

WEST COAST COATING CONSULTANTS

INDUSTRIAL, MARINE
COATING INSPECTION
FAILURE ANALYSIS, COATING SURVEYS

PHONE: 415-244-6429
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June 19, 2013
Via email: bquesnel@ltol.com

Mr. Bill Quesnel
Acumen Engineering
10775 Pioneer Trail
Suite 214
Truckee, CA 96161

Subject: Budgetary Cost Estimates for Painting Work at Truckee Airport

Dear Bill:

As you requested, West Coast Coating Consultants (WCCC) prepared the following cost estimates for the various coating activities that were recommended in the May 2, 2013 report. The estimates include costs for labor, equipment and materials.

Over Coating Factory Finished Siding and Aluminum Doors	\$3.00 to \$4.00/ft ²
Over Coating Previously Painted (Good Condition) Wood	\$2.50 to \$3.20/ft ²
Spot Repair and Over Coating Steel and Galvanized Steel Surfaces	\$4.00 to \$5.00/ft ²
Spot Repair and Over Coating Concrete	\$2.50 to \$3.00/ft ²
Priming and Finish Coating New Wood	\$3.50 to \$4.00/ft ²
Removal and Replacement of Existing Coatings on Steel	\$5.00 to \$6.00/ft ²

Should you have any questions, please do not hesitate to call me at 415-244-6429 or via email at coatingconsultants@yahoo.com.

Sincerely,

Greg Whiting

Greg Whiting

Facility Number	Facility Name	Component	Visual Description	Adhesion	Dry Film Thickness Spot Reading (mils)	Chalk Assessment
1	Care Flight Offices	T-111 Siding, Rough Hewn Trim, Wood Decking and Railing	Siding beginning to splinter at base. Railing is Heavily Cracked. Other Wood in Good Condition.	Two Tests: 10	Not Performed	Better than 8
2	Accounting Modular	Not Performed	Not Performed	Not Performed	Not Performed	Not Performed
3	Maintenance Facility and Adjacent Sheds	Siding - Original Paint	No Failures	One Test: 10	Not Performed	Better than 8
		Roll-up Doors	Glossy Factory Finish - No Failures	Not Performed	Not Performed	Better than 8
		Personnel Doors	Pinpoint Rust	One Test: 10	Not Performed	2
4	Hangar 2	Aluminum Siding	No Failures	Not Performed	Not Performed	Better than 8
		Raised Seam Roofing	No Failures or Rust	Not Performed	Not Performed	Not Performed
		Steel Doors	No Failures	One Test: 10	Not Performed	Better than 8
		Wood Stairway, Porch and Support Posts	Good Condition except Stringers - Cracked	Not Performed	Not Performed	Better than 8
5	Hangar 1	Aluminum Siding and Trim	Repainted Several Times - Failures on North façade	Two Tests: 10 Two Tests: 0	3.7 to 4.3	4
		Raised Seam Roofing	No Failures or Rust	Not Performed	Not Performed	Not Performed
		Steel Doors	No Failures	Not Performed	Not Performed	4
		Wood Porch and Support Posts	Good Condition Except Rafter Tails and Plywood - Cracked	Two Tests: 10 Two Tests: 0	Not Performed	Not Performed
6	Garage	Siding and Doors	Factory Finish. Minor Rust on Danged Siding	Two Tests: 10	Not Performed	Better than 8
7	Warehouse	Siding - Original Paint	No Failures	One Test: 10	Not Performed	Better than 8
		Unpainted Steel Garage Door Frames	Tightly Adherent Rust	Not Performed	Not Performed	Not Performed
		Siding on End of Building - Repainted	Minor Rust	Two Tests: 10	3.2 to 3.9	Better than 8
		Doors and Frames	Major Rusting	One Test: 10	3.0 to 3.5	4
8	Hangar A	Siding - Original Paint	No Failures. Rust on Edges	Two Tests: 10	1.7 to 2.2	Better than 8
		Textured Aluminum Doors	No Failures: Glossy Factory Finish	Two Tests: 10	1.2 to 1.4	Better than 8
		Wood Wainscot	Oxidized. Mild Cracking	Not Performed	Not Performed	Not Performed
9	Hangar B	Siding - Original Paint	No Failures. Significant Wear on East Side	Two Tests: 10	1.45	Better than 8
		Textured Aluminum Doors	No Failures: Glossy Factory Finish	Two Tests: 10	Not Performed	Better than 8
		Wood Wainscot	Oxidized. Mild Cracking	Not Performed	Not Performed	Not Performed
10	Hangar C	Siding - Repainted	No Failures	Two Tests: 10	2.0 to 3.4	Better than 8

