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Attendees:
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November 6, 2017 **FINAL FIELD REPORT** U2017 - 05

Assessment of the Jahn Permeable Mortar System In a Historic Bridge Abutment Application

Overview:
The Jahn Permeable Mortar System was installed on the Historic Taftsville Covered Bridge in 2012 as part of a larger rehabilitation project, after Tropical Storm Irene caused significant damage to the bridge. The Jahn Permeable Mortar System was chosen over others because it met the specifications outlined by the Historic Covered Bridge Committee, which included permeability, compressive strength and the ability of the material to expand and contract in relation to the stones within the pier or abutment. This report summarizes the August 2017 field visit of this bridge.

The purpose of this study was to examine and evaluate the impacts of the constructability, overall performance, and life cycle cost of Jahn M110 Permeable Pointing Mortar and Jahn M40 Crack Injection Grout designed and manufactured by Cathedral Stone Products. By using the Jahn Permeable Mortar System on bridge abutments, VTrans expects comparable or better pavement performance, cost and ease of installation as the standard approved historic rehabilitation practice.

Bridge 45 Site Visit – Town Highway 2 near US 4, Woodstock VT

EA: Experimental Features – SPR 352

Work Plan: WP 2011 R-5

Date: Wednesday, August 30th, 2017

Time: 11:00 AM to 12:00 PM

Weather: 63ºF, Sunny

A site visit to Bridge 45 in Woodstock was conducted as part of an investigative check. Observations and photos on the performance and appearance of the Jahn Permeable Mortar System after installation were collected and can be seen in Figures below.

Background on Site:
Jahn Permeable Mortar was used on the Taftsville Covered Bridge project, Woodstock BHO 1444 (52). The bridge is located on Town Highway 2, Taftsville Covered Bridge Road, roughly 0.02 miles easterly from its intersection with US 4 in the town of Woodstock. Work on the bridge included rehabilitation and retrofitting of the timber superstructure along with repair of masonry foundations.
The bridge was originally built in 1836 with the last major reconstruction occurring in 1952. It is

a 198 ft. long, 14.8 ft. wide single lane covered bridge, spanning the Ottauquechee River. The bridge was rated as stable for scour as of the 2010 inspection. Average annual daily traffic (AADT) at the location of this bridge was 1500 vehicles as of 2008 reporting.

Jahn Permeable Mortar System Site Visit Photos & Notes:

Front view of the Taftsville covered bridge on Town Highway 2, Woodstock VT.

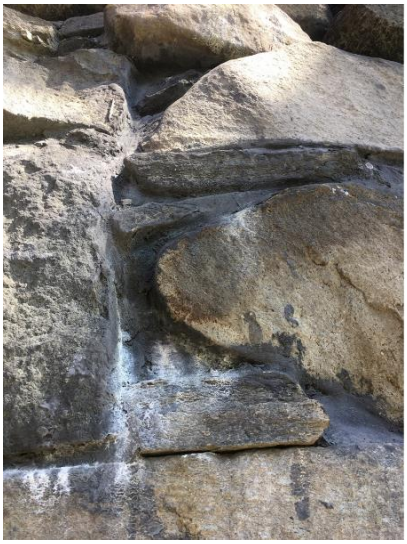
The top photo shows the overall view of the Northside wall of Bridge 45 looking towards the east, while the bottom photo shows the same Northside wall of the bridge, only looking towards the west.


The left photo shows the overall view of the Southside wall of the west abutment, while the photo on the right shows a close-up view of a powdery residue (most likely chlorides) leeching out of the mortar of the Southside wall of the west abutment. The observed residue stains consisted of two different colors, yellow/orange and white/gray. The yellow/orange stains might be indicating that the mortar is drawing out other minerals besides chlorides or that steel elements are deteriorating within the abutment.

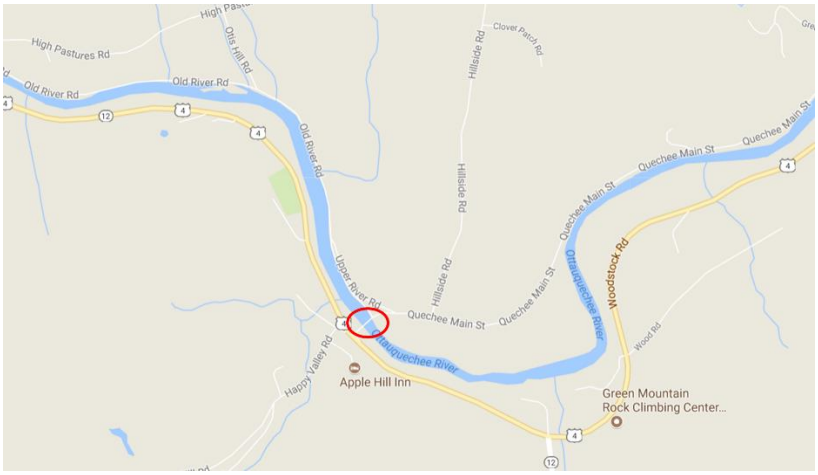

The left photo shows the overall view of the eastside wall of the west abutment, while the photo on the right shows a close-up view of the same wall and the Jahn mortar. Compared to the Southside wall (above photo), the Jahn mortar on this wall seemed to have a more historic and aged, faded gray look. Yellow/orange discoloration or residue was not prevalent on this wall.


The left photo shows the Westside wall of the middle pier, while the photo on the right shows both the south and east walls of the middle pier. The water level was too high to get a close-up look of the mortar around the middle pier, but from a distance the mortar on the south and west facing walls seemed more of a dark grey color

Overall view of the east end abutment of Bridge 45.



Both the photos are close-up views of the west wall of the east abutment. Both photos show the powdery residue (chlorides) leeching out of the mortar, but the right photo also shows PVC tubes that aid in the draining of moisture within the east end abutment. It was noted that the mortar on the west wall of the east abutment was a darker grey.



The location of Bridge 45 is represented by the red circle on this map from Google Maps.

Most Recent Bridge Management and Inspection Unit Observations:
The Bridge Management and Inspection Unit conducted their last inspection on 9-28-2016. The inspection personnel concluded that the Taftsville Covered Bridge was in good condition, which was also noted during this recent site visit. The structure inspection, inventory and appraisal sheet can be found (here) and the September 28th 2016 photos can be found (here).

Summary:
The performance of the Jahn Permeable Mortar System is supported by the visual inspection and photographic evidence gathered during the recent site visits. This study has surpassed its initial (no less than 3 years) study duration detailed in the approved FHWA Work Plan. The field visit documentation suggests that the Jahn Permeable Mortar System performs as expected and detailed by the manufacturer. The Jahn mortar system seems to be blending well to the surrounding abutment stonework taking on an aged, less noticeable, more natural look. The mortar also seems to be regulating salt and moisture content within the abutments, as advertised and evident by the leeching of chlorides from within the mortar. Results from this study will be given to the VTrans Structures Section and the Historic Bridge Advisory Group for consideration on future bridge designs.

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