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Stitch-In-Time™
Deep Injection™

MEMO

To: Mike Vinton
From: Dave Crowley
Date: February 15, 2010
Subject: Injection of Areas of Composite Roadway Before Demolition

On the VDOT I-81 project that we did last year, part of the added work was the injection into the subgrade in areas of the roadway that was to get full-depth replacement. We were asked to inject to minimize the possibility of the need for additional cut-outs due to poor soil conditions.

The full-depth repair work consisted of removal of the slab and 12 inches of base, if the base was in good shape. If the base was very poor and/or wet up to an additional 36" needed to be cut-out and the area filled with large stone (the size of a softball) with smaller stone/soil compacted around it.

We felt that we could minimize the need for the additional cut-out by injecting at minus four feet on a four foot by four foot grid pattern. We greased up the steel tubing before placing (hoping that material would not stick to the tubes when the concrete was pulled) and cut the tubes at the surface without pounding them down (to give as much friction against the asphalt overlay as we could in an effort to bring the tubes up with the concrete).

The first area that we injected was already saw-cut into 4 foot sections and we only averaged about 7 pounds per injection hole but on the other areas that had not been pre-cut we were able to get between 15-20 pounds per injection hole before getting a bump. In some cases the repaired areas were done a few days after our injection process in other areas it was a number of weeks before the repairs were accomplished.

There were 20 locations averaging 50 feet per location that we injected. Every location was dry and in good enough shape that additional cut-outs were not necessary. In almost every case the tubes came out with the concrete. Where tubes stayed in the soil the contractor knocked them over with a flat shovel. There was no pre-inspection of the soil condition so we do not know exactly how much we improved the sub-base.

This is the technique that I wish to take to the Research Council to see if they will approve testing of the procedure.

Controlling Pavement Lifting & Soil Stabilization



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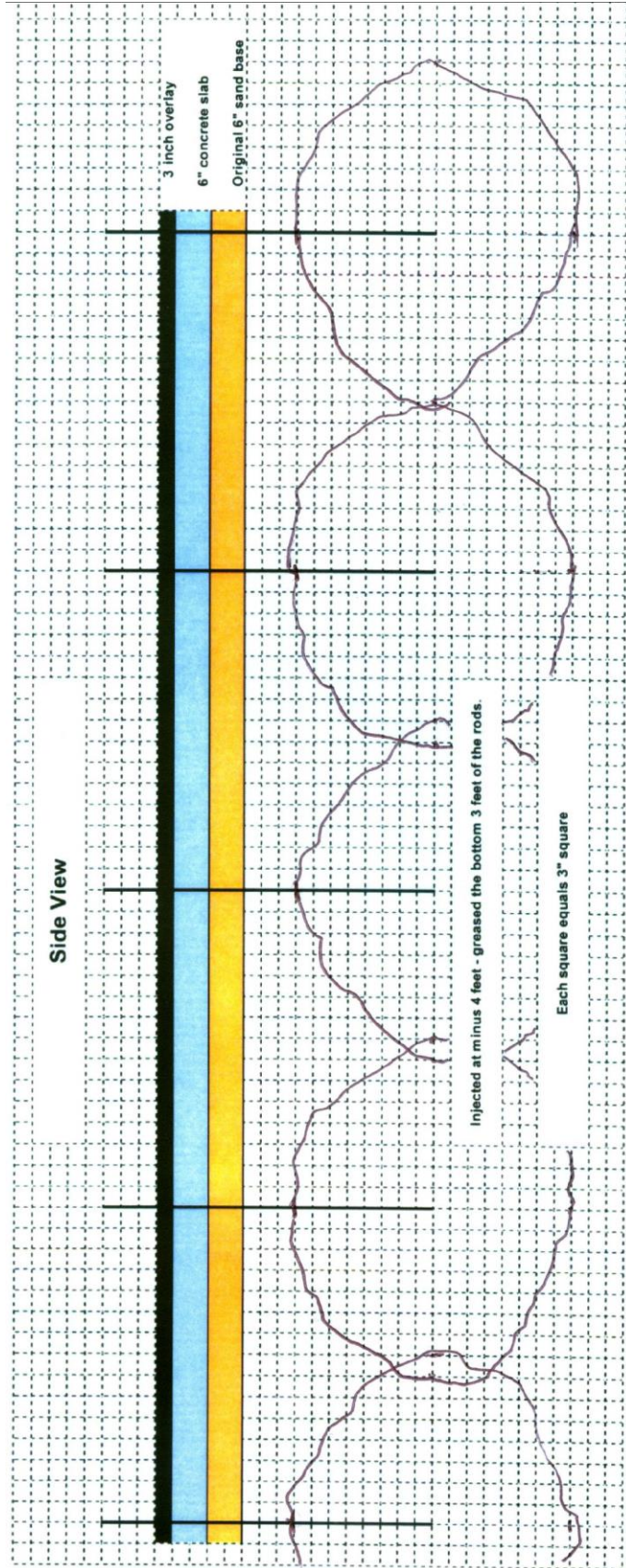
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I just spoke with Al Soltis, V. P. Milling and Paving for Lanford Bros. about how our UDI under the full depth repair areas affected their work, i.e. did we make it more difficult to cut and pull the slabs, was removing the tubes an issue, did soils stick to the tubes when they were pulled, etc.

Al at first said that it could be described as a minor disruption then explained that, after pulling the first 60 feet of the total of 1,000 lane feet it was not an issue at all. He also stated that they were extremely pleased with the way our crews kept ahead of their work and moved around so they did not get slowed down (we left the job for three weeks while they did the north bound lanes). He was also very surprised that there was no area that needed additional cut-outs and felt that our process definitely helped stabilize the subgrade – at the meeting with the VDOT engineers on Feb. 3rd they also felt the process was very successful.

I asked Al for scope of work documents or specifications on what was expected of them if they did have to remove poor soils and build up dry, compacted subgrade soil. He replied that they never got anything in writing and that was why they started the full depth repair three weeks after the start date. I'm not sure if it was VDOT or the FHWA that wanted it done, but – as best as I remember - they were told that they would have to dig out up to an additional 36" of poor subgrade and replace it with lifts of: #4 stone (about the size of a softball) laid down, compacted into the base then with a #57 stone/soil mix covering and filling the #4 stone, compacted into and on the #4 stone, then repeating the process until the cut-out is up to the base. I believe that the contractor felt that they could not get the required compaction requirements with that technique and the state couldn't figure how much they would allow in time-and-material charges (they failed to add it as a line item in the bid documents).

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