covered with a layer of aggregate, the seal coat must be rolled. This is done to orient the aggregate in its flattest dimension and seat it firmly into the asphalt binder.

Numerous types of rollers are used throughout the State on seal coat and surface treatment projects. They are:

- Pneumatic tired rollers
- Steel-wheeled tandem rollers
- Single drum steel wheeled rollers
- Three-wheeled rollers

## Pneumatic Tired Rollers

Pneumatic rollers operate on rubber air-inflated (pneumatic) tires. The tires, themselves, provide the forces needed to seat the aggregate firmly in the asphalt binder in a uniform arrangement.

The Standard Specifications Item 213.2(1) require that all pneumatic rollers used on seal coats and asphaltic surface treatments be self-propelled. They must also be capable of operating in both forward and reverse. The wheels must not wobble when the roller is in operation. If any wheel on any of the rollers can be seen wobbling, it is too much, and the roller should not be allowed on the project until it is repaired. Like all other pieces of equipment on any construction project, rollers must not leak engine coolant, fuel, hydraulic fluid, or anything else that might contaminate the asphalt binder or aggregate. If any leaks are detected, the roller must immediately be removed from the fresh seal coat, or the whole project could be ruined.

## Steel-Wheeled Roller

Steel-wheeled rollers, often called "flat-wheel," use a smooth-surfaced, cylindrical drum to exert compactive force. There are three types of steel-wheeled rollers used on seal coat and surface treatment projects:

- Single drum
- Two-axle tandem
- Three wheeled roller

Steel wheeled rollers used for surface treatments may not weigh less than 3 nor more than 6 tons. Particular attention must be paid to the maximum allowable weight, to ensure that a steel wheeled roller does not exceed 6 tons.

Like pneumatic rollers, steel-wheeled rollers must be self-propelled and must be capable of operating in both forward and reverse. All wheels must be flat and the surfaces of the drum and

wheels must be free of gouges or pits. The drums and rear wheels must be free of any visible wobble or excessive vibration.

## **Equipment Performance**

Three of the equipment discussed above determine the sustained production of the seal coat system. These are the asphalt distributor, the spreader, and the rollers. To achieve maximum sustained production, the production rates of the spreader and the rollers must be greater than that of the distributor. The distributor controls the overall production because no other piece of equipment can begin to produce its function until the distributor has applied the binder to the surface

The basis for estimating the amount of time required for rolling is based upon 2500 square yards per hour for light pneumatic rollers but this changes from district to district. Some districts use steel wheeled rollers, which are usually operated at somewhat slower speeds. 1800 to 2000 square yards per hour might be a reasonable estimate for a steel wheeled roller.

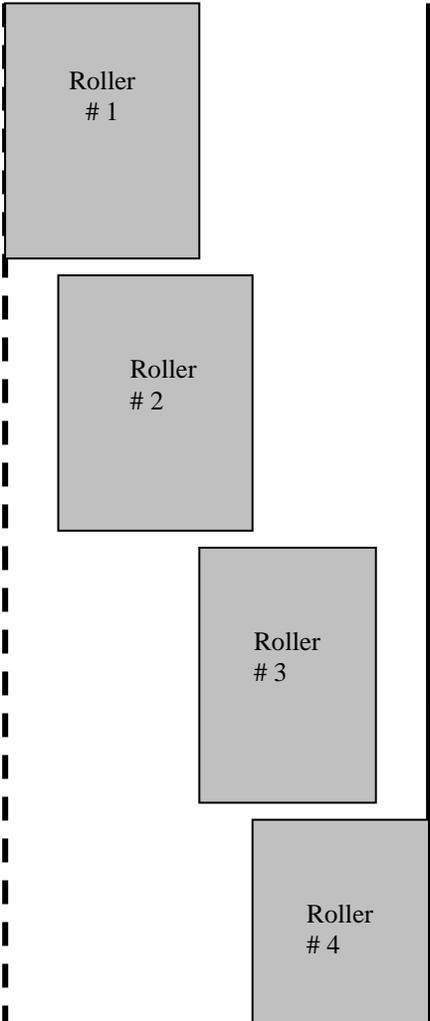
The rollers may not be spending the specified amount of rolling time on each shot since their primary objective would be to keep up with the distributor. General notes varied on the required amount of rolling time from a high of 1000 square yards per hour to a low of 5000 square yards per hour. The number of rollers in a specific project becomes a critical quality parameter. The sufficient number of rollers (N) to cover the shot width in a required number of passes can be calculated from the equation given below.

