UPDATE REPORT – 20 MONTHS AFTER TERMARUST OVERCOATING

High Pressure (5,000 psi) Water Wash Cleaning And Overcoating of a Historic (1915) truss bridge on Route 778 over the Middle River - in Augusta County, Virginia With the Termarust High Ratio Co-Polymerized Calcium Sulfonate coating system

For the Staunton District – Virginia DOT

Cleaning & Coating by Structural Coatings, Inc.

Clayton, North Carolina

Coating Materials from

Termarust Technologies, Vienna, Virginia

Project Painting Date: August, 2005

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OVERVIEW

This report provides some background information and pictures on the cleaning and painting portion of work that was done on this bridge, in the summer of 2005, for the Virginia DOT – and updated after a site visit on April 20, 2007 – 20 months after the pressure wash cleaning (with Chlor*Rid) and overcoat painting with the Termarust high ratio co-polymerized calcium sulfonate coating system.

The bridge is an old (1915) truss bridge, that is located in a rural area of the Staunton District of the Commonwealth (State) of Virginia.

The project involved doing some structural repairs to the bridge and then painting the superstructure. Because of this – the contract would go to a General Contractor and not to a painting contractor, who would usually prefer to use sandblasting and apply a traditional three-coat zinc-based coating system. However, it was recognized that the latter method would not stop further development of active crevice corrosion and pack rust – that was reducing the structural integrity and load capacity of connections in the 90-year old steel truss.

It is important to note that after the bridge was pressure washed it was found that at least 85% of the steel surfaces had between 2.0 and 25 mils of tightly adhered (**LEAD-BASED**) paint – that the State did not have to pay for disposal of. Also note – as seen in the pictures – the containment tarps were allowed to be removed after the pressure washing was completed.

Shown below are references, contract and bid cost information, procedures for cleaning and painting, and pictures of the bridge and the cleaning and painting operations.

UPDATE – OBSERVATIONS OF THE APRIL 20, 2007 SITE VISIT

On this date, **20 months after the bridge was pressure wash cleaned and painted**, the bridge was visited to look at the condition of the Termarust coating and whether there were any problems with the coating and/or any continued corrosion.

Photos No. 19 through 26 provide an overview of what was observed, which is summarized below:

1. The Termarust coating appears to be in excellent condition.

2. It may be seen that the color of the Termarust coating has not faded in color.

3. It was observed that there are a few small areas of dark colored stains on small portions of a few connection, for example see Photo 24.

These areas are believed to be where the water (from pressure washing) was not completely removed during the air pressure 'blow-down' of the connections – with the result that the Termarust TR2200 Penetrant and the TR2100 Topcoats (which have a polar attraction to steel) have pushed the 'rusty water' out of the connections and onto the surface of the connection – and then they 'wetted' the steel and chemically stopped further corrosion.

The fact that these areas have a 'dark' color (rather than bright red) indicates that the active corrosion in the connections has been stopped. Also, it has been found on other projects that this dark stain is just on the surface of the adjacent areas – and it can usually be wiped off.

It should be recognized that stopping corrosion on internal portions of such connections usually cannot be done. Thus, this is an important attribute of the Termarust TR2200 Penetrant; which can penetrate into such spaces and ***chemically stop corrosion***.

4. It was also seen that there are a very few areas (not shown) where the Termarust coating has been scraped off of the steel – but there has been no undercutting and delamination of the Termarust coating – and no further damage to the integrity of the coating is expected.

It is believed that these small areas of damaged coating were caused by a Contractor when work on the timber deck was being completed and when the guard rails were being installed.

REFERENCES

Virginia DOT – Staunton District

Park Thompson – Bridge Engineer – Phone: 540-332-9104

Painting Contractor

Structural Coatings, Inc., Clayton, NC - Phone: 919-553-3037

Contact Person: Grady White

Cost Information

It is important to note that this was a bridge rehabilitation project – that was finished by painting the truss. The project involved: (1) removal of the existing timber deck and replacing the longitudinal beams under the deck, (2) installing a new timber deck, and then (3) painting the truss, including the longitudinal eye-bars at the deck level.

