



INFRARED PROCESS

The purpose of this presentation is to outline the step-by-step process for utilizing the Infrared Restoration Process for the permanent repair of asphalt pavement. The Infrared Restoration process is often more an art than a science, therefore we ask that you use this information as a rule of thumb, rather than specific instructions.

STEP 1 – SETUP

Upon arriving at the job site, the first concern should always be to ensure a safe work area. The arrow board should be activated to properly direct traffic from behind. Signs and cones should be put out in conformance with DOT recommended safety procedures. It is important to ensure that adequate room is allowed on the sides of the equipment to provide the laborers safe access to the reclaimer for asphalt and to allow the raker to work on the sides of the patch. We recommend 5 feet minimum on both sides of the equipment.

STEP 2 – PREPARATION

The area must be swept clear of standing water, loose asphalt, and dirt. Any foreign material will significantly impede the infrared restoration process.

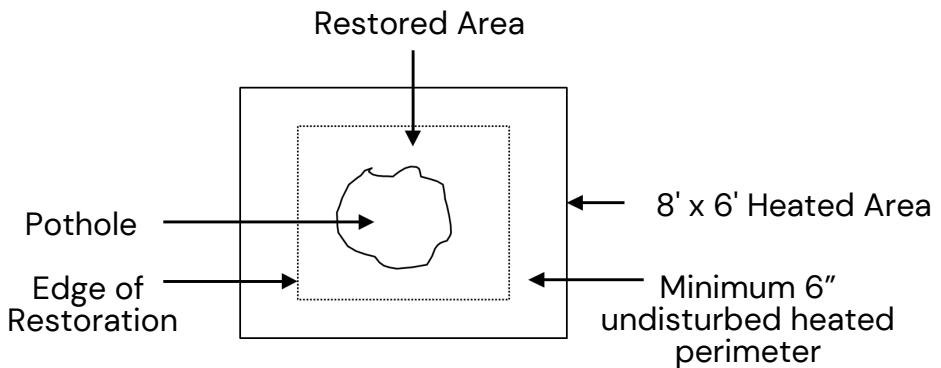


INFRARED PROCESS

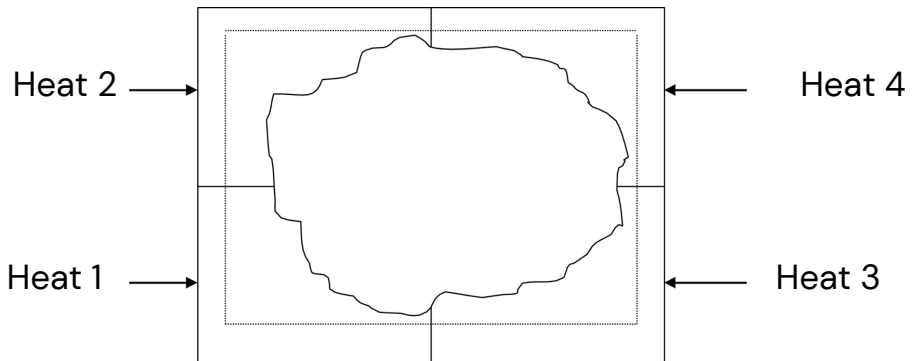
STEP 3 – HEATER PLACEMENT

It is very important that the infrared chamber is properly positioned over the repair.

The area to be restored must be squared off insuring that all the edges are at least 6" away from the damage. It is important that an additional 6" perimeter of the heated surface is left undisturbed. This will ensure that when the repair is rolled that the hot asphalt in the restored area is fused to the hot existing road, thereby eliminating any seam.



MULTIPLE HIT HEATING PATTERN FOR A LARGE REPAIR





INFRARED PROCESS

STEP 4- HEATING TIME

As a general rule, it will take 5-7 minutes for your Kasi Infrared heater to heat the asphalt pavement to 325 degrees, softening it to a depth of 2 inches in 60-degree ambient weather.

There are three major variables that impact the time it takes for infrared radiation to properly heat asphalt. They are the 3 M's.

MATERIAL, MOISTURE, & MOTHER NATURE.

MATERIAL

Not all asphalt is the same. Many factors affect the quality of the asphalt being worked with.

What was the mix design when the asphalt was originally batched?

How old is the asphalt? The age of the asphalt affects what percentage of the "maltenes" (light oils) has oxidized out. The dryer the material, the longer it takes to heat.

What size aggregate is in the material? The larger the stone the longer it takes to heat. $\frac{3}{4}$ inch binder mix can take as much as 2-3 minutes longer to soften than $\frac{1}{4}$ inch top.

What is the color of the asphalt? Because infrared rays must be absorbed into the asphalt, the lighter the color the longer it takes to heat. (The same way a black car gets hotter than a white car in the summer sun).



INFRARED PROCESS

·MOISTURE

Infrared should not be used to rid an area of standing water. It will, however, remove moisture from wet pavement. Depending on how porous the asphalt is will determine how much moisture is in the pavement. The amount of moisture in the pavement will determine how much additional time it takes to properly heat.

·MOTHER NATURE

The combination of temperature and wind effect both the heating time and the amount of time you will have to work with the asphalt once heated.

Obviously, it will take longer to heat the asphalt to 325 degrees if the outside temperature is 30 degrees versus 60 degrees. Also, once the infrared heater is removed from the patch the wind and the temperature will influence how much time the crew has to complete the repair. They will need to have sufficient time to rake, rejuvenate, add material, lute & roll the patch before it cools off. As a rule of thumb, the temperature with the wind chill factor can be no lower than 20 degrees for the infrared restoration process to work.

