



A588 WEATHERING STEEL GUARDRAIL

ROUTINE MAINTENANCE TURNS UP PROBLEMS

- Advanced deterioration was discovered in weathering guardrail sections.
- Beam guardrail along the Kancamagus Highway and other locations had rusted through at the point of joint overlaps.
- Preliminary investigation showed:
 - Virtually all areas containing A588 Steel are within National Forest or other park lands
 - Significant section loss in over 60% of joints

SHOULD WE CONTINUE TO USE IT?

- The Department wanted to keep it as an option.
- So, Research looked for ways to make it last longer.

Zinc Insert — Pre Salt Fog
Zinc insert on left



Control Sample — Pre Salt Fog



WHAT WAS DONE

- A team consisting of members of NHDOT Bureaus of Highway Design, Materials & Research, and the Maintenance Districts was formed.
- An inventory and condition survey was taken.
- Other states were surveyed on their use of weathering steel.
- The position of the U.S. Forest Service was sought.

THE RESEARCH STUDY

Several material types were evaluated as corrosion protection for guardrail joints. Test sections were assembled consisting of two 14" long pieces of W-beam guardrail, bolted together to simulate a typical overlapping joint assembly. Each of the materials to be evaluated was sandwiched between the guardrail pieces of a test section. The samples were sent to an independent testing laboratory where they were placed in a Salt/Fog testing chamber for a maximum of 5,000 hours.

The thickness of the steel was measured at specified locations before and after the test period. The test section was weighted before, during and after the salt/fog test cycle.

A field test was conducted concurrently with laboratory testing. The materials to be evaluated were sandwiched into the overlapping joints of weathering steel guardrail being erected on a NHDOT construction project. Thickness measurements were made after the rail had been erected and periodically, over an extended period of time, to track the deterioration of the rail.

GENERAL CONCLUSIONS

- Weathering steel is not suited for use in corrosive environments.
- The USFS supported the move to discontinue use of A588 guardrail.

CONDITION SURVEY

- Field measurements were compared to original thickness of guardrail
- More than 10% section loss was considered a failure
- Condition of weathering steel was compared to galvanized rail of the same age.

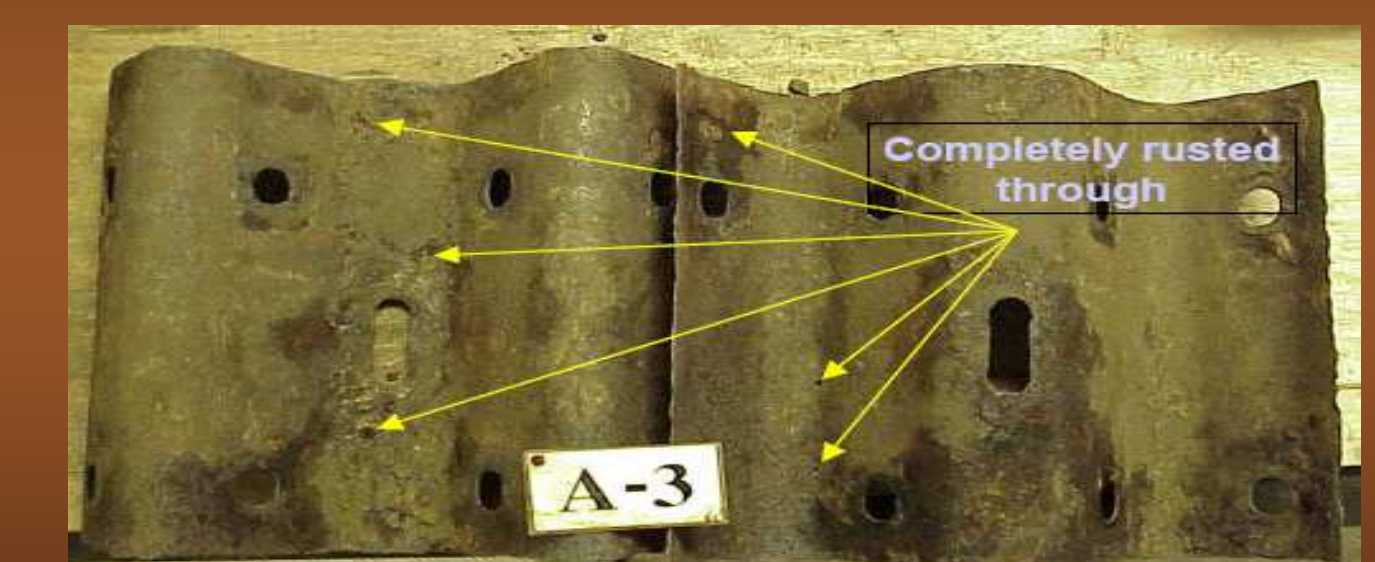
THE RESULTS?

- After 10-15 years in service
 - 25% failure at mid-span
 - 71% failure at lap connections

Zinc Insert — Post Salt Fog
Sacrificed zinc insert on left—little damage to rail
(Insides shown)



Control Sample — Post Salt Fog
Heavily rusted with thin, sharp edges



OTHER STATES WERE SURVEYED

- Do you use it? Half of 40 respondents did not.
- Have you used it in the past? Two had discontinued use due to corrosion issues.
- Those that used it, did so in limited applications.

SEVERAL PRODUCTS WERE TRIED BETWEEN THE SECTIONS

- Zinc inserts
- Corrosion inhibitor
- Fibered roof coating
- Royston Tac-tape
- Zinc-Hydrogel anode
- Mc-Miozinc paint
- Epoxy mastic coating

Zinc inserts showed the least corrosion after salt fog exposure. Preliminary estimates indicate that inserts increase guardrail construction costs by approximately 20%.

BENEFITS

- Discontinued general use of a deficient product.
- Development of an improved installation method, so the product can be used in limited applications.
- Cost savings by avoiding the need for early replacement of corroded metal.

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FOR MORE INFORMATION

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