

Evaluation of Vialit Asphalt's *Rephalt* Cold Mix Patching Material

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On January 16th, 2008 the Virginia Department of Transportation's Materials Division Asphalt Program partnered with Vialit Asphalt of Austria to install a field evaluation site of the company's cold mix asphalt, *Rephalt*. With the intent of evaluating the performance of the material for acceptance onto VDOT's approved list of proprietary High Quality Cold Patch Materials. Mr.'s Wolfgang Eybl and Kurt Birngruber with Vialit Asphalt were on hand to assist and give technical guidance on using the *Rephalt* material.

From 1994-1996 The Virginia Transportation Research Council (VTRC) conducted an extensive field and laboratory evaluation of cold mix patching materials (Prowell and Franklin, 1997). The Virginia Department of Transportation's current list of approved cold mix materials was derived from the results of that study. A conclusion of that report was that laboratory tests alone are insufficient for screening potential mixes. To that end this field evaluation was set up to evaluate the Vialit product *Rephalt* for use on VDOT maintenance work.

Evaluation Site:

The Elko Area Headquarters' (AHQ) Operations manager, Reggie Patterson, was asked to provide a location for the evaluation site. The preferred site (or sites) would be in need of repair, which the AHQ would typically use a cold patch material at this time of the year.

A deteriorated patch on US 60 West in New Kent County at Bottoms Bridge was selected for the evaluation site. This site would typically be repaired with hot mix asphalt (HMA), however the site was rapidly deteriorating and no HMA facilities were operational, therefore a 'permanent' cold patch solution was required.

Manfred Nettek of Global Manhole Restoration LLC (GMRS LLC), acting as a local representative for Vialit, reviewed the location and found it an acceptable candidate for the evaluation of the *Rephalt* material.



Figure 1, Evaluation site on US Route 60 West at Bottoms Bridge.

US 60 West:

This portion of US Route 60 was constructed using 8 inches of jointed plane concrete pavement (JPCP) and has been in service for 50 to 60 years. The Bottoms Bridge segment was built on fill and is adjacent to swamp land; this section also has poor surface and subsurface drainage. During a typical rain event standing water will develop well into the right wheel path of lane one. Soft wet sub-grade was encountered during the excavation of the distressed patch at the candidate site confirming the poor subsurface drainage.



Figure 2, Aerial View of evaluation site

Traffic:

US 60 west parallels Interstate 64 and is a convenient rest-stop for interstate truck and car traffic. This section also services a local ready mix concrete producer as well as several logging operations. Heavy haul trucks are common in both directions. Below is the excerpt for this section from the VDOT Traffic Engineering Division’s 2007 traffic volume estimate for New Kent County.

VDOT’s 2007 Traffic Volume Estimate:

Route	Annual Average Dailey Traffic	Percent 2 and 4 Tire Vehicles	Percent Busses	Percent Single Unit Trucks 2 Axle	Percent Single Unit Trucks 3+ Axle	Percent Combination Trucks 1 Trailer
US 60 @ Bottoms Bridge	12,000	93%	1%	1%	2%	3%



Figure 3, US Route 60 @ Bottoms Bridge

Patching Materials:

Rephalt is a dense coarse graded asphalt mixture that is workable at ambient temperatures. Typical cold patch mixtures require an emulsified or cutback asphalt to maintain workability at ambient temperatures. The Rephalt product however incorporates a bio-based component to maintain this workability. This component will then react with water incorporated into the mix during placement to ‘cure’ into a stiff pavement layer. Approximately one to two liters of water are added to each 25 kg of material to initiate this reaction.

Rephalt is typically shipped in individual plastic containers containing 25kg (55 lb) of material and must be kept sealed until just prior to use to prevent the material from reacting with ambient moisture. For this reason at present the material is only available for pre-packaged use and not bulk supplies under VDOT’s current special provision for cold patching materials. The material is produced in three size categories: a 0/4mm mix, 0/8mm mix and a 0/11mm mix.

Construction / Installation:

Weather:

The weather on the installation day was slightly overcast, cool and windy; the mean wind speed on the 16th was 6.5 mph with sustained gusts to 15mph. The previous and following night’s low temperature was 23/23° F (-5° C) with an average temperature of 34° F (1.1° C). The ambient temperature during construction was 39° F (3.8° C). The pavement temperature was 36° F (2.2° C).

Placement:



The existing distressed material was removed down to sound concrete.

The leading half of the patch was found to be sound at a depth of approximately 5 to 6 inches (127 to 152.4 mm).

