



STATE OF NEW HAMPSHIRE

INTER-DEPARTMENT COMMUNICATION

DATE September 13, 2017

From Jerry S. Zoller, P.E.
Project Engineer

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Subject **Hinsdale, NH- Brattleboro, VT 12210-C**
Br. No. 041/040 (west) NH 119 / Connecticut R
Br. No. 042/044 (east) NH 119 / Connecticut R

To David L. Scott, P.E.
Chief of Design, Bridge Design Bureau

Re: Item 556 Preliminary Bridge Painting Estimate



I was requested on September 6, 2017 to provide a preliminary estimate to repaint the two steel camel-back through truss bridges referenced above. The westerly bridge is one-span and 339-ft. long. The easterly bridge is three-spans with a truss center span and a total length of 297 ft. I visited the bridges and generally observed the existing coating conditions from the shoreline, sidewalk, and easterly bridge seat area. Please consider the following comments, recommendations, and preliminary estimate for Item 556, Painting Existing Structural Steel.



(a) Assessment of Bridge Coating (ABC report):

The 1920 bridges have a concrete deck in the roadway and a timber sidewalk cantilevered on the upstream side. The truss structures have built-up riveted members.



The bridge members have not been painted for many years and have suffered considerable deterioration and corrosion. Crevice corrosion and rusting is evident in built-up members particularly within the splash zone near and above the bridge rail, and extensively below the deck in flooring members and bottom chord members. The upper truss coatings are in better condition but exhibit coating delamination and peeling in areas. The easterly (NH-side) truss is in poorer condition than the westerly (VT-side).



It is evident that some steel repair work will be required as well due to the effects of corrosion, with section loss to rivet heads, rust pack and deterioration of members, and rust pack in crevices.

The original coating is an alkyd paint lead (orange primer) containing lead components (lead-bearing paint LBP) and mill scale is present under the coatings. The existing coatings need to be replaced entirely.

(b) Recommendations:

I recommend that the existing structural steel be totally repainted, i.e. the existing coating be removed by abrasive blasting to an SP10 Near White finish within Class 1A negative-pressure containment, and repainted with a high-performance system.



All of the work must conform to stringent NHDES requirements for environmental protection, industrial requirements for coating application, and OSHA regulations governing worker health and safety. The NHDOT Standard Specifications require that the work be performed by a qualified contractor (i.e. meeting SSPC QP1 & QP2), and the work be overseen by a qualified coatings inspector.



The recommended coating system is a four-coat moisture-cured polyurethane system including a penetrating sealer applied over the zinc primer to seep into crevices and provide additional protection. The Department has successfully used this and similar coating systems on a number of bridges and trusses over the years.

(c) Preliminary estimate:

The estimated cost to repaint the bridge as described above is as follows:



Hinsdale 041/040 - repaint steel (westerly) truss bridge;

Description	Quantity	Rate	Cost
Item 556 Structural Steel	7,831 sf deck	\$250.00/sf	\$ 1,958,000
Field Painting Inspection	16 weeks	\$6,500/wk	\$ 104,000
Total Bridge Painting Costs			\$2,062,000

Hinsdale 042/044 - repaint steel (easterly) truss bridge;

Description	Quantity	Rate	Cost
Item 556 Structural Steel	6,237 sf deck	\$300.00/sf	\$ 1,871,000
Field Painting Inspection	16 weeks	\$6,500/wk	\$ 104,000
Total Bridge Painting Costs			\$1,975,000

TOTAL - repaint steel (both) truss bridges;

Description	Quantity	Rate	Cost
Item 556 Structural Steel (westerly truss)	14,068 sf deck	\$250-300	\$ 3,829,000
Field Painting Inspection (westerly truss)	32 weeks	\$6,500/wk	\$ 208,000
Total Bridge Painting Costs			\$4,037,000

The two most comparable projects are the (2000) Orford-Fairley arch bridge and the (2016) Stewartstown arch bridge, both similarly large bridges with similar deteriorated paint condition and accelerated corrosion. The Appendix lists a number of truss bridges painted in recent years with information contributing to the estimate.

The Orford project costs are sixteen years old but in the Appendix table represent the high end of costs for Item 556, Painting Existing Structural Steel.

For this preliminary estimate I used the higher end of the 2016 Stewartstown project bid results as shown, and selected the three-bid average as a target cost. The additional considerations described below also suggest using the higher end of the Item 556 cost range.