$$N = \frac{(1760) P x}{A}$$

P is the production rate in of the asphalt distributor in lineal miles per hour, x is the width of the shot in yards and A is the rolling rate in square yards per hour. 1760 is the conversion factor for changing lineal mile per hour to lineal yard per hour. You can get more information about finding the required number of rollers and the derivation and usage of this equation in the Seal Coat Construction Field Guide, Equipment Performance Section.

## Roller Patterns

After finding the sufficient number of rollers the second step is to apply a roller pattern to the lane width. The sufficient number of roller has to cover the whole shot width in a single pass and the rolling coverage should be evenly distributed across the width of the shot. This can be shown in an example roller pattern graph. Figure 8 shows a rolling pattern with our roller in a shot width of 12 feet. The whole shot is covered and an even distribution of rolling coverage is achieved.



## **Figure 8. Roller Pattern and Coverage**

### **Equipment Inspection Checklist**

Each piece of equipment has its own unique features that must be checked individually. . Each piece of equipment has its own unique features that must be checked individually. Equipment inspections shall be done conducted on the first day of the project and continue for a minimum of one half day as agreed by the contractor and the project engineer. If the equipment does not perform consistently, the inspections will continue until all pieces of equipment are found to be satisfactory. Here are checklists for the seal coat equipment that will be used in seal coat projects.

#### **Asphalt Distributor Inspection**

Record the serial number, model, and other required information. This will be entered in the project folder.

#### Calibration

Check if asphalt distributor used on the project has a current calibration certificate. This means that the distributor has been checked to determine the accuracy of the measuring stick and the capacity of the tank. The tank must have been certified by a Department representative. There is no specific time during which the calibration must have been performed. The

calibration certificate is considered valid as long as there is no evidence or reason to suspect that any major modifications have been made to the distributor.

[ ] Check that strap stick is marked in either 20 or 25 gallon increments depending on the size of the distributor tank and that it is the stick that has been calibrated and marked for use with this particular distributor.

#### Visual Inspection Inside

[ ] The Tank unit should be clean to prevent contamination or mixing of different types of asphalt.

#### Heater Unit

[ ] The heater unit should be checked for proper starting and operation, Each burner should operate independently to allow either one to be used alone, or both could be used simultaneously. The burner flames must be adjustable to regulate the amount of heat being directed into the flues. The fuel lines and burners should be free of fuel leaks.

#### Thermometer

[ ] Check if the tank is equipped with a thermometer.

[ ] Many models have a mercury thermometer mounted in a well in the side of the tank. It should have a chain to prevent it from being dropped, and a screw-on cap to keep the well covered.

[ ] Other models of distributors use a dial-type thermometer mounted outside the tank. These use a thermocoupler that is mounted inside the tank.

[ ] Either type of thermometer should be checked for accuracy, if possible. If you have a thermometer of known accuracy, you could place both of them in a container of any liquid, and they should read approximately the same temperature. This, of course, would not be feasible with the dial-type thermometer.

#### Pump Unit

[ ] If the distributor has the pump motor mounted on the rear, the pump motor should be visually checked for leaks and you should have the operator start the motor.

[ ] While the pump motor is running, check the pressure gauge as the throttle is moved to different settings. As the engine RPMs increase, the pump pressure should show an increase, also if you see it fluctuating erratically, you should have the operator check it.

#### Spray Bar

[ ] Check if the ends of the bar can be raised and lowered. There should be some method of securing the ends in the raised position. Many models are equipped with a chain device to secure the ends when raised.

[ ] Make sure the length of the bar is straight when the ends are lowered. This should be checked in both the vertical axis, as well as from front to rear. Fan widths will be distorted if it is crooked.

