



Minnesota Department of Transportation

Office of Materials & Road Research

1400 Gervais Ave,

Maplewood, MN 55109

Memo

TO: Shawn Williams, Public Works Director
File

FROM: John Pantelis, Lead Research Technician
Ed Johnson, Research Engineer

DATE: August 29th, 2012

SUBJECT: August 22nd, 23rd & 24th, 28th & 29th Flex-Patch Construction and Installation Notes

This memo is to document the Fahrner Asphalt installation of BCI Flex-Patch materials within the City of North Branch, MN. Onsite staff included Shawn Williams and Brian Fields (Field Inspector) for the City of North Branch, Travis for Fahrner Asphalt (and numerous crew members) and John Pantelis for Mn/DOT Materials and Road Research. Ed Johnson was onsite 8/28/12.

The City has selected various residential and arterial routes within the city to repair transverse cupped cracks and localized potholes or failures. Light weight profiler measurements were made prior to installation to record ride benefits from these repairs. Measurements will be scheduled once excess rock has been cleared naturally.

Equipment used onsite included a Crafcro EZ 1500EB crack sealant melter plus a large compressor truck with propane operated heat lance. Also, a mechanical aggregate blower (termed: AMZ truck) was used after the second day to place cover aggregate, required when using this product. Leveling squeegees used for this installation included a 2 foot wide squeegee, 1 foot wide squeegee and a 3 inch wide nozzle mounted squeegee. The 2ft. was used to level larger areas, the 1ft. was typically used for most areas, and the 3in. was utilized as a clean & seal treatment for wider cracks with no apparent cupping.

Sections were pre-marked for crews to repair and which cracks to skip. Products were installed primarily in transverse cupped cracks, but also and a leveling course for depressions, potholes and some edge drop-offs.

Sealant temperatures were maintained to 350° inside the melter and 320° at the crack seal wand. Cover aggregate was pre-coated with a proprietary agent proposed to increase adhesion with sealant and prolong aggregate bond within the structure.

Overall, installation uniformity was superior when using the Mechanical Aggregate Blower (AMZ truck) over the shovel & scatter method. When using the shovel, particularly on routed or deep cracks, the aggregated tended to sink into the product, causing bleeding and less than a flush finish. The AMZ truck was able to blow the cover aggregate in place, providing an aggregate crust over top of the sealant products as well as force aggregate to penetrate the sealant surface. The aggregate cover rate could not be measure by either method, and sealant rates per crack varied greatly with the type of

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repair necessary. Aggregate or installation should be considered as a function of sealing, much like a Mn/DOT chip seal installation, and not as a separate pay item.

Any questions, please contact Ed or John.

First Day Installation Notes (8/22/12):

Temps are 320° @ Wand, 350° Kettle temp settings

Falcon Way is 1st location, then to Evergreen PL. cul-de-sac (neither are profiled sections)

City staff pre-marked locations appropriate for repair with Mn/DOT staff, City staff continued as a standard practice. These first sections were marked sparingly to avoid material waste, limiting repair or product for other targeted locations.

Pre-coated stones proprietorially available to Fahrner appears to be 1/8+ with coated and uncoated granite and/or basalt. Retained a 20 lbs. sample from truck bed.

Shovel casting of cover aggregate proved time consuming. No reliable/verifiable aggregate coverage rates or controls. This can lead to increased waste of aggregate. Also, aggregate dropped from height pushes sealant up and bleeds over route reservoir.

Sealant materials could be flowed and applied evenly. Packaging lists sealants as “Fahrner Asphalt Sealers BCI Flex-Patch” materials. Retained one empty box and 1 half gallon sample from wand.

Some cracks were routed, and once shoved cast rock was applied material tended to overflow reservoir. No more routing was attempted. Only wide cracks will be treated with the Clean & Seal method with cover aggregate applied, as selected by City staff.

Equipment / Installation Notes:

Crack Sealant Kettle –

Conventional Crafcoc crack sealant kettle used without modifications (per Travis). Aids in mobility over typical Mastic kettles without hassle of pug mill trailer lineup and buggy. Leveling squeegees resembled those of a typical Mastic installation project

Heat Lance / Air Compressor –

Compressed air was used from the front of truck; heat lance was used from the rear. Rose bud torch was added to increase weeding efforts, not as heat lance replacement. Hand pulling or clearing of weeds was required ahead of compressor truck. Because crews had an extra heat lance, discussion of additional propane lines for heat lancing front & rear, but lacked spare hoses.

Crack preparation did limit production speed for some areas, but quality preparation was not sacrificed for speed.

Repair areas with failed crack seal would, oftentimes, bubble thru sealant and/or cover aggregate.

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8/22/2012 Install Pictures:



Figure 1 – Heat Lance operations before sealing – Typical for all operations



Figure 2 – Pre-coated stone used for entire project

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Figure 3 – Shovel Casting of Cover Aggregate



Figure 4 – Routing, Cleaning and Heat Lancing of Cul-de-sac

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Figure 5 – Flush Filling of Routed Crack



Figure 6 – Bleeding of Flush Filled, Routed Crack – Typical of Shoved Cast Rock

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Figure 7 – Typical filling of squeegee for leveling operations (1ft. squeegee pictured)



Figure 8 – Cover aggregate awaiting sealant and squeegee installation

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Second Day Installation Notes (8/23/12):

Evergreen Ave., Evergreen Ct. and South ½ of 363rd St - Elk Ave. Section

Temps are 320° @ Wand, 350° Kettle temp setting

Evergreen 1st location, then to Evergreen Ct cul-de-sac, and then 363rd north to south ½ of Elk Ave. (profiled review sections)

Rain forces delay of start-up, once crack treated and rain forces delay again. Restart by 12:30pm.

