

Chip Seal News & Views

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Chip Seal Patching

A cost efficient method of pavement repair, before chip sealing full width

The ideal time to chip seal is before a road starts to deteriorate. The cost in the long run will be less and the road will be in better condition.

If **portions** of the road have deteriorated too far to be saved by a single chip seal, a chip seal patch may be the most cost effective way to preserve the asphalt pavement. The extra layer adds body and strength to the road, bridging over alligator type cracking, while remaining flexible. In most cases, chip seal patches perform just as well as hot mix asphalt (HMA) repairs, at a fraction of the cost. With proper application, patching with chip seal can bring the pavement rating up to an acceptable level, and this technique has been proven to last well into the next maintenance cycle.

Chip seal patches could be installed the same day as the chip seal, on a small scale, but the best results are achieved by allowing the patches to cure out overnight.

Applying an extra layer of chip seal for pavement repair should **NOT** be considered in the following circumstances:

- Extreme rutting
- Areas with serious sub-grade problems
- Areas where pre-leveling is needed
- Busy intersections

Repairing the deteriorated areas with chip seal instead of hot mix asphalt patches **eliminates** many of the problems of HMA repair, such as:

- Higher cost
- Longer traffic disruption
- Longer cure time; ideally, HMA should cure for several weeks, before chip seal.
- HMA requires a fog seal, before the chip seal.



Wheel rut cracks that we repaired with chip seal patches, before a full width chip seal

Roadway Preparation for Chip Seal

Crack seal should be applied as far ahead of the chip seal as practical, because the sealant can flush through the chip seal, especially if it is applied too heavy. If your schedule allows it, apply it a year in advance. The traffic will wear it into the pavement.

Applying crack sealant with a disc applicator is **NOT recommended** because it goes on too thick, increasing the likelihood of flushing through the chip seal, which could cause blemishes or bumps in the chip seal, or worse yet, becoming tacky immediately after the chip seal.

Use a squeegee, and leave as little sealant on the surface as possible.



Above photo shows crack sealant placed by the City, with a disc applicator, reflecting through a new chip seal. The bumps could be felt when driving.

Similar to the crack seal, HMA patches or prelevel should ideally be placed the year before. The new hot mix needs at least a few weeks to cure.

Hot mix asphalt patches need a **heavy** fog seal, if it is placed in the same season as the chip seal. Fresh HMA tends to be porous, and will suck in too much of the chip seal asphalt. If not enough fog seal is used, the chip seal may strip off over the first winter.



Fog seal on a new HMA patch

Additional Preparation:

- Remove thermoplastic. Chip seal does not stick very well to thermoplastic. Especially newer thermo, or thermo with large surface area, such as stop bars and crosswalks.
- Shoulders may need to be scraped back for proper drainage.
- Cut back the trees and vegetation so the equipment can chip seal to the edge of the pavement.
- Weeds should be removed from the cracks, including the joint between the road and the concrete curb and gutter.
- Apply chip seal patches where needed. Be sure that they are swept off completely before the final chip seal. Loose gravel between the layers can cause a bump, and a weak spot in the new pavement.
- Sweep – The streets need to be clean for best adhesion.
- If chip sealing early in the season, moss could be a problem. Sweep a month ahead of the project, then apply moss kill or salt brine. Sweep again before the project.
- Triangulate and map street hardware before covering, and place temporary traffic markings.

Sweeping – Too Often Ignored

One of the biggest complaints about chip seal is the loose gravel. A fog seal after the chip seal greatly reduces the amount of sweeping (and complaints), but there will be some gravel kicked loose over the next 9 months. If the labor and equipment is assigned for this extra sweeping beforehand, perhaps sweeping every few weeks, the local residents will be much more accepting of this pavement preservation method. This is especially important on streets with curbs or bike lanes. However, the sweeper operator needs to be cautious that he doesn't dig in with his gutter broom or skids.



Fog Seal

The use of a fog seal on top of a chip seal has become the industry standard. The recommended mixture is 60% CSS-1H, diluted with 40% warm water; applied at a rate of 0.12 to 0.15 gallons per square yard. It is good insurance to protect a new chip seal. The benefits are numerous:

- A fog seal puts more asphalt between the “chips”, to hold the rock better, greatly reducing the amount of shedding.
- Much less sweeping needed over the first winter.
- The black color gives better contrast for striping.
- The aesthetics of a black street are more acceptable to the Public
- It takes away some of the coarseness, slightly smoothing the surface.