[ ] Visually check to ensure there are no excessive leaks in any of the hoses, pipes, or joints in the bar. If asphalt leaks out onto the pavement while the distributor is stopped, a puddle of asphalt will form. No matter how much care is taken to clean it up before the shot, there is usually too much asphalt at that spot. It will tend to bleed up through the cover aggregate.

[ ] Check the spray bar to ensure it is the correct width. If the lanes to be sealed are 12 feet wide, ensure that the proper amount of extensions have been installed to have the nozzles measure 12 feet. All nozzles will be 4 inches apart, so you could count the nozzles rather than measuring the bar width.

[ ] Measure the spray bar height above the pavement surface. The distributor must be parked on a flat, level surface, with the bar in the lowered position. The height should be measured from the bottom of the nozzles to the ground. Measurements should be taken at various points across the width of the spray bar to ensure that the height is constant. Set the height according to the manufacturer's recommendations, for the type nozzles in use.

[ ] The bar height should be measured first with the tank empty, and checked again after the tank is full. These measurements should be roughly the same and may not exceed the tolerance cited in the specifications or general notes.

### Spray Nozzles

[ ] Check the spray nozzles. They must be in good condition. Have the operator raise the spray bar and rotate it outward so the nozzles can be inspected, if the model of distributor permits it.

[ ] Check to see that there are the correct number of nozzles. There will be a nozzle mounted every four inches along the width of the spray bar, on most models. If there are more nozzles than needed, have the operator remove the extras and replace them with solid plugs.

[ ] If a straight, sharp edge is desired on the asphalt coverage at either or both edges, check if the end nozzles are deflector nozzles.

[ ] Check the overall condition of the nozzles. If any are gouged or defaced (they are made of brass), they should be replaced; because they probably will not produce a proper spray pattern.

### Nozzle Angle

[ ] The nozzles must be set at an angle in relation to the axis of the spray bar. Whatever is prescribed in the manufacturer's specifications should be followed. The angles usually range from 15 to 30 degrees, depending on the make of distributor.

### Fan Width

[ ] Check the fan width of each nozzle, if it is possible, to ensure that they are close to the same width. , you can have the operator back onto a flat, sandy spot or place one or two thicknesses of brown wrapping paper under the spray bar. Have the operator turn the spray on - just momentarily. Make certain he turns it off as quickly as possible. This will not give an exact representation of the fan widths, but it will quickly uncover any nozzles that are greatly different from the rest. If this is not conclusive, you could have the operator drive forward for about 20-30 feet and spray a short test strip. This will usually reveal any nozzle problems.

### Nozzle Output

[ ] Check the variation in nozzle output. The best method of checking nozzle output is with the bucket test. (For more information about bucket test go to Seal Coat Field Guide, Asphalt Distributor Inspection (Nozzle Output) Section)

### Transverse Variation

[ ] Check transverse variation of asphalt. (For more information on transverse variation go to Seal Coat Field Guide, Asphalt Distributor Inspection (Transverse Variation) Section)

### **Haul Truck Inspection**

All trucks must be legally registered to operate on the public highway and have appropriate safety equipment.

### Visual Inspection

All trucks to be used on a seal coat project must be checked visually for leaks.

Check if each truck has its own unique number permanently affixed where it is clearly visible.

### Identifying Data

Record the model and serial number of each truck for entry in the project folder, along with the truck bed measurements.

### Bed Measurements

Take the measurements of the bed of each truck and convert them to cubic yards.

Check if all trucks used on the project are the same size. Only in this way can you accurately compute the cubic yards of aggregate applied on the road. If the Contractor has an odd-sized truck, it cannot be used on the job.

### Deduction for Hoist Housing

Some trucks have the hoist mechanism recessed into the truck bed, with a housing in the bottom front of the bed. If the trucks on the project have these, their area must be deducted from the total area of the truck bed.

### Acceptable Size

The truck capacity should be an even number of cubic yards, or just over, such as 6.1 CY, 12.15 CY, etc. Check if the truck capacities fulfill this restriction.