Factors that were of major concern to the VDOT District Bridge Engineer:

1) Stopping further development of crevice corrosion and pack rust (in the connections of the truss) – that were reducing the load capacity of the truss,

2) Minimizing the cost for the entire project, and

3) Minimizing the time that the bridge would be closed to local traffic – and keeping it open during the 'school year.'

It was recognized that:

- The Termarust coating system will ***chemically*** stop corrosion; including crevice corrosion and pack rust, in addition to being an excellent barrier coating system. It is common in Canada, and now frequently in the U.S., that there is an all inclusive 5-year warranty against coating system failure – that is not available from any other coating supplier.

- It is not unusual to save more than 50% of total Project Cost for painting projects where the cleaning was with 5,000 psi pressure washing and application of the Termarust 'one-coat' system vs. sandblasting and application of a traditional 3-coat zinc based system (that will not stop crevice corrosion and pack rust).

Since this project involved structural rehabilitation work, and not just painting, the contract had to go to a General Contractor, not a painting contractor that would usually prefer to use sand blasting and application of a traditional three-coat zinc-based coating.

In order to gather comparative cost information for using pressure washing and overcoat the remaining existing (tightly adhered) paint with the Termarust system vs. sandblasting and a traditional coating system – the bid documents had the following requirements:

1. **Only two acceptable paint systems:**

   Alternate A – a zinc-rich single component moisture cure polyurethane primer, micaceous iron oxide filled single component moisture cure polyurethane intermediate coat, and a micaceous iron oxide filled single component moisture cure polyurethane or aliphatic polyurethane topcoat – with expected preparation by sandblasting.

   Alternate B – The proprietary paint system…manufactured by **Termarust Technologies**; which recommends preparation with a 5,000 psi pressure washing – with Chlor*Rid in the final wash water (to remove soluble salts; e.g. chlorides, nitrates and sulfates – which respectively create hydrochloric acid, nitric acid, and sulfuric acid) [see www.chlor-rid.com for technical information on this topic].

2. **The (General) Contractor had to submit two bid prices:**

   1) The cost of repair work + use of the Alternate A paint system, and

   2) The cost of repair work + use of the Alternate B paint system (the Termarust coating system, with preparation with pressure washing)

Obviously the General Contractor(s) wanted to submit the lowest prices possible – in order to be selected for the contract award.

The following table shows bid information that was 'published' on the VDOT website.

It may be seen that the bids from both contractors showed a cost savings by using pressure washing and the Termarust system. It may also be seen that by awarding the contract to Contractor No. 1 – **the State saved $63,860 – by using pressure washing and the overcoating with the 'one-coat' Termarust coating system; which will stop crevice corrosion and pack rust in the connections of the truss bridge.**

Here it is also important to note that after the bridge was pressure washed it was found that at least 85% of the steel surfaces had between 2.0 and 25 mils of tightly adhered (**LEAD-BASED**) paint – that the State did not have to pay for disposal of. This also permitted a reduction in the amount of paint needed for the project; i.e. 10 mils dry film thickness (DFT) over bare steel and tight rust and only 5 mils DFT over tight paint.

The cost savings by using Termarust

	Alternate A paint system	**Alternate B = Termarust**	**Cost savings by using Termarust**
Contractor No. 1	$476,356	**$412,496**	**$63,860**
Contractor No. 2	$611,018	$588,518	$22,500

CLEANING AND APPLICATION PROCEDURES

The following Termarust standard procedures were followed:

1. Pressure wash clean the bridge with a 5,000 psi pressure washer (at a 6" standoff distance) with clean water with an additive of Chlor*Rid to remove non-visible salts; e.g. chlorides.