Facility Number	Facility Name	Component	Visual Description	Adhesion	Dry Film Thickness Spot Reading (mils)	Chalk Assessment
		Aluminum Doors - Repainted	No Failures	Two Tests: 10	Not Performed	4
11	Hangar D	Siding - Repainted	No Failures	Four Tests: 0	5.0 to 5.4	4
		Aluminum Doors - Repainted	No Failures	Two Tests: 0	5.2 to 5.6	4
12	Hangar E	Siding - Repainted	No Failures	Three Tests: 10	3.0 to 3.6	Better than 8
		Aluminum Doors - Repainted	No Failures	Two Tests: 10	Not Performed	Better than 8
		Wood Wainscot	Oxidized. Mild Cracking	Not Performed	Not Performed	Not Performed
13	Hangar F	Siding - Original Paint	No Failures	One Test: 10	1.05 to 1.85	Better than 8
		Textured Aluminum Doors	No Failures: Glossy Factory Finish	One Test: 10	1.2 to 1.4	Better than 8
		Repainted Doors	No Failures	Two Tests: 0	4.8 to 5.2	8
		Unpainted Plywood	Raised Grain and Cracked	Not Performed	Not Performed	Not Performed
14	Hangar G	Siding - Original Paint	No Failures	One Test: 10	1.05 to 1.85	Better than 8
		Textured Aluminum Doors	No Failures: Glossy Factory Finish	One Test: 10	1.2 to 1.4	Better than 8
		Repainted Doors	No Failures	Two Tests: 0	4.8 to 5.2	4
		Unpainted Plywood	Raised Grain and Cracked	Not Performed	Not Performed	Not Performed
15	Hangar H	Siding - Original Paint	No Failures	One Test: 10	1.05 to 1.85	Better than 8
		Textured Aluminum Doors	No Failures: Glossy Factory Finish	One Test: 10	1.2 to 1.4	Better than 8
		Repainted Doors	No Failures	Two Tests: 0	4.8 to 5.2	4
		Unpainted Plywood	Raised Grain and Cracked	Not Performed	Not Performed	Not Performed
16	Hangar J	Siding - Repainted 5 years ago.	No Failures	Two Tests: 10	5.0 to 6.5	6
		Galvanized Doors	Coating Delaminations	One Test: 0	Not Performed	2
		Wood Frames and Doors	Heavily Split and Cracked	Not Performed	Not Performed	Not Performed
17	Hangar K	Siding - Original Paint	No Failures	One Test: 10	1.15 to 1.45	Better than 8
		Textured Aluminum Doors	No Failures. Tight and glossy paint	One Test: 10	Not Performed	Better than 8
		Galvanized Trim	Mild Rust	One Test: 10	Not Performed	Better than 8
		Fiberglass	Inaccessible			
18	Hangar L	Siding - Original Paint	No Failures	Two Tests: 10	Not Performed	Better than 8
		Textured Aluminum Doors	No Failures. Tight and glossy paint	Two Tests: 10	Not Performed	Better than 8
19	Hangar M	Siding - Original Paint	No Failures	Not Performed	0.9 to 1.0	Better than 8