If truck bed sides are used to accomplish an even number of cubic yard truck capacity, check if the gross vehicle weight established by law is not exceeded.

### Hoist

Always have the truck operator raise and lower the bed, so you can check the operation of the hoist. Visually check to see that it operates correctly, and check for hydraulic leaks as the hoist is in operation.

### Tailgate Release

As the bed is raised, check the locking mechanism on the tailgate. Make certain it locks securely when the bed is in the down position, and ensure that it unlocks smoothly as the bed begins to rise.

### Truck Hitch

Check if the truck is equipped with a hitch that is compatible with the hitch on the aggregate spreader box.

## **Aggregate Spreader Inspection**

### Visual Inspection

[ ] Check the overall condition of the power train, primarily directed at detecting evidence of leaks in the engine and transmissions.

### Identifying Data

[ ] Record the manufacturer's name, spreader model number and serial number, and kept in the project file.

### Receiving Hopper

[ ] Visually check the receiving hopper for overall condition. There should be no holes or large gaps that would allow aggregate to fall through. The conveyor belt system should have rubber, neoprene, or fabric cowling (or flaps) around it to prevent aggregate loss. There should also be a flap on top of the receiving hopper to ensure a tight fit against haul trucks as the aggregate is being dumped into the receiving hopper.

### Truck Hitch

[ ] Check the truck hitch visually, to look for anything broken or bent. Pull up on the locking portion to ensure that it locks securely. Have the operator manipulate the release to be sure it will disengage the truck cleanly.

### Conveyor Belts

[ ] Inspect the conveyors to ensure the belts are in good condition. Have the operator start the conveyors and demonstrate the speed control. The speed should be variable to ensure that the supply of aggregate reaching the front hopper can be increased or decreased as needed.

[ ] Check if there is an excessive amount of slack in the belts, if there is too much slack, the belts must be tightened.

### Discharge Hopper

[ ] Visually check the front hopper to ensure that it is clean and does not contain any aggregate particles from a previous project.

[ ] Check the scalping grate to ensure that it covers the entire top of the hopper.

[ ] Check to be certain there are no holes or cracks in the hopper, where aggregate can fall through and cause a ridge or row of excess aggregate.

### Discharge Gates

[ ] The discharge gates have control handles to enable the operators to open and close the gates individually. Check the operation of the manual controls to ensure that they function properly.

[ ] Check to see that they are correctly adjusted to close the gates fully. You will not be able to judge whether the adjustment is correct when the gates are open, until the spreader is actually dispensing aggregate.

### Discharge Roller

[ ] The steel discharge roller at the bottom of the hopper must be checked visually to ensure there is nothing caked on its surface.

[ ] Check the roller for warpage using a stringline. When checking the roller, have another person assist you. Use a length of heavy twine string and have your assistant hold one end against the front of the roller. You hold the other end of the string against the opposite end of the roller, stretching it as tight as possible. Sight down the string to the opposite end. The string should be in contact with the roller the entire distance. If the roller is warped, it will be readily apparent, because there will be a gap between the roller and string, or else the string will bulge under an outward warp.

[ ] Once you have checked the roller with a stringline, have the operator turn it on so you can check the end bearings for excessive wear. If they are badly worn, the roller will probably wobble, or you may be able to hear noise coming from the bearings as they turn.

### Discharge Hopper Exterior

[ ] Check the exterior of the discharge hopper, looking for damage.

### Wheels and Tires

[ ] Closely observe the wheels with the spreader in motion,. Look for any indication of wheel wobble or excessive "toe-in" or "toe-out".

[ ] Give the tires a visual check to detect any gouges that might adversely affect the aggregate arrangement. Gouges that may weaken the sidewall should be noted, as well. Don't take a chance on a spreader box tire having a blowout while in operation. it would be better to bring it to the Contractor's attention so he can have it changed before the project starts.

### Brakes and Clutch

[ ] Have the operator stop and start the spreader a few times so you can check the operation of the clutch and brakes.

## **Roller Inspection**

### Roller Types

[ ] Check if the roller type is acceptable according to the specifications.