Limitations of Chip Seal - A Guide for Determining What Treatment is Needed

Chip seal is most efficient when it is used as part of an ongoing road maintenance program. It rejuvenates the road, seals the cracks and adds another wearing surface. It offers better flexibility and better skid resistance than hot mix asphalt (HMA). If the roads were sealed on a regular basis (7-year rotation), very little additional maintenance would ever be required, minimizing life-cycle costs.

However, not all streets deteriorate at the same rate because of many factors (sub-grade, environment, traffic volume, vehicle weight, etc.). The pavement condition of each road should dictate what preservation method or **combination** of methods should be used. The following pictures offer an idea of the capabilities of chip seal and the preparation involved.



The picture, above, depicts a tight crack, less than 1/8" wide. Ideally, roads should be sealed before the condition gets any worse than this. Chip seal should seal hairline cracks like this for at least 7 years.



Wider cracks, shown above, should be sealed beforehand, with a hot applied rubberized asphalt sealant. Without sealing these cracks first, they will probably reflect through in two to four years.



This alligatored wheel rut (above) is too far gone to be saved by crack seal with a single chip seal. It could be repaired by grinding it out, then patching with hot mix asphalt (HMA).

But if the rutting is not too severe, it would be more cost efficient to place a chip seal patch first, then chip seal full width.

Unless there is a poor sub-grade, double chip seal or double bituminous surface treatment (DBST) is the most cost effective way to deal with asphalt pavement that has deteriorated too far to be saved by a single chip seal. The road shown below carries light to moderate traffic, and has not had any maintenance in over 30 years; an excellent candidate for double chip seal. This treatment will hold up better than a thin overlay because it bonds to the old pavement better, it seals better, it is much more flexible, and it will last longer.



The crack sealing that was done in the past doesn't begin to cover the widespread alligatoring, below. This street is a good candidate for double chip seal. That would bring this distressed pavement up to an acceptable pavement condition, which will last beyond the next maintenance cycle.



This busy Auburn arterial, 15th Street SW, westbound lanes, near C Street (above), should have had the pavement ground off and replaced with hot mix asphalt. The funds were not available for that, so we applied a double chip seal in 2006. It has had no maintenance since then, it is a little bumpy with a few cracks, but the DBST is holding it together in much better condition than it was.



2016 - 10 Years Later

DBST Procedure

When applying a double bituminous surface treatment, larger aggregate is placed on the bottom layer, such as 1/2"-#4 or a 3/8"-#4, with a top layer of 3/8"-#4 or 3/8"-#10. We have also had good success with 3/8"-#10 on the bottom and 1/4"-#10 on top. However, it is feasible to use the same rock for both layers. **Be sure to sweep thoroughly between layers.**

The asphalt application rate for the second layer should be 10% to 18% more than a typical single shot application, because the surface is rough and porous.

UPDATE: Proven Value from Double Chip Seal

(Fourth in a series of articles tracking the quality and longevity)

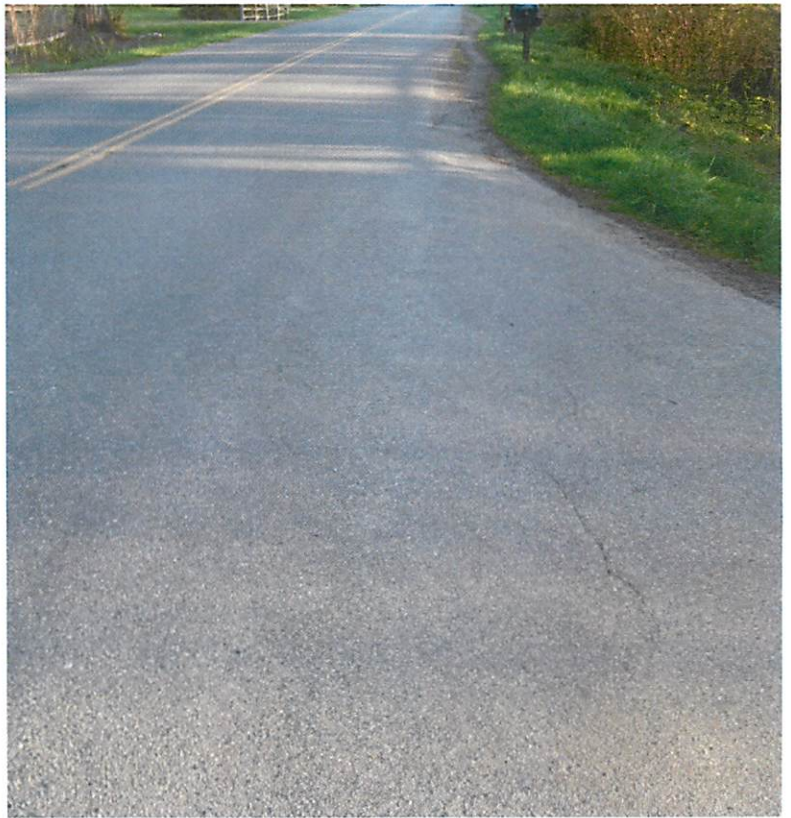
Double chip seal may be the most cost effective way to deal with asphalt pavements that have deteriorated too far to be saved by a single chip seal. It will hold up better than micro-surfacing or a thin overlay because it bonds to the old pavement better, it seals better, and is more flexible. To substantiate this, we continue to monitor the condition of past projects.