Facility Number	Facility Name	Component	Visual Description	Adhesion	Dry Film Thickness Spot Reading (mils)	Chalk Assessment
		Three Repainted Doors	No Failures	Two Tests: 10	Not Performed	2
		Textured Aluminum Doors	No Failures	Two Tests: 10	Not Performed	Better than 8
20	Phoenix Hangar	Siding - Original Paint	No Failures	Not Performed	2.1 to 2.7	Better than 8
		Textured Aluminum Door	No Failures	One Test: 10	5.0 to 5.4	Better than 8
21	EAA	T-111 Siding and Plywood	Poor Condition on Back of Building: Cracked with Numerous Delaminations	Two Tests: 0	Not Performed	Not Performed
		Rough Hewn Wood Trim	Poor Condition on Back of Building: Cracked with Numerous Delaminations. Good on Front of Building	Not Performed	Not Performed	Not Performed
		Roll-up Door	No Failures: Factory Finish	Not Performed	Not Performed	Better than 8
		Fiberglass Personnel Door	No Failures	Not Performed	Not Performed	Not Performed
22	Generator Building	Siding	Partially Repainted in Spots. No Failures	Two Tests: 10	Not Performed	Not Performed
23	Auto Rental Building	Wood Siding	Substrate Showing Through	Not Performed	Not Performed	Not Performed
		Rafter Tails	Almost free of Paint. Heavily Cracked and Oxidized Wood	Not Performed	Not Performed	Not Performed
		Eaves	Unpainted Wood - Slightly Oxidized	Not Performed	Not Performed	Not Performed
		Porch Deck and Railings	Deck is Stained. Railings Cracked with Coating Worn Away	Not Performed	Not Performed	Not Performed
24	Self Serve Facility	Steel Tank	Infrequent Impact Damage	Three Tests: 10	10.5 to 11.4	Better than 8
		Shed	Spot Rust	One Test: 10	8.0 to 8.5	Better than 8
25	Fuel Farm	Structural Members	Edge Rusting, minor areas of pinpoint and spot rust. No section loss. Rust is superficial. Shiny steel but no profile.	Four Tests: 10	0.8 to 2.5	Better than 8
		Seismic Rods	Spot Rust and coating delaminations. Mill scale on substrate.	Two Tests: 0	Not Performed	Better than 8
		Tank 1	Less than 10% of the coating has delaminated (primarily on the back end).	Two Tests: 0	2.9 to 4.8	2
		Tank 2	Less than 10% of the coating has delaminated (primarily on the back end).	Two Tests: 0	3.1 to 5.6	2
		Tank 3	Less than 10% of the coating has delaminated (primarily on the back end).	Two Tests: 0	3.4 to 11.5	2

Facility Number	Facility Name	Component	Visual Description	Adhesion	Dry Film Thickness Spot Reading (mils)	Chalk Assessment
		Diesel Tank	Less than 10% of the coating has delaminated (primarily on the back end).	Two Tests: 0	6.7 to 9.2	2
		Pump Station	Coating delaminations and worn coating. Oil and grease.	Three Tests: 2	Not Performed	2
		Steel Platforms	Coating delaminations and worn coating. Oil and grease. Mill scale on Substrate.	One Test: 6	Not Performed	2
		Stairways and Tank Access Walkways	Coating delaminations and worn spots. Rust on grating and handrails	One Test: 6	Not Performed	2
		Concrete Tanks	Very Little Wear. Glossy Paint. Oil and Grease.	Two Tests: 6	Not Performed	Better than 8
		Diesel Pumping Station	Light Gage Steel Structural Members. Heavy Rust. No Section Loss.	One Test: 10	2.0 to 2.3	Better than 8
		Guard Shack	Minor Rust	One Test: 10	2.2 to 2.3	2
26	Administration Building	Steel Stairways, Balconies, Structural Steel	No Defects	Not Performed	Not Performed	Better than 8
		Wood Siding	No Defects	Not Performed	Not Performed	Better than 8
		Stained Wood Under Eaves	No Defects	Not Performed	Not Performed	Better than 8