### Identifying Data

[ ] Record the manufacturer's name (or brand name), model number, and serial number of all rollers used on the project and enter in the project folder. This applies to all types of rollers.

### Weight Certification

[ ] Check if the weight of the rollers meet the specifications. Manufacturers publish the gross weights of their product with water and wet sand maximum ballast. If either of these materials is used and the ballast tanks are full, the Inspector can safely certify whether or not it meets the weight requirements. If, however, the Contractor uses another material, such as aggregate for ballast, it may be impossible for the inspector to determine I with certainty whether the rollers meet the weight requirements or not. In this case, it would be wise and certainly justified to

require the Contractor to have the rollers weighed. A weight ticket will be issued with a certified vehicle weight, and can be included in the project folder.

### Visual Inspection

- Check the overall condition of the equipment.
- Check the presence of leaks of any kind.
- Check if the roller has smooth tires (no tread pattern).
- Check if all tires are the same size and have ply rating.
- Check if the rollers start and stop smoothly. Brakes should not grab because this can ruin a seal coat (especially if an emulsion is used) in an instant.
- Check if the roller is self-propelled and can operate in both forward and reverse.
- There should be no wheel wobble, since this will scuff the cover aggregate and require major repairs.
- Check tire stability on turns. If there is unusual scuffing, it may mean a bad bearing or king pin which might not be detectable when the roller is moving in a straight line.
- Check if the roller tires have large gouges or chunks missing that would alter the contact pressure of the tire.

### Tire Pressure

- Check if the tire pressure is correct to check the tire pressure you have to check also the factors that effect the tire pressure. These are:
  - Check gross operating vehicle weight.
  - Check the number of wheels (either 7 or 9 are required for this class of roller. Most used on seal coats have 9).
  - Check tire size and ply.
  - Check the required ground contact pressure, as specified in Item 213.2. For light pneumatic rollers contact pressure of 45 PSI is required. For medium (Type A), 80 is required; for medium (Type B), 90 PSI. These are the minimum amounts; higher contact pressures are allowed.

### Computation for Tire Pressure

Assume that you are inspecting a light pneumatic roller. You have a certified weight ticket showing the gross weight of the roller as 17,700 pounds. It is a nine-wheeled roller. The tires are 7.50 X 15, 6 ply. Standard Specifications call for a minimum of 45 PSI contact pressure per wheel. First divide the number of wheels into the gross vehicle weight, to determine the weight on each tire (wheel load) as shown in the equation below.

$$\frac{17700}{9} = 1,967 \text{ lbs. wheel load}$$

Next, turn to the Pneumatic Tire Pressure Table. Look in the left-hand column which gives tire size and ply. Find the block which applies to 7.50 X 15, 6 ply tires. The next column gives wheel load. Since the blocks are broken down into 250 pound increments, the chart shows 1,750, then 2,000 pound wheel loads. Since the 1,750 block is less than the 1,967 pound wheel load on our roller, go to the 2,000 pound block.

The next column to the right is Inflation Pressure. Skip over this column and go to the one titled Contact Pressure. The Specifications call for a minimum of 45 PSI Contact Pressure. Again, there is a division of only 43 and 46 PSI, so you must use the higher number. Reading back to the left one column (Inflation Pressure), you find that 40 PSI is the minimum inflation pressure for the size tires used on our example roller.

#### Checking Inflation Pressure

Have the roller operator check the inflation pressure of all tires on the roller, in your presence. Remember that there cannot be more than 5 PSI variation between any of the tires.

#### Steel-Wheeled Rollers

Steel-wheeled roller must be inspected visually for excessive pits or gouges in the drums.

Use a straightedge to check the roller drums to ensure constant and even contact pressure across the entire width of the drum.

Check the drum or drums for wobble on both straight paths and on turns.

#### **Rotary Broom Inspection:**

#### Identifying Data

Record the manufacturer's name, model number, and serial number and enter in the project folder

#### Visual Inspection

Visually check the power train and hydraulic lines and couplings for leaks. Give the broom an overall visual check for its general condition.