To establish a “worst-case” cost to represent the high end of the estimate range for comparison, I note the Portsmouth Memorial bridge bid of 2008 which yielded the highest cost at \$410/sf deck.

Project (bid year)	Deck Area	Unit cost/sf	Item 556 Cost
Orford-Fairley 12898 (2000)	14,068 sf	\$102	\$ 1,435,000
Orford-Fairley 12898 (adjusted for inflation)	14,068 sf	\$ 142	\$ 1,998,000
Stewartstown 15838 A-Bid	14,068 sf	\$ 163	\$ 2,293,000
Stewartstown 15838 B-Bid	14,068 sf	\$ 153	\$ 2,153,000
Stewartstown 15838 C-Bid	14,068 sf	\$ 350	\$ 4,924,000
Stewartstown 15838 Average-Bid	14,068 sf	\$ 222	\$ 3,123,000
Selected to use	14,068 sf	\$ 250-300	\$ 3,829,000
Portsmouth Memorial Br 13678	14,068 sf	\$ 410	\$ 5,768,000

(d) Additional considerations:

Factors influencing the repainting effort and preliminary estimate:

- The easterly bridge is three spans, the same work for the truss but additional for the beam spans.
- The considerable number of crevice corrosion locations will add to the surface preparation, sealing, caulking, and painting operations;
- The bridges will be closed enabling the Contractor to access the bridge unhindered, a favorable factor, however, painting a truss is always more expensive because of the ration of containment required versus area of steel to be painted;
- The large length and height of the trusses and the site over the river will require that the containment area be smaller perhaps than normal to reduce the effects of “sail” area and wind loads on the containment support structure and on the bridge itself;
- The proximity of the westerly bridge to the city, and particularly to the restaurant (Whetstone Station) on the northwest corner only ten feet away will be an added difficulty of risk to consider;
- The nature of the rehabilitation project, including considerable steel replacement and repair, will require the painting Contractor to mobilize to the site twice: (1) early to blast and prime the steel to de-lead the bridge for structural work and to inspect the steel for repair determinations; and (2) to repaint the entire bridge at the end of the job;
- The site location over the Connecticut River will add challenges, including winds, colder conditions, fog and condensation, altogether a shorter paint-friendly weather season;

APPENDIX - Project & Price Comparisons

Since 1993 the Department has contracted several painting projects for truss bridges. The comparison of bridge features and bid data below contributed to this preliminary cost estimate.

Yr	Town	Proj #	L	W	Steel area, sf	A-Bid, \$	A-Bid unit \$/sf	B-Bid unit \$/sf	C-Bid unit \$/sf	Deck area, sf	A-Bid \$/sf deck
16	Stewartstown	15838	232	30.5	---	1,150,000	---	---	---	7,076	\$163
08	Ports Mem'l	13678	600	29.0	402,600	7,134,000	\$17.72	---	---	17,400	\$410
08	Ashland-bw	14272	800	29.0	101,500	1,860,000	\$18.33	17.70	19.50	23,200	\$ 80
06	Monroe	14095	308	22.2	34,600	668,000	\$19.31	18.06	20.12	6,838	\$ 98
03	Effingham	13647	140	19.0	6,400	133,000	\$20.78	28.27	31.48	7,429	\$ 50
01	Haverhill	12363	259	31.4	30,000	740,000	\$24.67	29.17	20.00	8,133	\$ 91
00	Orford	12898	432	34.0	124,000	1,500,000	\$12.10	15.53	---	14,688	\$102
99	Ports I-95	12514	1344	105	818,000	8,610,000	\$10.53	10.76	11.25	140,448	\$ 62
99	Plymouth	12811	172	25.6	24,000	266,000	\$11.08	10.98	13.13	4,403	\$ 60
98	Bethlehem	12808	124	24.0	12,500	160,000	\$12.80	11.32	16.99	2,976	\$ 54
93	Piermont	S-4277	352	24.3	---	623,500	---	---	---	8,554	\$ 73



Stewartstown Arch (2016)



Stewartstown Arch (2016)



Stewartstown Arch (2016)



Portsmouth Memorial (2008)



Ashland-Bridgewater (2008)



Monroe (2006)



Effingham (2003)



Haverhill (2001)



Orford (2000)



Portsmouth I-95 (1999)



Plymouth (1999)



Piermont (1993)