Bainbridge Island - Arrowpoint Drive NE @ intersection of Frey Road N.E.

In 2000, a double chip seal was applied to this road. 1/2"-1/4" crushed screenings were used on the first lift and 3/8"-#10 on the second lift. Prior to applying the two lifts, the road showed signs of extreme alligator cracking in this area. The road needs to be scheduled for another chip seal, as it is in fair condition with some cracks starting. The City of Bainbridge Island has done over 55 miles of double chip seal in the last 18 years; and many more miles of single chip seal, using chip seal patches beforehand where needed. The double chip seal has worked very well, staying flexible, and bridging over cracks and alligatored areas.



June 2000 –“Before”
Looking south from Frey Rd

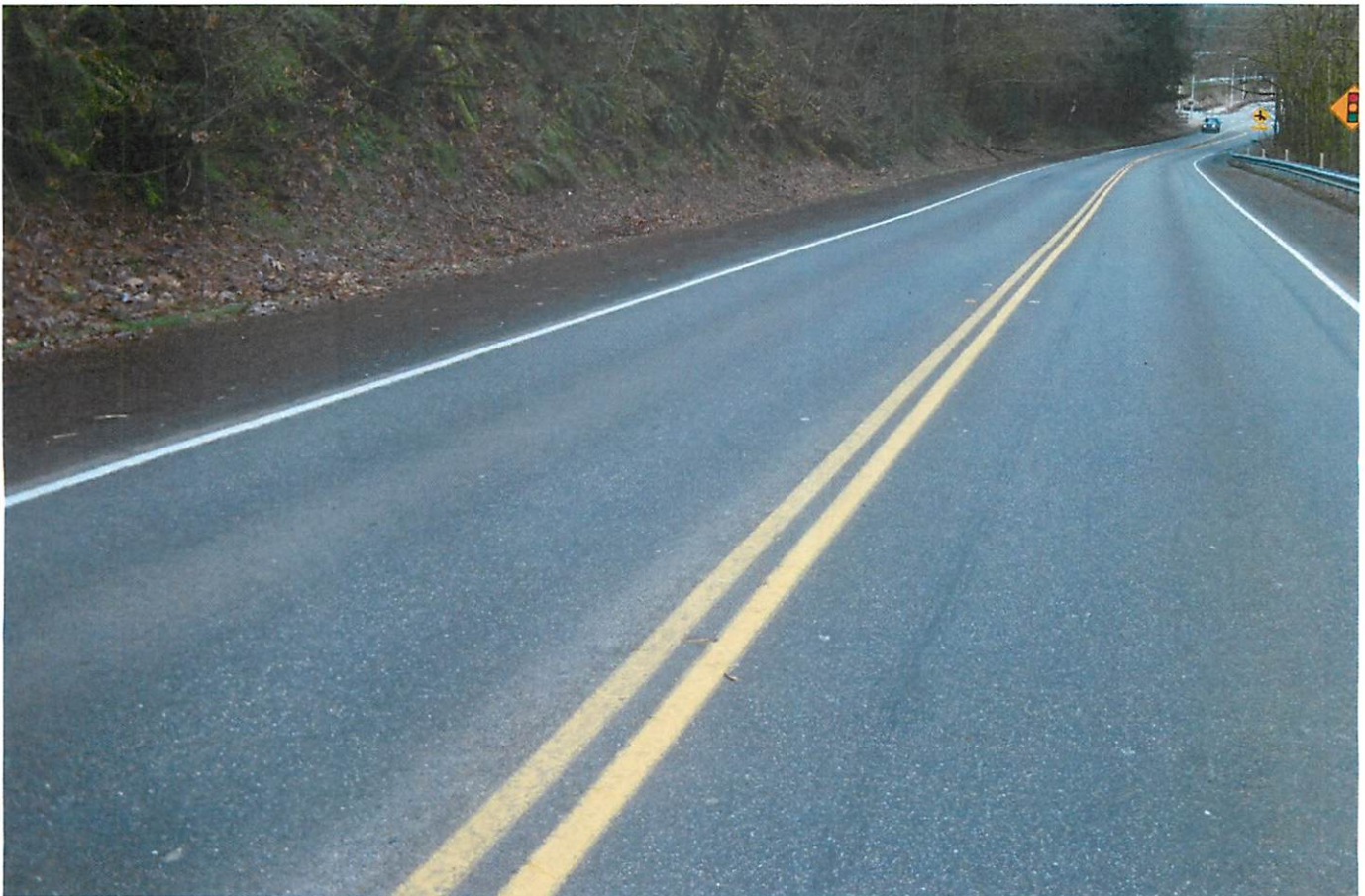


April 2016 - **16 years** after double chip seal
A few cracks have started, but it is in **much**
better condition than it was.

Auburn - Kersey Road SE, from SE 53rd to south city limits - In 2006 this major arterial, between Auburn and Lake Tapps / Bonney Lake area, received chip seal patches in the wheel ruts, before applying a double chip seal using CRS-2P. The chip seal patches and first lift were installed using 1/2"-1/4" aggregate. The second lift used 3/8"-#10 aggregate, then fog sealed using CSS-1H, (mixed 60:40 with water).



AUBURN – 10 Years Later



March 2016 - Ten years after wheel rut patching and double chip seal. The road surface looks good, considering the traffic and age. It needs a new chip seal, as a few hairline cracks have started.

Port Angeles - 3rd Street, off US 101

In front of a busy Safeway store and gas station we placed a double chip seal in 2005. The pavement was “alligatored” with cracking throughout the entire block. Liquid asphalt CRS-2P was applied, with 1/2"-1/4" aggregate on the bottom lift, 3/8"-#10 for the top lift, then a CSS-1h (diluted) fog seal was applied.