#### Safety Markings

If required on the project, safety markings, signs, and flags must be checked for the benefit of the motoring public as well as the sweeper operator.

#### Bristles

Check the bristles on the sweeper to ensure they are in good condition. Also, sight down the width of the brush to check for evenness. If the bristles are worn off unevenly, too much pressure will be exerted in one spot and the bristles may not even make contact in another. If there is a readily visible unevenness, the bristle assembly should be replaced.

#### Brush Controls

Check to ascertain that the brush can be raised and lowered and that it can be rotated from one angle to another. It should rotate fully from left-side to right-side discharge.

Check that the brush controls start it rotating and stop it properly.

#### **Transporter and Booster Inspection**

#### Identifying Data

If the transporter and boosters belong to the Contractor, it would be safe to record the standard vehicle identification information and include it in the project file. This would also apply if the Contractor has leased the equipment.

[ ] If the transporter belongs to a petroleum company or to an independent trucker, it would be wise to note down the company name and the truck license or other unique number.

#### Manifest

[ ] Check the transporter's manifest before it is unloaded to make certain the asphalt in the truck is the right type for the project. A copy of the manifest of each load of asphalt delivered on the job must be retained in the project folder.

#### Cleanliness

[ ] Check if the transporter has been cleaned if a different type of asphalt was transported on a previous project. It is not usually possible for you to determine exactly what type of asphalt had been hauled previously, so a good rule of thumb is to be certain it is clean before it hauls asphalt to the current project.

#### Contamination

[ ] Ensure that the transporter tank and piping protect the asphalt from contamination during off-loading to the heater unit. Sometimes a transporter is used as a booster tank on the job, transporting asphalt from the heater unit to where the distributors are operating. In this case the distributors are filled directly from the transporter. If asphalt cement (AC) is being shot on the project, it must be shot in the vicinity of 300° F. This would necessitate having an insulated transporter, in order to keep the asphalt hot between the heater unit and the distributor.

#### Booster Tanks

[ ] The booster tanks should be inspected for cleanliness, if they are used on the project; to guard against contamination; and have the identifying data recorded.

[ ] The piping and shut-off valves of booster tank should be checked for leaks to guard against puddles of asphalt being left behind after they have refilled an asphalt distributor.

#### Insulation

[ ] Ensure that booster tanks, if used to carry AC at high temperatures, are adequately insulated.

### **Heater Unit Inspection**

#### Storage Tank

[ ] The storage tank must be inspected for cleanliness and the presence of any condition which would permit contamination of the asphalt. There should be a continuous-recording thermometer on the tank, which records any and all fluctuations in asphalt temperature.

#### Heater

[ ] The heater unit must be inspected. It should have a burner that can be regulated to alter the intensity of heat. The burner should direct the flame into flues, similar to the arrangement in an asphalt distributor. The pump should circulate the asphalt through the heater unit sufficiently to prevent the asphalt from burning next to the flues and from sticking (from cooling) near the outside of the tank.

### Pump Unit

[ ] Check the pump unit for proper operation, but your primary concern is to ensure that the pump and associated piping protects the asphalt from contamination. Ensure that the pump unit is assembled so that no dirt or fuel can enter the piping or pump unit.

### Location

[ ] Check the location of the heater unit. Although the location of the heater unit is the Contractor's responsibility, you should consider the location of the unit from the standpoint of safety for the motorists. The Contractor may situate the pump unit where it is most convenient for his distributor or booster tank drivers, and may overlook the safety of motorists using the road. The heater unit will have transporters moving to and from it, as well as asphalt distributors or boosters pulling onto and off the highway in the vicinity of the heater. This traffic must be clearly visible to motorists driving through the construction area. Therefore, it should not be situated on or near blind curves, and probably well clear of intersections. If the heater unit is situated in the vicinity of the aggregate stockpile, it should be separated far enough away to ensure that no contamination of the aggregate occurs. Asphalt is often spilled around heater units, so it is best that the heater be situated well away from aggregate stockpiles, if possible.

### Recording Thermometer

[ ] Pick up the record card from the continuous recording thermometer each day. Install a new card when the old one is removed.