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PROTECTIVE COATINGS FOR STRUCTURAL STEEL

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A Cooperative Project with Bridge Division

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PROTECTIVE COATINGS FOR STRUCTURAL STEEL

At the request of Mr. S. M. Cardone, a number of proprietary structural steel paint systems were laboratory-evaluated in order to obtain an indication of their service life as protective coatings on steel bridge members.[1] These proprietary paint systems were laboratory-tested in comparison with the currently specified MSHD Paint System of Number 1A Red Lead Primer and Number 5 Aluminum Paint Finish Coat.

The evaluated paint systems can be divided into two series: systems (1 through 24) which were received early enough to be evaluated in salt spray, in accelerated weathering, and in alternating salt spray and accelerated weathering tests, and also a second series consisting of systems (30 through 37) which, because they were received after the testing began, were subjected to only the alternating salt spray and accelerated weathering test.

Paint Characteristics

Some physical characteristics of the various paints, such as color, ease of brushing, drying time, weight per gallon, viscosity, and percent non-volatile, have been determined and are listed in Table 1. These values help to characterize the paints, while the percent non-volatile value, which in the tested paints varied from 11.8 to 95 percent, can also be used to approximate the square feet of coverage, at a given dry-film thickness, to be obtained from a gallon of paint. One gallon of 100 percent non-volatile paint will coat about 1600 square feet of surface at a one-mil dry-film thickness; however, coverage diminishes proportionally with a decrease in the non-volatile content of the paint.

Preparation of Test Panels

The test panels were cut from flat, 20-gage hot-rolled steel sheets. The hot-rolled grade was selected because structural steel and the bridge hand railings are of that particular type. After cleaning off the occasional rust spots, the test panels were degreased in a trichloroethylene vapor bath prior to coating. All coating systems except one, No. 18, were applied as two-coat systems. Test System No. 18 is a 3-coat system having a proprietary, penetrating, rust inhibitive initial

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[1] Paint systems are identified and coded in Table 3.

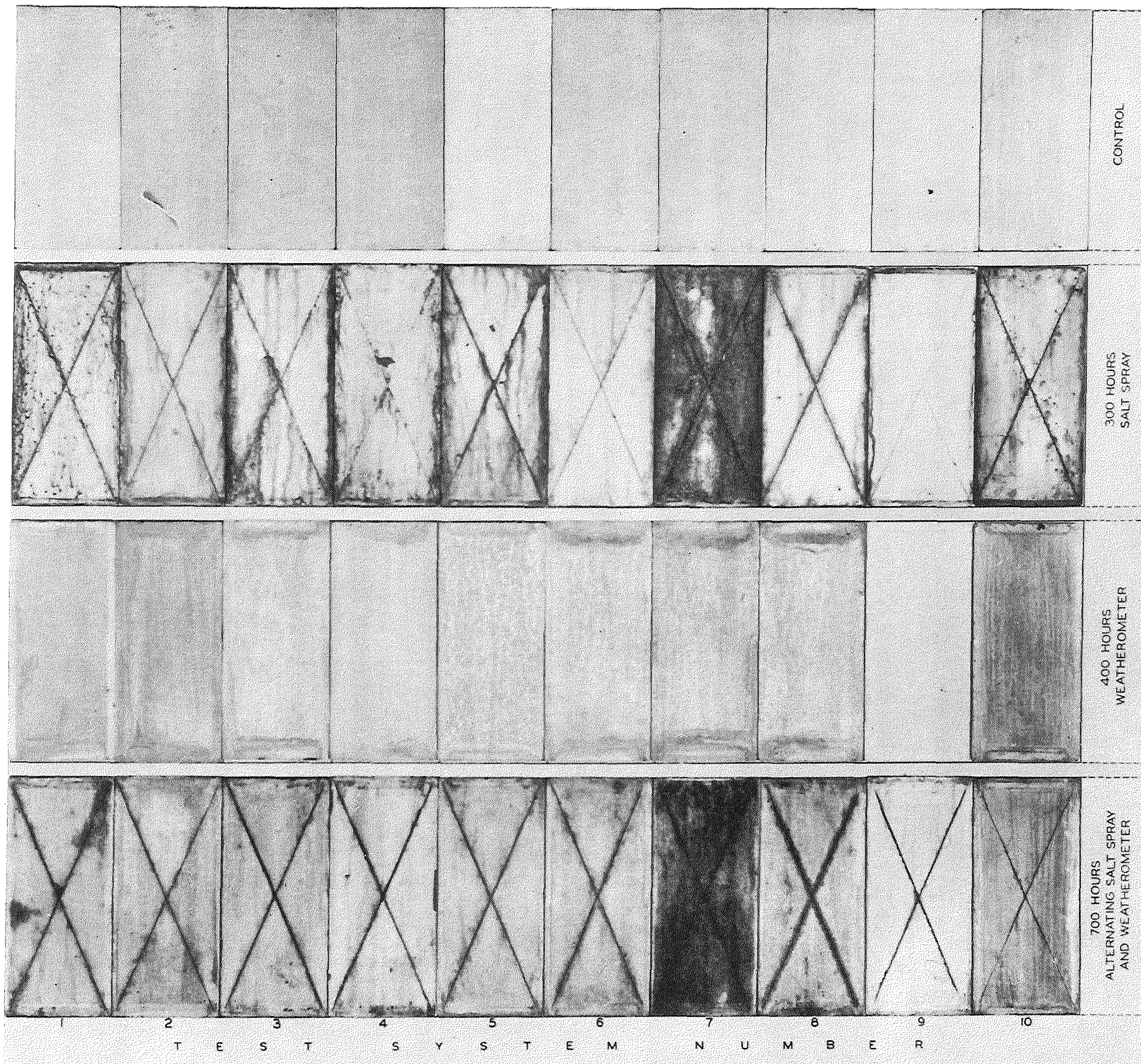


FIGURE 1A, TEST PAINT PANELS

coat under Test System No. 17. An aluminum paint was the finish coat on all paint systems except two.

All paints were applied by brushing since that is the method of paint application on the maintenance coating of bridges. The ease of brushing of each coating has been noted and is listed in Table 1. All priming coats were allowed to dry at least five days in the laboratory before application of the finish coat. The time interval between application of finish coats on February 15, 1956 (Paint Systems 1 through 24) and the insertion of the panels into the separate tests is noted in Table 1, since the amount of paint pre-aging affects its resistance to the various degrading agents. The time of the year when laboratory pre-aging occurred (February) is also significant since paint breakdown is generally accelerated during the summer months of high humidity as compared to the winter period of low indoor humidity.

Laboratory Tests

Different panels of each test system were put through the following tests:

1. Salt spray tests run in accordance with ASTM Method B 117-49T and utilizing a chamber temperature of 95° F. These test panels were pre-aged in the laboratory for 40 days before start of the test and were cross-scratched through the coating to the metal base prior to testing. The test period was 300 hours.

The ratings of the test systems (Number 1 through 24) are given in Table 2. The average thickness of the paint film on each panel is also recorded; this indicates the amount of paint that can be brushed on in two coats of that system. Another reason for noting the coating thickness was to check its effect on the performance rating of maintenance paints on outdoor steel. Photographs of the test panels are shown in Figures 1A, 1B and 1C.

2. Accelerated weathering, carbon-arc tests were run on a second series of panels, in an Atlas Twin-Arc Weather-Ometer in accordance with Method 615.2 of Federal Specifications TT-P-141a. Each machine cycle consisted of 20-minute exposure to light including one 3-minute period exposure to water wetting.

These panels were pre-aged in the laboratory for 40 days before start of the test. The test period was 400 hours. The ratings of the paint systems, (Numbers 1 through 24) in the accelerated weathering tests are also given in Table 2 as are the film thicknesses. Figures 1A, 1B and 1C show photographs of the tested panels.

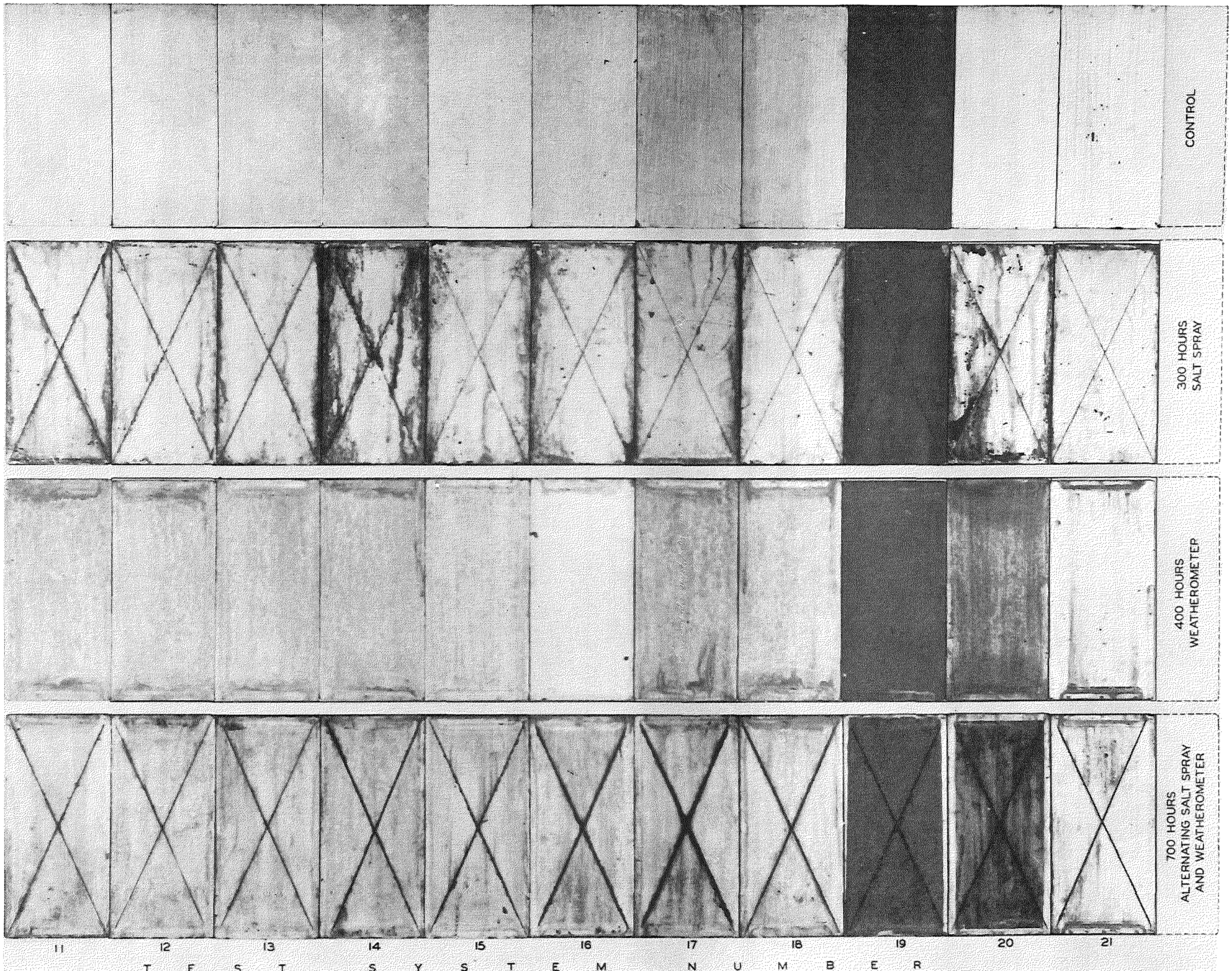


FIGURE 1B TEST PAINT PANELS

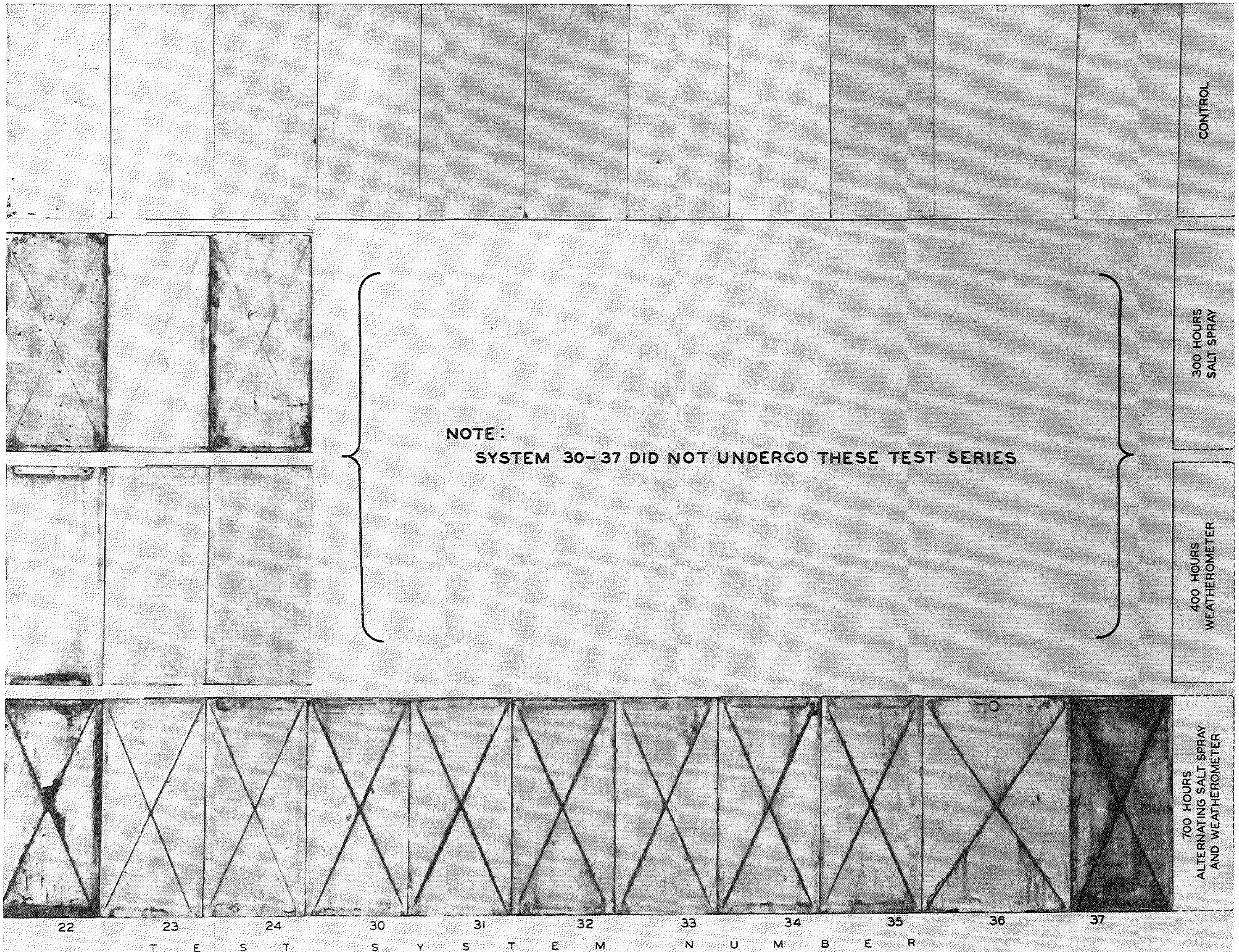


FIGURE 1C TEST PAINT PANELS

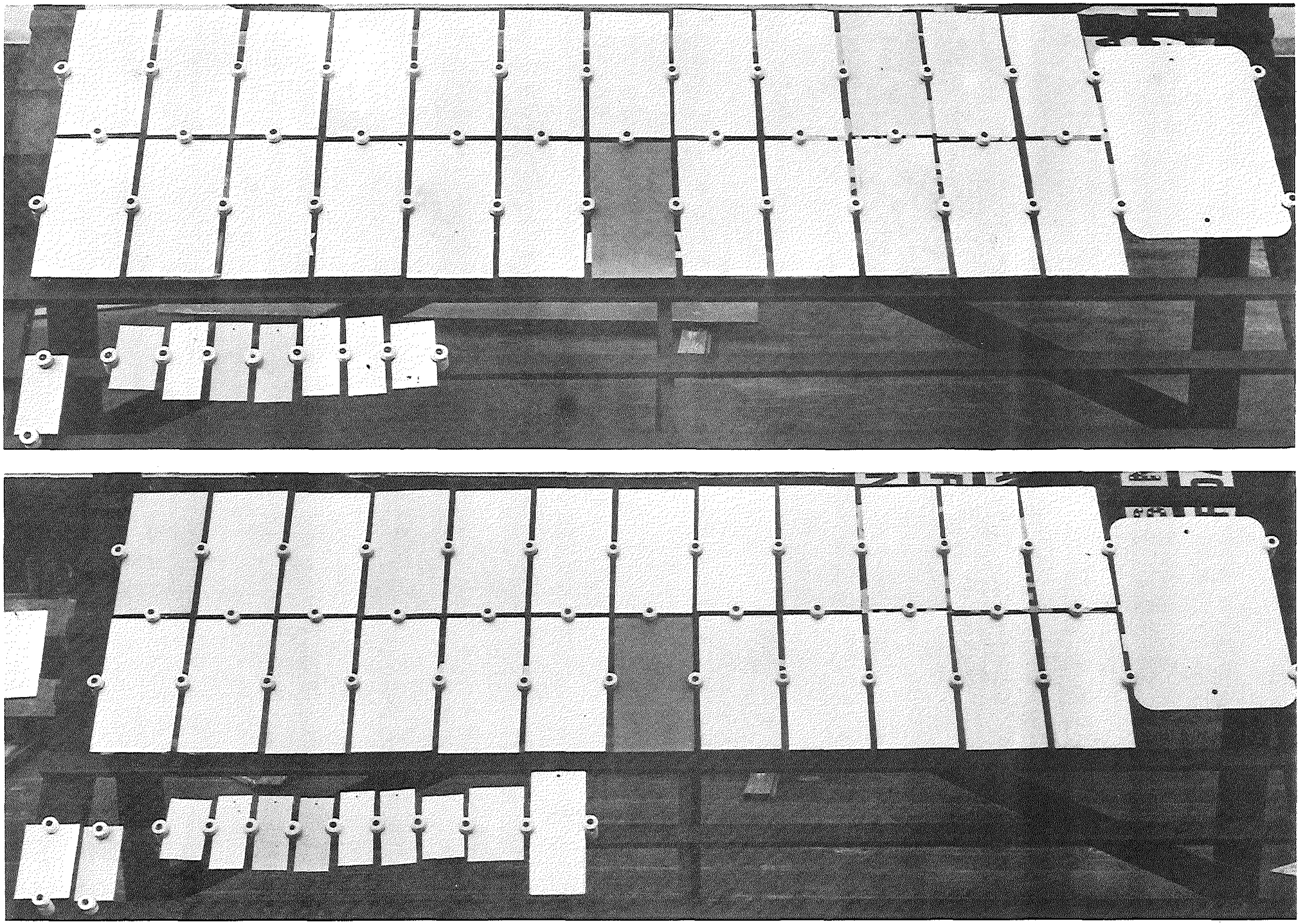


FIGURE 2. (TOP) WEATHER RESISTANCE EXPOSURES. INITIAL CONDITION, MARCH 27, 1956.
(BOTTOM) WEATHER RESISTANCE EXPOSURES. DETERIORATION, SEPTEMBER 1, 1956

3. Alternating accelerated weathering and salt spray tests were run on a third set of test panels which were pre-aged in the laboratory for 70 days (Systems 1 through 24) before insertion into the test chambers. The test panels were cross-scratched through the coating to the metal base prior to testing. The salt spray and accelerated weathering cycles were run as outlined above in paragraphs 1 and 2 respectively. The cycling of the test panels from one test to another was performed on the following schedule:

a) 100 hours of Weather-Ometer exposure.
b) 25 hours of salt spray exposure.
c) 50 hours of Weather-Ometer exposure.
d to q) Repeat cycles b) and c), respectively.

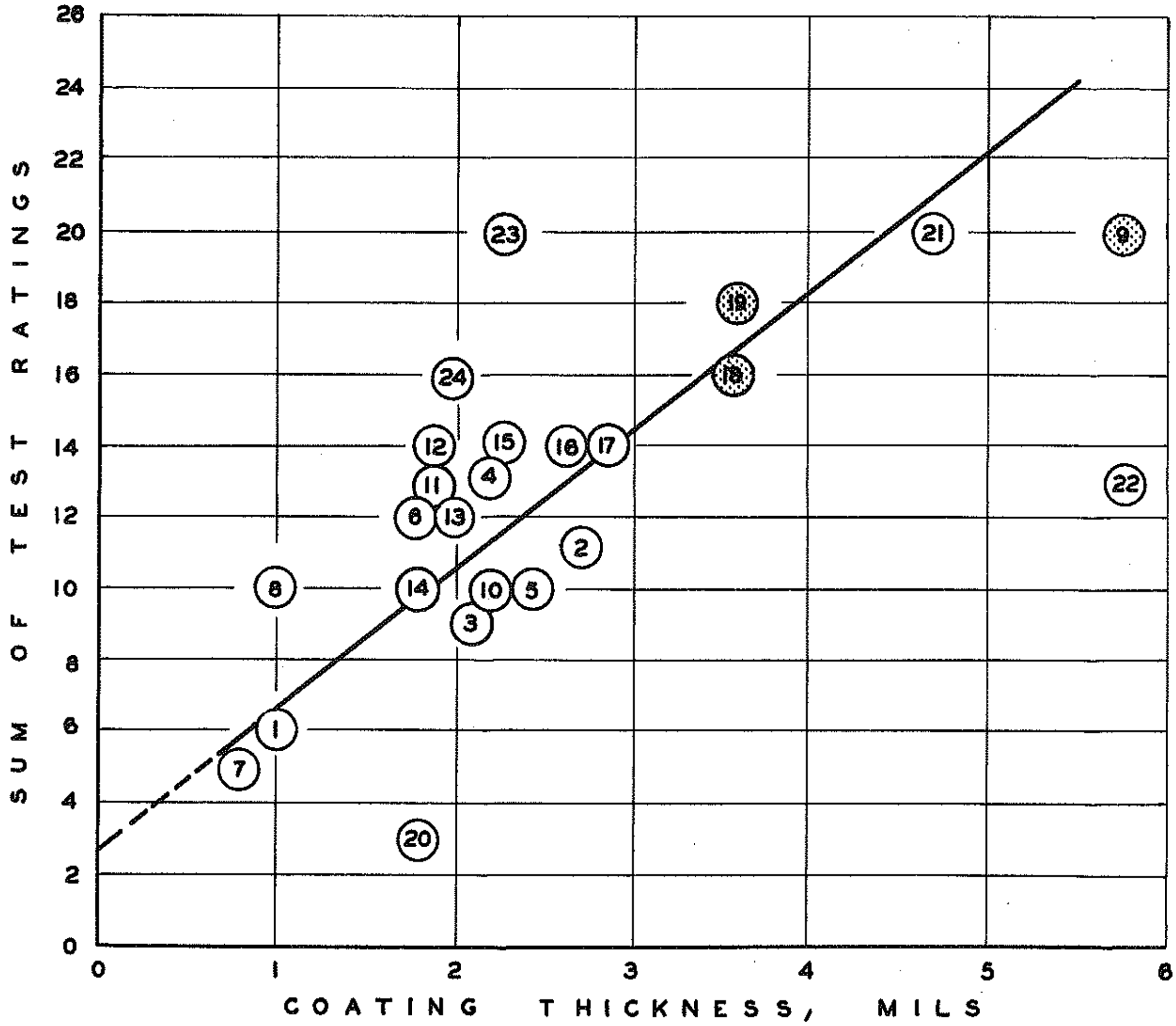
The entire test included a total of 500 hours of Weather-Ometer exposure and 200 hours of salt spray exposure. The ratings of the paint systems to the alternating accelerated weathering and salt spray tests are listed in Table 2. Photographs of the tested panels are shown in Figures 1A, 1B and 1C.

4. Weather resistance of the paint systems is being determined by a fourth set of panels, according to Method 616.1 of Federal Specifications TT-P-141b. The exposure-rack face containing the test panels is set at an angle of 45° from the vertical, facing south, on the roof of Olds Hall at the Research Laboratory. The test panels were set outdoors on March 19, 1956, after a laboratory pre-aging interval of 33 days. Figure 2 shows the initial appearance of the test systems. Future examinations and a report on these exposures will be made.

Experimental Correlation

In Figure 3 the average coating thickness of the three different test panels for each test system is cross-plotted against the sum of the three test ratings (data presented in the last two columns of Table 2). The individual paint systems are identified on the figure. On Figure 3 the best straight line representing the data is also shown; it correlates the dependence of Performance Rating on Thickness of a paint coating upon a steel base with the assumption that the relationship is of the straight line type. The equation of the line is: Rating = 3.9 (coating thickness) + 2.6. This means that a paint conforming to the correlation increases its Rating Value by 3.9 points for each one-mil increase in thickness.

The correlation of the test data with a straight line is not completely satisfactory. However, when one realizes that the test paint systems represent the gamut



GRAPH COVERS TEST SYSTEMS 1 TO 24

(1) NUMBER INDICATES TEST SYSTEM

(9) SYSTEM DEVIATES IN NUMBER OF COATS OR COLOR

FIGURE 3. PLOT OF SUM OF TEST RATINGS VS COATING THICKNESS

of possible maintenance coatings including vinyls[1], oil-based paints, epoxies, polyesters, and alkyd-based paints, together with a variety of corrosion-inhibitive pigmentations, then the rather loose correlation is understandable. Concurrently, publications[2] keep emphasizing the dependence of coating service life, or rating, upon film thickness in the maintenance painting of steel, although the curve representing such correlations is not a straight line at either extremity of the coating thickness range. The producers of the tested paint systems are listed in Table 3.

Conclusions

This report covers a study made on a variety of paint systems brushed on hot-rolled steel in two coats in accordance with the Department's practice in the maintenance painting of steel bridge members.

An extensive laboratory evaluation of twenty-four paint systems recommended for the coating of steel, including the presently specified MSHD No. 1A Red Lead Primer and No. 5 Aluminum Finish Coat System, gives the following conclusions:

1. The MSHD No. 1A Red Lead Primer and No. 5 Aluminum Finish Coat System forms a very good paint coating on steel. Under the conditions of the laboratory tests, better performance ratings were found for only three other systems out of twenty-one comparable two-coat systems containing an aluminum paint finish coat. These three superior performing systems merit field evaluation by the Bridge Division:

   a) Test System 21 which utilizes a black primer based on a tar pitch base; the primer brushed on to form a thicker film. The aluminum paint was premixed or one package.

   b) Test System 23 which utilizes a black primer based on a linseed oil-alkyd vehicle and a newly developed ion absorber additive to inhibit base metal corrosion.

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[1] System No. 1, a vinyl coating, has previously been covered by Research Laboratory, Testing and Research Division Report No. 250.

[2] Pierce, R. R., "Key to Savings in Painting Costs", Chemical Engineering, pp. 149-153, May 1952.

c) Test System 24 which utilizes a brown primer containing multipigments, including red lead, plus an oleoresinous vehicle.

2. Two-coat paint systems which yield the greater film thickness also produce the better performance ratings.

3. Addition of a third coat as a primer to the two-coat system consisting of MSHD No. 1A Red Lead and No. 5 Aluminum Finish Coat did increase the performance rating as well as the system coating thickness.

4. Substitution of a more highly pigmented paint for the MSHD No. 5 Aluminum Paint Finish Coat did increase the coating thickness and performance rating of a system employing a MSHD No. 1A Red Lead Primer.

Since these tests affirm the high protective value of MSHD No. 1A Red Lead as a primer on steel, a study should be made to change that specification so as to remove some of the objections to its use, such as poor package stability, hard pigment settling, and long drying time.

A less extensive laboratory evaluation was made on eight other paint systems since they were received after the initial tests were in progress. All of these systems merited the evaluation because they embody some of the latest developments in coatings technology. These include an aluminum paste containing a rust inhibiting pigment, and a hard scratch resistant eposy-amine coating. The paints rated well on the basis of the test and merit further study and observation, notably as specialized coatings for bridge railings.

Recommendations

From the results of the laboratory tests reported here, as summarized in Table 2 and Figure 3, the following can be concluded:

1. The presently specified MSHD Red Lead-Aluminum Finish Coat, Test System No. 17, is a good paint system on steel. Figure 3 discloses that this system's rating falls on the straight line correlation at a coating thickness of 2.8 mils, and that among the tested systems there are fewer superior ratings than inferior ones. In observing Figure 3 it should be noted that Systems 15 and 16 are also red lead primed systems, but substitute a proprietary, aluminum paint finish coat for No. 5 Aluminum Paint.

2. Figure 3 shows that the rating of a red lead primed system can be improved by additional coating thickness, System 18 versus System 17, and also by substituting MSHD No. 4A Green Finish Coat for No. 5 Aluminum Paint, System 19 versus System 17.

3. Figure 3 shows that of the aluminum paint coated systems, Test Systems 21 and 23 are notably superior by laboratory evaluation. It is recommended that those systems and System 24 be field evaluated against the presently specified MSHD No. 1A Red Lead and No. 5 Aluminum Finish Coat System.

4. Figure 3 shows that the white Test System No. 9 has a superior rating by laboratory evaluation. It is recommended that this system be considered for field evaluation providing it can be obtained in an aluminum pigmented finish coat. The finish coat (two package) is based on a polyester resin which sets up into a very scratch resistant film, especially desirable for bridge railings.

5. From the alternating salt spray and accelerated weathering test Table 2 shows that a better performance rating is obtained when the higher pigment content, inhibitive aluminum paste in Systems 30 and 31 is substituted for the MSHD No. 5A Aluminum Paste, System 17, in the finish coats over red lead primed steel. Therefore it is recommended that this inhibitive aluminum paste be field evaluated in comparison with MSHD No. 5A aluminum paste in No. 5 Aluminum Paint.

6. From the alternating salt spray and accelerated weathering test, Table 2 shows that a zinc dust primer paint meeting Federal Specification TT-P-641b requirements, as represented by Test Systems 34 and 35, is slightly superior to the standard MSHD Test System No. 17 having a red lead primer. Therefore it is recommended that this two package, faster drying, zinc dust primer be considered for field evaluation in comparison with MSHD No. 1A Red Lead Primer.

7. Table 2 shows that Test System No. 36 is equivalent to the MSHD red lead-aluminum paint system, Test No. 17, in the alternating salt spray and Weather-Ometer test. It is believed that white Test System No. 36, a very hard coating, when formulated to contain aluminum and rust inhibiting pigments would be a superior coating on bridge railings where abrasion or scratch resistance is a requirement. A similar type of epoxy coating is providing durable protection in industrial use and also in traffic paints.

TABLE 1

PHYSICAL CHARACTERISTICS OF TEST PAINTS

Test Paint	Color	Brush-ability	Drying Time, hr.	Wt/Gal, lb.	Viscosity KU	Paint N-V Wt. %	Components
1 Primer	Grey	fair	1	8.07	61	27.6	1
Finish	Aluminum	fair	1	7.64	78	22.7	1
2 Primer	Yellow	good	8	10.20	81	61.9	1
Finish	Aluminum	fair	1	7.62	54	44.2	1
3 Primer	Orange	good	18	10.99	73	76.2	1
Finish	Aluminum	good	4	7.86	57	55.4	2*
4 Primer	Yellow	poor	1	11.29	65	65.8	1
Finish	Aluminum	good	2	8.26	54	60.3	1
5 Primer	Red	fair	1	12.11	89	71.5	1
Finish	Aluminum	good	2	7.80	54	48.9	1
6 Primer	Yellow	poor	1	7.84	90	27.4	1
Finish	Aluminum	good	4	7.86	57	55.4	2*
7 Primer	Clear	good	1	7.04	49	11.8	1
Finish	Aluminum	good	4	7.86	57	55.4	2*
8 Primer	Yellow	poor	1	7.39	56	16.0	1
Finish	Aluminum	good	4	7.86	57	55.4	2*
9 Primer	White	good	2	12.29	61	67.6	1
Finish	White	fair	18	10.31	100	71.1	2
10 Primer	Orange	fair	15	$\frac{3}{1}$ 9.79 9.04	92	62.3 75.7	2
Finish	Aluminum	good	2	$\frac{1}{1}$ 7.42 8.96		35.7 46.8	2
11 Primer	Brown	fair	3	12.89	94	70.5	1
Finish	Aluminum	good	4	7.86	57	55.4	2*
12 Primer	Brown	fair	3	12.91	94	68.5	1
Finish	Aluminum	good	4	7.86	57	55.4	2*

*MSHD Specification

TABLE 1 (Continued)

Test Paint		Color	Brush-ability	Drying Time, hr.	Wt/Gal, lb.	Viscosity KU	Paint N-V Wt. %	Components
13	Primer	Brown	good	8	14.11	76	80.2	1
	Finish	Aluminum	good	4	7.86	57	55.4	2*
14	Primer	Yellow	fair	4	9.50	78	54.5	1*
	Finish	Aluminum	good	4	7.86	57	55.4	2*
15	Primer	Red	good	24	24.0	102	95.0	1*
	Finish	Aluminum	good	2	8.80	59	53.3	1
16	Primer	Red	good	24	24.0	102	95.0	1*
	Finish	Aluminum	good	2	8.04	55	60.6	1
17	Primer	Red	good	24	24.0	102	95.0	1*
	Finish	Aluminum	good	4	7.86	57	55.4	2*
18	Precoat	Lt. Brown	good	24	7.84	40	49.0	1
	Primer	Red	good	24	24.0	102	95.0	1*
	Finish	Aluminum	good	4	7.86	57	55.4	2*
19	Primer	Red	good	24	24.0	102	95.0	1*
	Finish	Green	good	10	12.32	100	74.3	1
20	Primer	Brown	good	30	13.52	71	84.2	1
	Finish	Aluminum	good	4	7.75	55	46.9	1
21	Primer	Black	fair	10	12.63	121	82.0	1
	Finish	Aluminum	good	8	8.00	56	52.8	1
22	Primer	Black	very poor	10	12.65	very high	80.8	1
	Finish	Aluminum	good	72**	8.00	56	52.8	1
23	Primer	Black	good	24	11.79	76	91.8	1
	Finish	Aluminum	good	8	7.95	54	49.2	2

*MSHD Specification

**This finish coat dries satisfactorily, but not on this particular primer; same manufacturer made both paints.

TABLE 1 (Concluded)

Test Paint	Color	Brush-ability	Drying Time, hr.	Wt/Gal, lb.	Viscosity KU	Paint N-V Wt. %	Components
24 Primer	Brown	good	10	13.75	71	84.1	1
Finish	Aluminum	good	8	7.95	54	49.2	2
30 Primer	Red	good	24	24.0	102	95.0	1*
Finish	Aluminum	good	4	8.35	59	56.6	2
31 Primer	Red	good	24	24.0	102	95.0	1*
Finish	Aluminum	good	8	8.76	60	54.7	2
32 Primer	Aluminum	good	4	8.35	59	56.6	2
Finish	Aluminum	good	4	8.35	59	56.6	2
33 Primer	Aluminum	good	8	8.76	60	54.7	2
Finish	Aluminum	good	8	8.76	60	54.7	2
34 Primer	Grey	good	6	16.0	69	71.7	2
Finish	Aluminum	good	4	8.35	59	56.6	2
35 Primer	Grey	good	6	16.0	69	71.7	2
Finish	Aluminum	good	8	8.76	60	54.7	2
36 Precoated	White						
37 Precoated	Aluminum						

*MSHD Specification

TABLE 2

TEST RESULT RATINGS

Test System	300 hr. Salt Spray		400 hr. Weatherometer		700 hr. Salt Spray & Weatherometer		Average Thickness Mils	Summation of Ratings
	Thickness, Mils	Rating[1]	Thickness, Mils	Rating[1]	Thickness, Mils	Rating[1]		
1	1.1	2	1.0	2	1.0	2	1.0	6
2	3.3	4	2.5	4	2.4	3	2.7	11
3	2.3	1	2.2	5	1.8	3	2.1	9
4	2.5	3	2.0	7	2.0	3	2.2	13
5	2.5	2	2.4	5	2.3	3	2.4	10
6	1.8	4	1.8	5	1.8	3	1.8	12
7	1.0	0	0.8	5	0.7	0	0.8	5
8	1.1	3	1.0	5	1.0	2	1.0	10
9[a]	6.0	8	6.0	8	5.4	4	5.8	20
10	2.5	2	2.3	4	2.0	4	2.3	10
11	2.0	4	1.9	5	1.8	4	1.9	13
12	2.0	4	1.8	5	1.8	5	1.9	14
13	2.0	3	2.0	5	1.8	4	1.9	12
14	1.8	1	1.8	5	1.8	4	1.8	10
15	2.5	5	2.5	5	2.0	4	2.3	14
16	2.8	5	2.8	5	2.5	4	2.7	14
17	2.8	7	2.8	3	2.8	4	2.8	14
18[b]	3.8	7	3.8	4	3.2	5	3.6	16
19[a]	4.0	7	3.5	7	3.2	4	3.6	18
20	1.8	1	1.8	1	1.8	1	1.8	3
21	5.0	7	4.5	6	4.5	7	4.7	20
22	6.0	8	6.0	4	5.5	1	5.8	13
23	2.5	8	2.5	6	2.0	6	2.3	20
24	2.0	5	2.0	6	2.0	5	2.0	16
30					3.0	5		
31					3.0	5		
32					2.3	4		
33					2.3	4		
34					2.5	5		
35					2.5	5		
36					3.5	4		
37					8.0	4		

[1] ASTM Designation D 610-43 Rating System in which
10 designates no failure, and
0 designates complete failure.

[a] Other than Aluminum Finish Coat.

[b] Three Coat-System.

TABLE 3

PAINT SYSTEM IDENTIFICATION

1.	55 MR-78	Vinylon No. 100 Metal Under-primer.
	55 MR-79	Vinylon No. 100 Aluminum Paint (Ready-mixed).
		From Surface Coating Engineers, Kalamazoo, Mich.
2.	55 PR-112	Speed Rex Metal Primer, Yellow.
	55 PR-113	Speed Rex Aluminum (Ready-mixed).
		From Truscon Laboratories, Detroit, Mich.
3.	55 PR-123	Bar-Ox Kromokote Primer, Orange 57.
		From Truscon Laboratories, Detroit, Mich.
	55 PR-124	MSHD No. 5 Aluminum Paint.
4.	55 PR-114	United Zinc Chromate Rust Inhibitive Primer, X-200.
	55 PR-120	United Rust Inhibitive Ionoklad No. 81 Aluminum Paint.
		From Sherwood Products Co., Lansing, Mich.
5.	55 PR-119	United Red Chromate Primer X-200-2.
	55 PR-121	Titelox - 3% Silicone Aluminum
		Sherwood Products Co., Lansing, Mich.
6.	56 PR-1	Stantite Spraying Primer, 66 R-3157A.
		From Stanley Chemical Co., East Berlin, Conn.
	55 PR-124	MSHD No. 5 Aluminum Paint.
7.	56 PR-2	Clear Stantite Primer, 45X-152.
		From Stanley Chemical Co., East Berlin, Conn.
	55 PR-124	MSHD No. 5 Aluminum Paint.

TABLE 3 (Continued)

8.	56 PR-3	Wash Primer, One Package, 40X-610.
		From Stanley Chemical Co., East Berlin, Conn.
	55 PR-124	MSHD No. 5 Aluminum Paint.
9.	55 PR-100A	EV-R Shield Glascote Metal Primer.
	55 PR-100B	EV-R Shield Glascote White Surfacer.
		From EV-R Shield Products Co., Joppa, Maryland.
10.	56 PR-9(A+B)	Monoseal Orange Primer, Two Package.
	56 PR-10(A+B)	Monoseal Aluminum Paint, Two Package.
		From Monoseal Corporation, Salem, Mass.
11.	56 PR-5	Epoxy Primer, MSHD Research Lab. Formulation.
	55 PR-124	MSHD No. 5 Aluminum Paint.
12.	56 PR-6	Alkyd-Parlon Primer, MSHD Research Lab. Formulation
	55 PR-124	MSHD No. 5 Aluminum Paint.
13.	56 PR-7	Alkyd-Linseed Oil Primer, MSHD Research Lab. Formulation
	55 PR-124	MSHD No. 5 Aluminum Paint.
14.	46 B-348	MSHD No. 28 Zinc Chromate Primer.
	55 PR-124	MSHD No. 5 Aluminum Paint.
15.	46 B-2770	MSHD No. 1A Red Lead Primer.
	55 PR-98	Silocone Aluminum Paint, XP-389 (Ready-mixed).
		From Dow Corning Corporation, Midland, Mich.
16.	46 B-2770	MSHD No. 1A Red Lead Primer.
	55 PR-79	Rust-Cure Anti-Rust Aluminum Paint (Ready-mixed).
		From Monroe Co., Inc. Cleveland, Ohio.
17.	46 B-2770	MSHD No. 1A Red Lead Primer.
	55 PR-124	MSHD No. 5 Aluminum Paint.

TABLE 3 (Continued)

18.	50 MR-100	Bar-Ox Formula No. 97.
		From Truscon Laboratories, Detroit, Mich.
	46 B-2770	MSHD No. 1A Red Lead Primer.
	55 PR-124	MSHD No. 5 Aluminum Paint.
19.	46 B-2770	MSHD No. 1A Red Lead, Primer.
	56 PR-8	MSHD No. 4A Green, Laboratory, Modification.
20.	56 PR-11	Degraco Prime-Rite Primer No. 501.
	56 PR-12	Syn-Gard Aluminum Paint No. 601 (Ready-mixed).
		From Detroit Graphite Co., Detroit, Mich.
21.	56 PR-22	Bitumastic Super Service Black Primer.
	56 PR-23	Bitugloss Aluminum Paint (Ready-mixed).
		From Koppers Co., Pittsburgh, Pennsylvania.
22.	56 PR-21	Bitumastic Black Primer No. 50.
	56 PR-23	Bitugloss Aluminum Paint (Ready-mixed).
		From Koppers Co., Pittsburgh, Pennsylvania.
23.	56 PR-40	Black Antoxide Primer No. 789.
	56 PR-42	Dulux Aluminum Paint, (2 package).
		From DuPont Co., Inc., Wilmington, Delaware.
24.	56 PR-41	Metal Primer No. 785.
	56 PR-42	Dulux Aluminum Paint, (2 package).
		From DuPont Co., Inc., Wilmington, Delaware.
30.	46 B-2770	MSHD No. 1A Red Lead Primer.
	56 PR-81	Inhibitive Aluminum Paste (2.5 lbs/gal) of MSHD No. 16 Varnish.
		Aluminum Paste No. 7-392, from Reynolds Co., Richmond, Va.
31.	46 B-2770	MSHD No. 1A Red Lead Primer.
	56 PR-81	Inhibitive Aluminum Paste (2.5 lbs/gal) of MSHD No. AV-2 Vehicle.
		Aluminum Paste No. 7-392, from Reynolds Co., Richmond, Va.

TABLE 3 (Continued)

32.	56 PR-81 56 PR-81	Inhibitive Aluminum Paste (2.5 lbs/gal) of MSHD No. 16 Varnish. Inhibitive Aluminum Paste (2.5 lbs/gal) of MSHD No. 16 Varnish.
		Aluminum Paste No. 7-392, from Reynolds Co., Richmond, Va.
33.	56 PR-81 56 PR-81	Inhibitive Aluminum Paste (2.5 lbs/gal) of MSHD No. AV-2 Vehicle. Inhibitive Aluminum Paste (2.5 lbs/gal) of MSHD No. AV-2 Vehicle.
		Aluminum Paste No. 7-392, from Reynolds Co., Richmond, Va.
34.	56 PR-79	Zinc Dust Primer.
		From Pittsburgh Plate Glass Co., Pittsburgh, Pennsylvania.
	56 PR-81	Inhibitive Aluminum Paste (2.5 lbs/gal) of MSHD No. 16 Varnish.
		Aluminum Paste No. 7-392, from Reynolds Co., Richmond, Va.
35.	56 PR-79	Zinc Dust Primer.
		From Pittsburgh Plate Glass Co., Pittsburgh, Pennsylvania.
	56 PR-81	Inhibitive Aluminum Paste (2.5 lbs/gal) of MSHD No. AV-2 Vehicle.
		Aluminum Paste No. 7-392, from Reynolds Co., Richmond, Va.
36.	56 PR-80	White Epoxy-Amine mono-coating system.
		Precoated by Kish Industries, Lansing, Mich. (Truscon Resins).
37.	56 PR-85	United Inhibitive Primer, X 200-4. Special Aluminum Paint.
		Precoated by Sherwood Products, Co., Lansing, Mich.