   (For more information on Chlor*Rid – see www.chlor-rid.com)

2. With dry compressed air – blow dry all connections (and cross-over points on built-up lattice members. (almost all superstructure members)

3. Apply Termarust TR2200 Penetrant into all 'open' connections

4. Apply a caulk (or stripe) coat of Termarust TR2100 into/onto edges of connections

5. Spot prime areas of bare steel and tightly adhered rust with 5 mils DFT of Termarust TR2100

6. Overcoat the entire area with another 5 mils DFT of TR2100.

It is important to note that steps 3 through 6 are done immediately after each other; i.e. wet-on-wet; which is why the Termarust system is considered to be a "One Coat" system.

The final result was:

- 5 mils DFT on tight paint,
- 10 mils DFT on bare steel and tight rust, and
- 20 mils DFT over connections.

PICTORIAL OVERVIEW

The following pictures provide a pictorial overview of the project.

Photo 1 – Bridge in 2004, before painting.

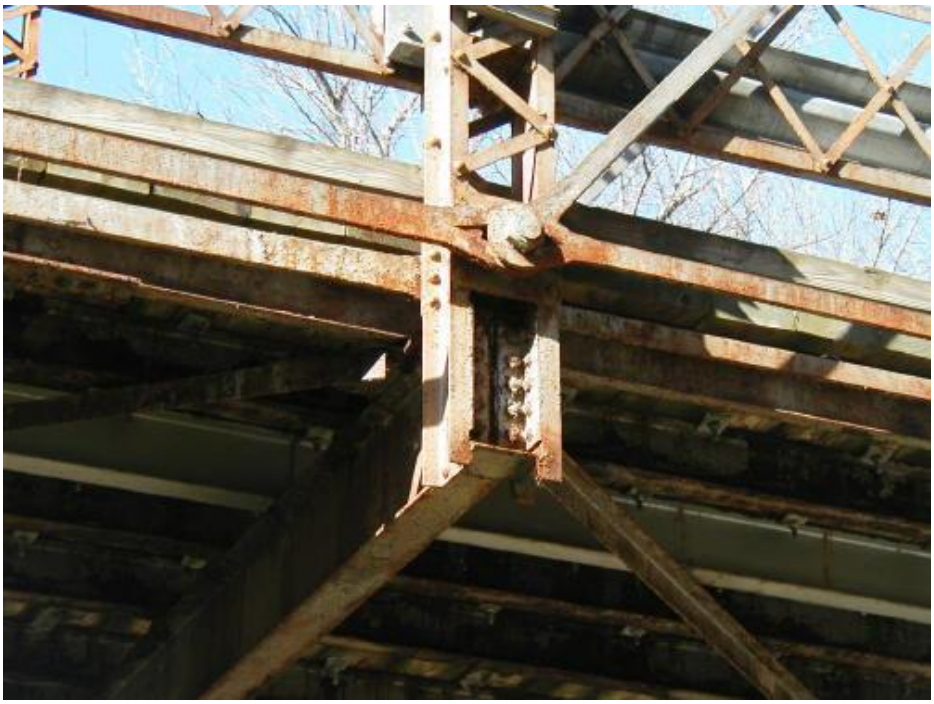

Photo 2 – Bridge in 2004. (see Photo 26)

Photo 3 – Bridge in 2004. (see Photo 20)

Photo 4 – Bridge in 2004.

Photo 5 – Tarps for containment for pressure washing

Note – the tarps extend 18” above top of bridge – but top is open.

Photo 6 – Flow-through tarp and filter fence contain paint chips.

Photo 7 – Underside of containment.

Photo 8 – 5,000 psi pressure washing, standoff distance less than 6”.

Photo 9 – Truss member cleaned by pressure washing, ready for painting.

(see Photos 18 and 21)

Photo 10 – Bottom of tie rod assembly cleaned and ready for painting. (see Photo 25)

Photo 11 – Pin/truss assembly cleaned and ready for painting.