The trailing half of the patch was deteriorated down to the sub-grade in the center of the patch.

The excavated patch was cleaned and blown free of loose debris, the deepest distressed portion was seated with a vibratory plate compactor.



Rephalt 0/4mm material was used as a leveling and consolidating course for the deepest section of the excavation.



0/4mm mix compacted using a 'jumping jack' compactor



Two lifts 0/11mm mix were used as base and binder layers.

The 'jumping jack' compactor was used for compaction on all layers lower than the final surface

Approximately 1 liter of water was added to each 25kg bucket before placement and an additional liter was "sprinkled" on the loose material before compaction.



A final 0/8mm lift was placed for the final riding surface of the patch.

Edges were pinched with the 'jumping jack' compactor.



A small roller was used with vibratory and static passes to achieve final compactive effort and achieve a smooth uniform surface



The final surface was slightly high to the right and center of the patch.

Although the material appeared set and ready for traffic upon completion of the clean up operations (approximately 30min) the patch was allowed to cure for approximately 1 hr before the lane was opened to traffic. The extra time was given due to the cold weather and the heavy haul trucks.

In-Service Performance:

The site was visited routinely in the first two to three weeks of service, to ensure the material stiffened adequately with the reaction to the added water. The site was inspected monthly thereafter. There have been no signs of pushing, shoving or rutting in the patch; distresses that would be associated with a weak or unstable mix.



Figure 4, evaluation site after one week of service

The following pictures show the candidate site on June 26th, 2008 after five and a half months of service. To include record sustained heat for June in Richmond, VA; as provided by the Nation Weather Service in Wakefield, VA:

_____ 5 WARMEST JUNES (AVG TEMPERATURE) _____

RANK.....	RICHMOND.....	NORFOLK.....
1.....	79.2 F (1943)	1...80.1 F (1943)
2.....	***79.0 F (2008)***	2...79.5 F (1994)
3.....	78.8 F (1895)	3***79.2 F (2008)***
4.....	78.4 F (1892)	4...78.8 F (1934)
5.....	78.1 F (1890)	5...78.5 F (1952)

OTHER NOTES...

Richmond:

***AVG HIGH TEMPERATURE FOR THE MONTH WAS 91.4 F...THE HIGHEST ON RECORD. THE SECOND HIGHEST IS 90.0 F IN 1984.

***TODAY (JUNE 30) HIT 89 F LEAVING THE NUMBER OF DAYS 90+ FOR JUNE AT 19. THE MOST 90+ DAYS FOR ANY JUNE IS 20 IN 1943.

***THE 13 CONSECUTIVE DAYS WITH HIGH TEMPERATURES 90+ FROM JUNE 4-16 TIED 1943 (JUNE 16-28) FOR THE LONGEST SUCH STREAK WITHIN JUNE.

***THE 3 DAYS OF 100+ HIGH TEMPERATURES (JUNE 7, 8, AND 10) ARE THE MOST OF ANY JUNE SINCE 1952 WHEN 3 WERE ALSO RECORDED.

Note: Sustained high temperatures are a primary cause of asphalt rutting under traffic if the proper binder and aggregate structure are not utilized and makes these unusually high temperatures worthy of note.



Evaluation site as of 06/26/08



Material is in-place, stable and shows no signs of cracking



Material has maintained a uniform profile, very little to no pushing or shoving and no rutting



Tight joints have been maintained, material has not bled, or streaked away from the patch

Final Recommendations:

Five primary distress types were evaluated in the 1997 VTRC report used to generate VDOT's existing approved list: bleeding, rutting / dishing (further compaction under traffic), debonding, raveling and pushing & shoving. These distresses were identified by the authors as the primary distress modes of concern for cold mix patching materials in Virginia.

The Rephalt material did not exhibit any quantifiable distress in these five categories. There was slight pushing in one quadrant of the patch; this was most likely due to the patch being high on the center of the right edge during construction. The distortion in the patch was just noticeable to the eye and was not measurable.

To date the Rephalt cold mix material has met all expectations that the Virginia Department of Transportation has on cold mix patching materials. The three Rephalt mix sizes, 0/4mm, 0/8mm and 0/11mm will be placed on VDOT's approved list of High Quality Cold Patching Materials. The evaluation site will continue to be monitored by the Materials Division Asphalt Program; the Materials Division reserves the right to remove this material from the approved list should this site deteriorate suddenly and unexpectedly in the near future.

Eighteen month follow up photos, June 2009:





