Alternate Paint Systems for Overcoating

THE PROBLEM:

Nearly all steel bridge paints applied prior to 1985 contained lead or chromates and are no longer permitted. Like most states, New Hampshire found that complying with environmental regulations related to lead paint removal and containment placed greatly increased costs on the bridge maintenance program. Maintenance overcoating can be a viable treatment if performed on candidate bridges early enough to pre-empt the need for complete removal of existing paint. The need to keep bridges in good condition while keeping costs under control prompted the Department to investigate various overcoating systems that could be applied with minimal surface preparation and provide adequate long-term performance.

This coating has deteriorated to a point where maintenance overcoating is no longer appropriate

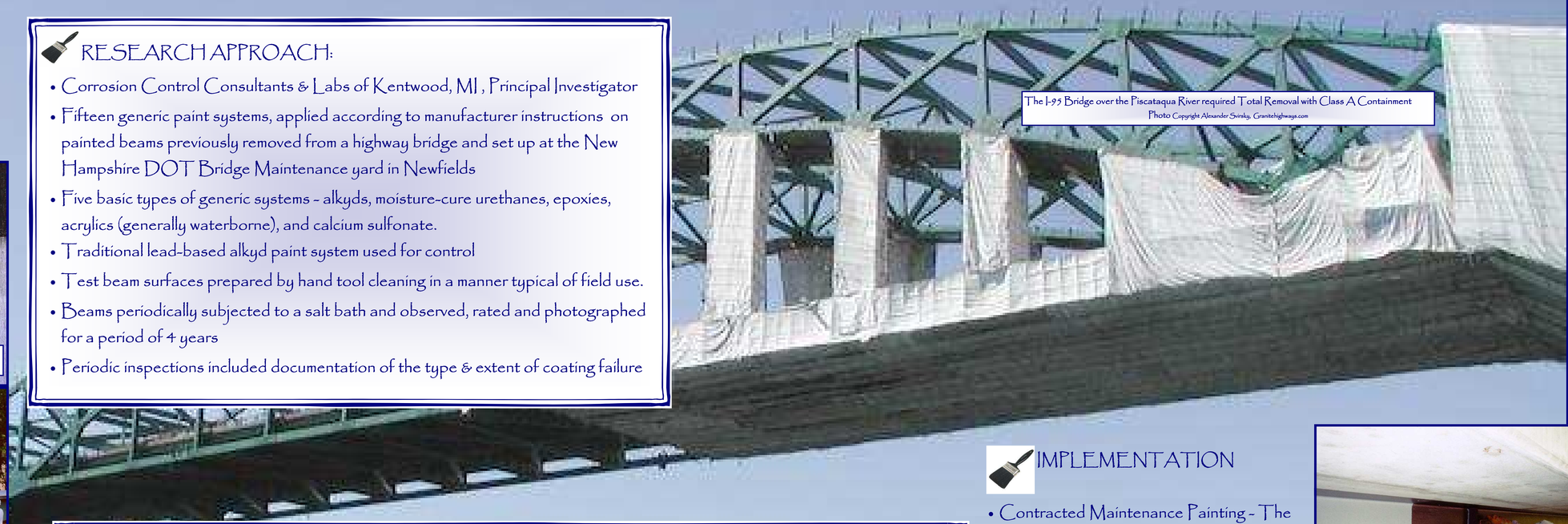
Test beams at Newfields Bridge Maintenance Yard

A six-inch wide strip was blasted along the base of each panel and allowed to rust before painting

After painting, each panel received a vertical line scribed to bare steel

RESEARCH APPROACH:

- Corrosion Control Consultants & Labs of Kentwood, MI , Principal Investigator
- Fifteen generic paint systems, applied according to manufacturer instructions on painted beams previously removed from a highway bridge and set up at the New Hampshire DOT Bridge Maintenance yard in Newfields
- Five basic types of generic systems - alkyds, moisture-cure urethanes, epoxies, acrylics (generally waterborne), and calcium sulfonate.
- Traditional lead-based alkyd paint system used for control
- Test beam surfaces prepared by hand tool cleaning in a manner typical of field use.
- Beams periodically subjected to a salt bath and observed, rated and photographed for a period of 4 years
- Periodic inspections included documentation of the type & extent of coating failure



The I-95 Bridge over the Piscataqua River required Total Removal with Class A Containment
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KEY FINDINGS:

- The soundness of the existing coating is the most important factor in the success of maintenance overcoating
- Surface preparation prior to application of a new paint system is very important
- When overcoating over hand-tool prepared surfaces, some areas will fail quite rapidly and will require repair after 2-3 years to obtain maximum effectiveness of the entire system
- The best performing overcoat system was the three-coat Moisture-Cure Urethane system
- Alkyds varied in performance when compared to the Lead-based Alkyd control, but are not recommended because of long cure times and appearance
- Epoxies tended to place sufficient stress on the existing system to cause the original primer to delaminate.
- Acrylics (generally waterborne systems) performed satisfactorily on the painted surfaces, but failed within the first two years on rusted areas
- Calcium Sulfonate remained soft and tacky for up to two years. Although the system performed well from a corrosion protection viewpoint, it became quite dirty and therefore was judged to be aesthetically unacceptable
- Measurement of dry film thickness with DFT gages is difficult and of little value on overcoating projects.

IMPLEMENTATION

- Contracted Maintenance Painting - The study provided guidance for coating selection and surface preparation which were incorporated into project designs and specifications
- Bureau of Bridge Maintenance - Using Research Implementation funds, training was provided and equipment & supplies were purchased, enabling maintenance personnel to implement many of the recommendations

Maintenance overcoat being applied to a bridge in Dover

BENEFITS:

This study provided significant benefits to NHDOT and spawned subsequent research regionally and nationwide.

- Helped to rank specific systems for Department use based on performance
- Emphasized the importance of adequate surface preparation prior to painting
- Provided a better understanding of the limitations of maintenance overcoating
- Influenced Department practices for overcoating specific NH paints (e.g. vinyls, ZHP, BLSC, etc.).
- Provided the model for the regional NEPOVERCOAT study, which in turn became the model for the national standard for evaluating overcoat systems.

New Hampshire DOT
Department of Transportation
RESEARCH

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