April 2016 - 11 Years Later. The pavement condition was good, especially considering the traffic. Recommend another chip seal at this time, but the previous “block” cracking is not reflecting through.



11 Years Later

Mukilteo - Harbor Point Blvd, west of SR 525.

2011 Single Chip Seal, with chip seal patches in the areas of deteriorated pavement. 1/2"-#4 chips were used for the chip seal patches, then 3/8"-#10 chips were placed full width, with a fog seal afterwards.



April 2016, 5 years later, No evidence of any cracks



Bike Lanes Need Special Treatment

Ask any bicycle enthusiast, and they will tell you that chip seals should not be used on a bike lane. 1/2" chip and 3/8" chip seals have generated plenty of complaints. But the bike lanes still need maintenance.



BIKE LANE OPTIONS:

- **Postpone** until the next maintenance cycle. Chip seal the traveled lane, but not the shoulder / bike lane.
- **Fog seal** the bike lane at the same time as the traveled lane, however, it may need a lighter application rate than the adjacent chip seal, because it is smoother pavement. This will be a minor benefit to the longevity of the pavement, for a very small cost.
- Chip seal the bike lane with a **smaller chip**, such as 1/4"-#10. This could be improved further by using a 2 ton steel wheel roller. Experiment with the vibrate mode. This will keep the shoulders in the same condition as the traveled lanes for the next maintenance. Additional cost for the smaller chips depends on quantity.
- Chip seal the bike lane, then use two coats of a heavy parking lot type of **seal coat** to define the lane. Additional cost for the seal coat depends on quantity.
- Chip seal the bike lane, then use a **slurry or micro-surfacing** to smooth the surface and define the lane. Additional cost could be significant.
- Use a **parking lot sealer or slurry** without the chip seal.