Photo 12 – Top of portal truss cleaned and ready for painting.

Photo 13 – Top of portal frame cleaned and ready for painting

Note: most of pack rust under longitudinal member has been removed by pressure washing.

Photo 14 – Film thickness gage shows 4.5 mils of existing tightly adhered lead-based paint.

(At least 85% of the bridge had 2.0 to 25 mils of tightly adhered paint, after pressure washing)

Photo 15 – Applying TR2200 Penetrant to connections.

[**Note – the containment tarps were removed after pressure washing**]

Photo 16 – Applying TR2100 Topcoat, for caulk/stripe coat and spot priming over bare steel and tight rust.

Photo 17 – Painting the bridge from two scissor lifts.

Photo 18 – Painting completed. (see Photo 21)

Photo 19 – 20 Months after painting. (see Photo 16)

Photo 20 – 20 Months after painting. (see Photo 3)

Photo 21 – 20 Months after painting. (see Photos 9 and 18).

Photo 22 – 20 Months after painting. (see Photos 3 and 20)

Photo 23 – 20 months after painting. (see Photos 3 and 20)

Photo 24 – 20 Months after painting – corrosion in connection has been stopped.

(see Note 3 on Page 3)

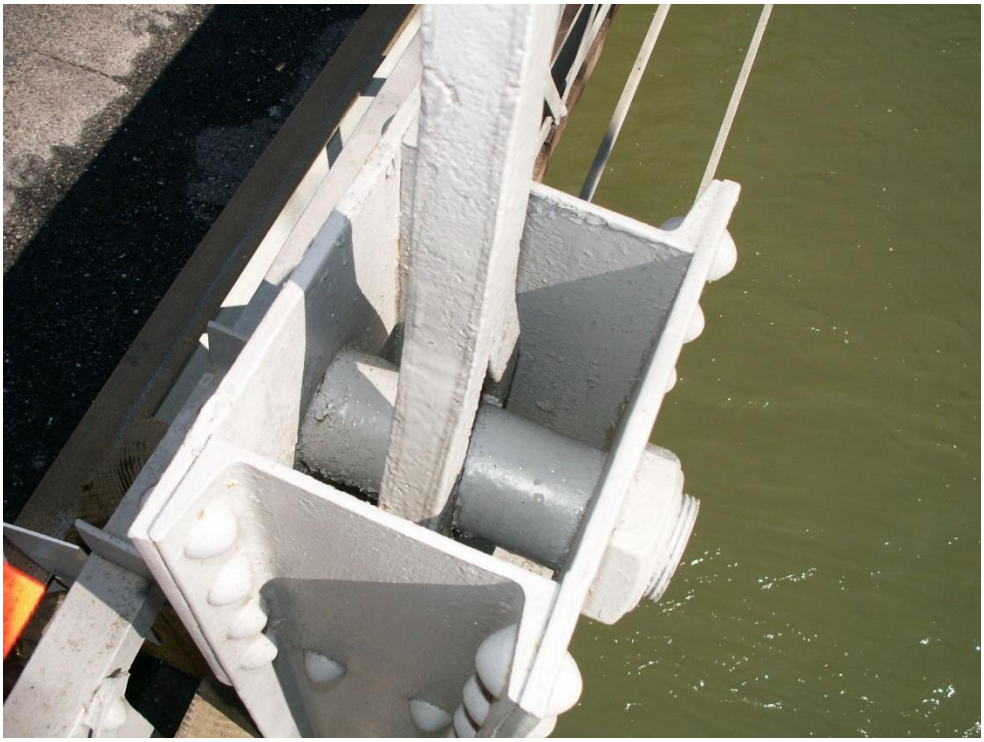

Photo 25 – 20 Months after painting. (See Photos 4 and 10)

Photo 26 – 20 Months after painting. (see Photo 2)