City staff pre-marked locations appropriate for repair during rain delay. These sections were again marked sparingly to avoid material waste. More Clean & Seal repairs were marked for 3in. squeegee and cover aggregate.

Third Day Installation Notes (8/24/12):

Start-up temperatures were as low as 280° at the wand and rising. Returned to the typical 320° production temps within half hour.

City staff pre-marked locations appropriate for repair. These sections were again marked sparingly to avoid material waste. More Clean & Seal repairs were marked for 3in. squeegee and cover aggregate.

Additional rose bud propane torch was used to speed up weed cleaning preparation before heat lancing. Smaller torch did not replace heat lancing operations.

Cover Aggregate Observations:

Clean & Seal operations worked better with mechanical blower applications. City and State staff would not recommend shovel casting cover aggregate as standard practice. Mechanical placement should be part of the installation specification.

Cover aggregate exhibited less sinking when mechanical blower was used. Fine particles would come from the hose before larger particles. Operator could feather aggregate into the sealant for deeper pothole filling or add aggregate lightly where shovel added aggregates dropped from height could lead to some bleeding or over filling of repaired area.

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8/23 & 8/24 Install Pictures:



Figure 9 – Typical Operations, Mechanical Aggregate placement, Squeegee & Sealant Wand



Figure 10 – Leveling and placement operations

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Figure 11 – Finished 3in. Squeegee with cover aggregate



Figure 12 – Large Depression to be filled south view



Figure 13 – Same Depression, as repaired north view

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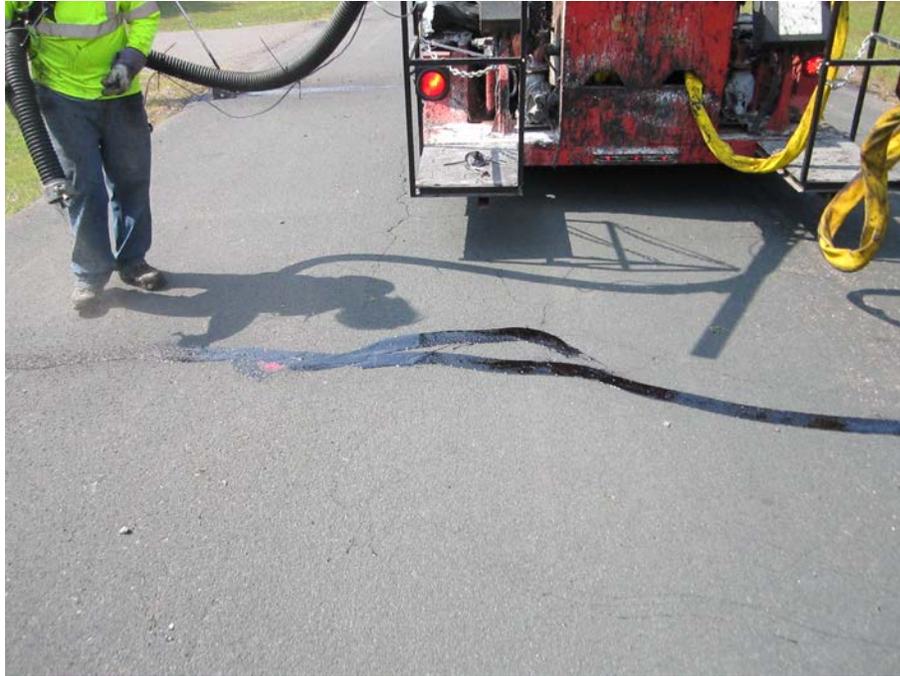


Figure 14 – Clean & Seal Repair area



Figure 15 – Clean & Seal ½ completed – Note 3/4+ crack size

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Figure 16 – Squeegee, Wand and Mechanical Aggregate mobility from trailer



Figure 17 – Picture of retained sealant box

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Fourth and Fifth Day Installation Notes (8/28 & 8/29/12):

Rain delay holds install into the afternoon. Rejoined crews at Finley Ct. / 408th area of Chain o' Lakes.

4th day Temps are 340° @ Wand, 378° Kettle temp setting

5th day Temps were lower in morning work, 305° at wand. Was raised to 335° at wand before building test sample patch.

Artie from Fahrner is the Project Supervisor for remainder of installation. Entire new crew today. Some start up direction and personnel direction was required but not excessive.

Equipment notes:

All equipment is different from previous installation days.

Kettle is an EZ1500 Crafcro Melter. Only a single Heat Lance was onsite. No supplemental air compressor or rose bud heater was onsite.

Mechanical aggregate placement and sealant applications were slower with this equipment. Older pumps or different designs are contributing to the delay.

On 8/29/12 I produced a field sample patch using a new and cleaned steel painter's tray. This was produced without hand working of the materials. Tray was filled with wand and had aggregate mechanically applied. See Figure 23 & 24 for finished sample picture.

8/28 & 8/29 Install Pictures:



Figure 18 – Cul-de-sac Installation Start-up

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Figure 19 – To be repaired crack, heat lanced



Figure 20 – Leveling with Squeegee



Figure 21– 1st pass with cover aggregate



Figure 22 – Finishing with extra cover aggregate

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Figure 23 – Side view of variable thickness field sample



Figure 24 – Down view of sample

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