



Research Notes

September 1998

Alternate Method for Pothole Patching

BACKGROUND

During the winter months, asphalt pavements are subjected to traffic, moisture penetration and in many areas of Oregon, freeze thaw cycles. These conditions often lead to the formation of potholes. In Oregon, highway maintenance agencies use either the "throw and roll" method (placing cold mix material with some means of compaction) or a semi-permanent method to repair potholes. A semi-permanent repair requires milling out the pothole to firm support, filling with a cold or hot-mix material and compacting with a roller. Typically, throw and roll pothole patches will likely fail before the pavement is resurfaced or rehabilitated. Alternatively, semi-permanent repairs are time consuming and require more people and added lane closure time.

SPRAY INJECTION PATCHING PROCESS

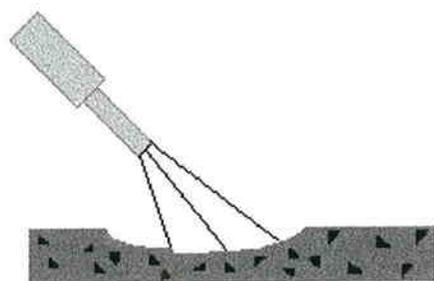
An alternate method is available to quickly, safely and permanently patch potholes that can be employed year-round. Although not currently used in Oregon, a successful pothole repair method used in other states is spray injection. Spray injection is a process where using specialized equipment, aggregate is simultaneously pre-mixed with a heated emulsion and sprayed through a hose and nozzle into the pothole.

In addition to repairing potholes, spray injection equipment can be used to repair alligator cracking, transverse cracking, edge breaks, depressions, and rutting. The diagram below illustrates the process.

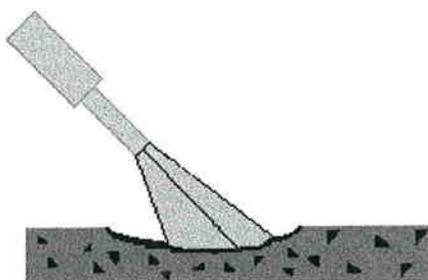
After the area is filled with asphalt emulsion and aggregate mix, the surface is covered with a thin layer of uncoated aggregate. No compaction is required since the compaction is achieved as the hole is filled from the bottom to the surface. The repair can be opened to traffic as soon as the workers and equipment are clear. The spray injection equipment offers potential for greater productivity and efficiency and can operate in the winter months in extreme cold weather.

A typical emulsion used with the equipment is a CRS-2 or CMS-2, depending on the weather conditions. The rock is a washed 9.5 mm/6.3 mm uniformly graded crushed aggregate.

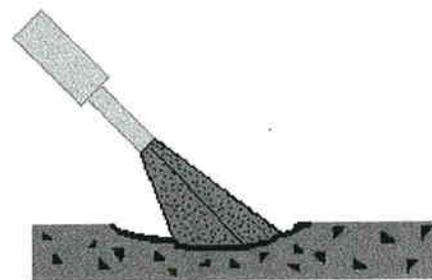
A 1993 Strategic Highway Research Program (SHRP) study on pothole repair methods and materials reported that spray-injection patching was the most productive method in terms of tons/person-day. The study also noted that spray injection patches were more durable when compared to those made using other methods.



Air is blown into the pothole to remove any standing water or loose debris.



The bottom and sides of the pothole are coated with asphalt emulsion.



A mixture of asphalt emulsion and aggregate is blown into the hole filling it to surface grade.

TYPES OF SPRAY INJECTION EQUIPMENT

There are three types of units that are used by highway maintenance agencies. They include:

- Trailer type units;
- Modified truck units; and
- Self-contained units.

The trailer unit is pulled by a dump truck and the truck feeds the aggregate to the unit through a modified tailgate. At least two people, the truck driver and a person to operate the spray injection hose and nozzle, are required. The operator works behind the trailer to control the delivery hose suspended from a boom on the rear of the unit.

With the modified truck unit, the patching equipment is reconfigured so that it can be mounted on the chassis or dump truck bed of an existing agency truck. This eliminates the need for pulling a trailer, although the spray injection hose is still operated from the rear of the truck.

In the self-contained unit, only one person is required to patch the pothole. The spray injection equipment is factory built onto a truck chassis. The patching is done by the truck operator inside the truck's cab using a joystick to remotely control the spraying operations. The boom and attached hose extend from the front of the truck.

USE BY OTHER DOT AGENCIES

Spray Injection patching equipment is being widely used throughout the United States. Nine DOT agencies were contacted by the ODOT Research Unit to assess how well spray injection patching equipment was performing. Each agency contacted provided positive endorsements about spray injection patching equipment. They are using the equipment to repair asphalt pavement as well as portland cement concrete pavement. Some are even using the equipment to repair interstate highways.

EQUIPMENT COSTS

The cost of the equipment ranges from \$40,000-\$45,000 for the trailer type units and modified truck units. The self-contained units are priced in the \$120,000 range. There are four leading manufacturers of spray injection equipment. The manufacturers, through their distributors, can also provide leasing arrangements and are very willing to arrange a free demonstration.

TO FIND OUT MORE...

Request a copy of the full research report from the Research Unit by phone, e-mail, or in person. Also, each ODOT District Manger has been provided a copy of the research report. If you have access to the ODOT Network, an electronic copy is available at "s6000e\TDB\6531shar\Report Winter Pothole Patching.doc". A copy will soon be available via the Research Unit web page as well.

For additional information about this project, contact Andrew Griffith, Research Unit, by phone at (503) 986-3538, or via e-mail at andrew.s.griffith@odot.state.or.us.

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