It is extremely important that pavement is heated for the proper length of time. If the heater is not on long enough, the asphalt will not be softened deep enough to insure a proper repair. If the heater is down too long, then the asphalt could burn which will ruin it. Please note that simply removing the ruined asphalt will not correct the problem. Remember that in order to ensure a seamless restoration it is necessary to leave at least 6 inches of heated asphalt undisturbed. If that asphalt is burned, then the seam will fail.



INFRARED PROCESS

STEP 5 – SCARIFYING

Once the heater is removed the damaged area must be squared off and scarified. To square it off take the back edge of a steel asphalt rake and cut into the asphalt. Push that material into the center of the repair. Once the outside edge is set turn the rake over and deeply scarify the entire area. At least 1-½ inches of asphalt should be disturbed. Leave the area roughly level with a slight trough at the edges.

STEP 6 – REJUVINATING

Age and sunlight cause a percentage of the light oils present in new asphalt to oxidize out over time. We recommend that a small amount of “maltenes” rejuvenator be applied to the existing asphalt at this time. This is not acting as a tack coat. It is simply replacing exactly what was originally there.

Using a good quality commercial hand sprayer, apply a light coat of the rejuvenator over the entire area, including the edges. The rejuvenator we recommend is Cyclogen LE and is available through Kasi Infrared in 55-gallon drums. The Cyclogen should be mixed 1:1 with water.



INFRARED PROCESS

STEP 7 – ADDING NEW ASPHALT & FINISH RAKING

To ensure proper grade and a level patch, new material will need to be added to the repair. You will want to ensure that the restoration closely matches the surface texture of the restoration is determined by several things. First, what type of material is the original surface and what type of new material is being added. You would not want to add 3/8" top mix to a surface made up of overlay sand mix. Second, the "lute man's" raking skills. All handwork requires special effort to ensure that the material is not segregated with all the stone on top. Third, compaction, which we will talk about later.

The raker determines how much asphalt is needed and the material is then wheel barrowed from the reclaimer to the patch. The virgin asphalt is raked evenly throughout the patch being sure to pull this new material into the trough created around the edges. The entire patch is then lured smooth and level.

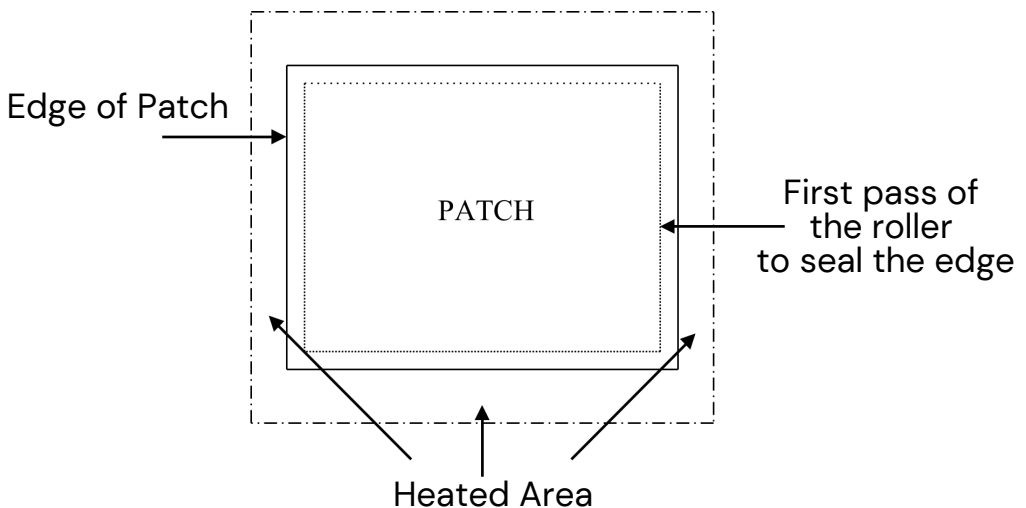


INFRARED PROCESS

STEP 8 - COMPACTION

The asphalt is now ready to be compacted. We strongly recommend that a roller be used in lieu of a plate compactor. Because the infrared restoration process only disturbs 2-3 inches of compaction it is not necessary to use a large ride on roller for this process. However, it is important to have sufficient total applied force to insure proper compaction. There are a number of quality single drum, vibratory walk behind rollers which do an excellent job. We recommend that a total of at least 2,000 lbs. per square inch applied force be used.

As soon as the raking is finished begin rolling immediately. The rolling pattern should always begin with the edges. This is to seal the seam between the repair and the existing pavement. Use approximately 2 inches of the drum to pinch the new asphalt to the existing road. After the edges are sealed the remainder of the patch is rolled.



INFRARED PROCESS

STEP 9 – FINISH

After the rolling is completed, we recommend that the patch be lightly dusted with stone dust or some other fine material. This removes any residual tackiness and allows the repair to immediately accept traffic. Sweep up any mess, pack up the truck, remove the traffic protection, and you're finished!

COLD WEATHER APPLICATION

After initial heating, edging, scarifying and rejuvenating the chamber must be applied for 1-2 minutes to re-heat the cooled surface. Fresh mix is then added and luted to compaction grade. If the surface has again cooled, and additional re-heat of 1 minute should be applied prior to compaction.

Make certain anti-freeze has been added to roller water in sub-freezing temperatures and the rejuvenator has been kept warm.





INFRARED PROCESS