Facility Number	Facility Name	Component	Priority	Recommendations
1	Care Flight Offices	T-111 Siding, Rough Hewn Trim, Wood Decking	3	Spot Repair and Overcoat - Wood
		Hand Rails	1	Replace, Prime and Paint
2	Accounting Modular			
3	Maintenance Facility and Adjacent Shed	Siding - Original Paint	3	Spot Repair and Overcoat - Siding and Doors
		Roll-up Doors	3	Spot Repair and Overcoat - Siding and Doors
		Personnel Doors	1	Spot Repair and Overcoat - Siding and Doors
4	Hangar 2	Siding	3	Spot Repair and Overcoat - Siding and Doors
		Raised Seam Roofing	4	Spot Repair and Overcoat - Siding and Doors
		Steel Doors	3	Spot Repair and Overcoat - Steel
		Wood Stairway, Porch and Support Posts	3	Spot Repair and Overcoat - Wood
5	Hangar 1	Siding and Trim	2	Spot Repair and Overcoat - Siding and Doors
		Raised Seam Roofing	4	Spot Repair and Overcoat - Siding and Doors
		Steel Doors	4	Spot Repair and Overcoat - Steel
		Wood Porch and Support Posts	2	Spot Repair and Overcoat - Wood
		Plywood Siding and Rafter Tails	1	Replace, Prime and Paint
6	Garage	Siding - Original Paint	3	Spot Repair and Overcoat - Siding and Doors
7	Warehouse	Siding - Original Paint	3	Spot Repair and Overcoat - Siding and Doors
		Unpainted Steel Garage Door Frames	1	Spot Repair and Overcoat - Steel
		Siding on End of Building - Repainted	2	Spot Repair and Overcoat - Siding and Doors
		Doors and Frames	1	Spot Repair and Overcoat - Steel
8	Hangar A	Siding - Original Paint	1	Spot Repair and Overcoat - Siding and Doors
		Textured Aluminum Doors	3	Spot Repair and Overcoat - Siding and Doors
		Wood Wainscot	1	Spot Repair and Overcoat - Wood
9	Hangar B	Siding - Original Paint	1	Spot Repair and Overcoat - Siding and Doors
		Textured Aluminum Doors	3	Spot Repair and Overcoat - Siding and Doors
		Wood Wainscot	1	Spot Repair and Overcoat - Wood
10	Hangar C	Siding - Repainted	3	Spot Repair and Overcoat - Siding and Doors
		Aluminum Doors - Repainted	3	Spot Repair and Overcoat - Siding and Doors
11	Hangar D	Siding - Repainted	2	Spot Repair and Overcoat - Siding and Doors
		Aluminum Doors - Repainted	2	Spot Repair and Overcoat - Siding and Doors
12	Hangar E	Siding - Repainted	3	Spot Repair and Overcoat - Siding and Doors
		Aluminum Doors - Repainted	3	Spot Repair and Overcoat - Siding and Doors
		Wood Wainscot	1	Spot Repair and Overcoat - Wood
13	Hangar F	Siding - Original Paint	2	Spot Repair and Overcoat - Siding and Doors
		Textured Aluminum Doors	3	Spot Repair and Overcoat - Siding and Doors
		Repainted Doors	2	Spot Repair and Overcoat - Siding and Doors

Facility Number	Facility Name	Component	Priority	Recommendations
		Unpainted Plywood	1	Replace, Prime and Paint
14	Hangar G	Siding - Original Paint	2	Spot Repair and Overcoat - Siding and Doors
		Textured Aluminum Doors	3	Spot Repair and Overcoat - Siding and Doors
		Repainted Doors	2	Spot Repair and Overcoat - Siding and Doors
		Unpainted Plywood	1	Replace, Prime and Paint
15	Hangar H	Siding - Original Paint	2	Spot Repair and Overcoat - Siding and Doors
		Textured Aluminum Doors	3	Spot Repair and Overcoat - Siding and Doors
		Repainted Doors	2	Spot Repair and Overcoat - Siding and Doors
		Unpainted Plywood	1	Replace, Prime and Paint
16	Hangar J	Siding - Repainted 5 years ago.	3	Spot Repair and Overcoat - Siding and Doors
		Galvanized Doors	2	Spot Repair and Overcoat - Steel
		Wood Frames and Doors	1	Replace, Prime and Paint
17	Hangar K	Siding - Original Paint	3	Spot Repair and Overcoat - Siding and Doors
		Textured Aluminum Doors	3	Spot Repair and Overcoat - Siding and Doors
		Galvanized Trim	1	Spot Repair and Overcoat - Steel
18	Hangar L	Siding - Original Paint	3	Spot Repair and Overcoat - Siding and Doors
		Textured Aluminum Doors	3	Spot Repair and Overcoat - Siding and Doors
19	Hangar M	Siding - Original Paint	2	Spot Repair and Overcoat - Siding and Doors
		Three Repainted Doors	2	Spot Repair and Overcoat - Siding and Doors
		Textured Aluminum Doors	3	Spot Repair and Overcoat - Siding and Doors
20	Phoenix Hangar	Siding - Original Paint	2	Spot Repair and Overcoat - Siding and Doors
		Textured Aluminum Door	3	Spot Repair and Overcoat - Siding and Doors
21	EAA	Wood Siding	1	Replace Heavily Cracked Siding Prime and Paint
		Wood Trim	2	Spot Repair and Overcoat - Wood
		Roll-up Door	3	Spot Repair and Overcoat - Siding and Doors
		Fiberglass Personnel Door	3	Spot Repair and Overcoat - Siding and Doors
22	Generator Building	Siding	2	Spot Repair and Overcoat - Siding and Doors
23	Auto Rental Building	Wood Siding	2	Spot Repair and Overcoat - Wood
		Rafter Tails	1	Replace, Prime and Paint
		Eaves	1	Spot Repair and Overcoat - Wood
		Porch Deck	3	Spot Repair and Overcoat - Wood
		Porch Railing	1	Replace, Prime and Paint
24	Self Serve Facility	Steel Tank	1	Spot Repair and Overcoat - Steel
		Shed	1	Spot Repair and Overcoat - Steel
25	Fuel Farm	Structural Members	1	Spot Repair and Overcoat - Steel
		Seismic Rods	1	Remove and Repalce

Facility Number	Facility Name	Component	Priority	Recommendations
		Tank 1	2	Remove and Repalce
		Tank 2	2	Remove and Repalce
		Tank 3	2	Remove and Repalce
		Diesel Tank	2	Remove and Repalce
		Pump Station	1	Spot Repair and Overcoat - Steel
		Steel Platforms	1	Spot Repair and Overcoat - Steel
		Stairways and Tank Access Walkways	1	Spot Repair and Overcoat - Steel
		Concrete Tanks	3	Spot Repair and Overcoat - Concrete
		Diesel Pumping Station	1	Spot Repair and Overcoat - Steel
		Guard Shack	1	Spot Repair and Overcoat - Steel
26	Administration Building	Steel Stairways, Balconies, Structural Steel	4	No Action Required
		Wood Siding	4	No Action Required
		Stained Wood Under Eaves	4	No Action Required

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INTRODUCTION

Acumen Engineering contracted with West Coast Coating Consultants (WCCC) to conduct coating/corrosion assessments on numerous structures at the Truckee Airport in Truckee, CA. The assessments were deemed necessary since the airport is in the process of preparing a twenty year maintenance plan. A detailed plan for maintenance painting was desired to be part of the overall plan. Mr. Ray Tombaugh, Senior Consultant for WCCC was assigned to perform the investigation and prepare this report.

SUMMARY

Twenty-five different buildings/structures were surveyed. Anywhere from two to twelve different components were examined within the structures. In all eighty-four different components were examined which included five different substrates (wood, steel, aluminum, galvanized steel and concrete).

Coating condition varied across the airport facility from areas in immediate need of painting as a result of substrate degradation or unsightliness to components that were recently painted with no evidence of any near term failures or maintenance painting requirements.

1. Twenty-eight components are recommended for remediation work within the next two years. This group includes the wood components that are significantly degraded, the steel structural members, stairways, seismic rods and other components at the fuel farm, the self serve tank and the galvanized siding, trim and doors that are rusting on a few of the hangars.
2. Twenty-two components are recommended for maintenance painting within two to five years as a result of coating delaminations or other unsightly conditions. However, there was no evidence of substrate degradation at this time. These surfaces primarily include most of the hangar siding and the tanks at the fuel farm.
3. Twenty-eight components were recommended for maintenance painting after five years and before ten years. These surfaces include the factory finished doors, some of the siding and the concrete tanks at the fuel farm.
4. Finally, only six areas, the raised seam roofing, some steel doors and the Administration Building will not require painting until after ten years.

Most surfaces can be repainted by spot repair and over coating the existing paint. Pressure water jetting is used to remove any loose paint. Areas of exposed substrate are prepared and primed and then all surfaces are over coated. Five components, the steel tanks and the seismic rods require complete coating removal by abrasive blasting and replacement with a new

coating system. Ten components will require replacement of the substrate, priming and finish painting.

SCOPE OF THE FIELD ASSESSMENTS

The field assessments were conducted on March 16, 2013 and included visual observations, adhesion tests and dry film thickness measurements. When deemed necessary, the coating was removed in order to examine the substrate.

The assessment was performed on twenty-six structures. Twenty-six structures are listed on Figure A, Airport Facilities, but the Accounting Modular is not shown on the map and could not be found in the field. Another structure, not included on the map (the Care Flight Offices), was assessed. When multiple substrates are part of the structure (i.e. siding, doors, frames, etc.), the condition of each was evaluated. The assessments were conducted from grade. No climbing was done to reach elevated surfaces.

The assessment data for each building / component investigated is reported in Table 1 – Field Assessment Data, appended to the report.

Chalk assessments were performed in accordance with ASTM D4214, Method C, “Standard Test Method for Evaluating the Degree of Chalking of Exterior Paint Films.” The procedure is performed by moistening the fingertip and making one continuous rub 2” to 2.5” long. The material that accumulates on the finger is then compared to a pictorial reference standard. Chalking is evaluated on an even scale between 8 and 2 with 2 being the heaviest chalking.

Rusting was evaluated in accordance with SSPC-VIS 2, “Standard Test Methods for Evaluating the Degree of Rusting on Painted Surfaces.” The standard quantifies the degree of rusting on painted steel surfaces according to a 0 to 10 scale based on the percentage of visual rust present on the surface. A rating of 0 represents greater than 50% of the surface containing rust and a rating of 10 represents less than or equal to 0.01% of the surface containing rust. The distribution of rust is classified as spot rust, general rust, or pinpoint rust. Rust staining on the surface of the coating is excluded from the assessment.

Coating adhesion was evaluated in accordance with ASTM D6677, "Standard Test Method for Measuring Adhesion by Knife." ASTM D6677 involves making an X-scribe in the paint film and then lifting the coating with the knife blade at the intersection of the incisions. Adhesion is rated according to the amount of coating removed by the knife on an even number scale of 0 to 10, with 10 being best.

Dry film thickness measurements were obtained using a Positector 6000 FN3 Type II gage in general accordance with ASTM D7091, “Standard Practice for Nondestructive Measurement of Dry Film Thickness of Nonmagnetic Coatings Applied to Ferrous Metals and Nonmagnetic, Nonconductive Coatings Applied to Non- Ferrous Metals.

RESULTS OF THE FIELD ASSESSMENT

The coated substrates at the Truckee Airport include steel, galvanized steel, aluminum, concrete and wood. Coating condition varies from location to location and from substrate to substrate, even within the same structure. A description of the coating condition on each of the substrates on each of the structures is provided, below.

Fuel Farm

There a number of different components that are included in the fuel farm located at the northwest end of the airport property (Photo 1). The components include an overhead structure, four fuel tanks (labeled 1 to 3 starting at the northeastern end of the tank farm and a diesel tank) and associated piping, stairways and walkways leading up to and across the tops of the tanks, two concrete tanks, two pumping stations and a guard shack.



Photo 1 shows a general view of the Fuel Farm.



There is significant edge rusting on the roof rafters and diagonals that support the roof (Photo 2).

Photo 2 shows a general view of the roof rafters and the diagonals that support the roof structure. Note the edge rusting on the rafters. The diagonal rods are also rusted. The inset photo shows a closer view.

In addition there are few isolated areas of spot rust and pinpoint rust on the columns and main structural members. When evaluated in accordance with SSPC VIS-2 rust grades of 9-S and 9-P were observed. These grades represent less than 0.03% of the surface that is rusted. When the coating is forcibly disbonded the underlying surface appears free of rust and mill scale but there is little evidence of surface abrasion (abrasive blasting) (Photo 3).



Photo 3 shows an example of the spot rust that is observed on the structural members. The inset photo shows an example of the pinpoint rust that is present and the underlying substrate when the coating is forcibly disbonded.

The applied coatings are very thin (between 0.8 and 2.5 mils) and are tightly bonded to the substrate.

The seismic rods that run between the columns have rust (SSPC VIS-2: 5G) and mill scale that is lifting the coating off of the surface (Photo 4). Approximately 3% of the surface is rusted. Coating adhesion is poor.

Tanks 1 through 3 and the Diesel Fuel Tank have coating delaminations that are primarily found on the back end of the tank. Overall less than 10% of the surface is affected (Photo 5). When the coating is forcibly disbonded the substrate is covered in mill scale. The coating is poorly bonded to the substrate and is heavily chalked. The coatings applied to the tanks are thin (primarily between 3 and 7 mils).



Photo 4 (left) shows a general view of the seismic rods that run between the columns. Note the significant amount of rust on the surface. Photo 5 (right) shows a general view of the tanks. The inset photo shows a close-up of a delaminated area. Mill scale is present on the surface of the steel.

The stairways and grating have patches of pinpoint rust, primarily found on the grating but also on the hand rails, stringers and support structure (Photo 6).



Photo 6 shows the general condition of the stairways.



Photo 7 shows the general condition of the pumping station.

The main pumping station has coating delaminations and areas of worn coating (Photo 7). Rust is present where the substrate is exposed. Oil and grease is present on the painted surfaces.

The piping associated with the tanks and pumping station has a significant amount of coating delaminations (Photo 8). In addition there is also unpainted black iron pipe included in the piping system.



Photo 8 shows the general condition of some of the painted surfaces on the piping associated with the pumping station.

The diesel tank pumping station consists of factory painted equipment and instruments and is enclosed in a corrugated panel shed (Photo 9). The corrugated panels are shop coated and the coating is in excellent condition. It is tightly adhered to the substrate and free of rust. The pump skid sits on a steel platform that is rusted and oily.



Photo 9 shows a general view of the Diesel Tank Pumping Station.



The coating applied to the concrete tanks is in reasonably good condition with only minor wear (Photo 10). Adhesion tests indicated moderate adhesion (ASTM D6677: 6).

Photo 10 shows a general view of the concrete tanks. The inset photo shows the results of an adhesion test performed on the tank surface.



The guard shack is constructed of a painted steel frame and composite panels. There is some coating delamination and rust on the steel frame, most of which is located in areas of wear (Photo 11). The coating ranges between 2.2 and 2.5 mils thick on the steel surfaces and is tightly adhered to the substrate.

Photo 11 shows a general view of the pumping station. The inset photo shows a close-up of some of the rust that was found on the structure.

Garage

The garage is constructed of factory coated corrugated metal siding and roll-up doors. The coating is in good condition with no delaminations and only minor rust (Photo 12). The rust is primarily restricted to areas of wear or damage to the siding.

The coating on both the siding and roll-up doors is tightly adhered to the substrate and free of chalk.



Photo 12 shows a general view of the garage.

West Side Modular (CARE Flight Offices)



Photo 13 shows a general view of the West Side Modular.

The T-111 siding is generally good condition. Only a minor amount of degradation (splintering as a result of exposure to water) was observed along base of the building.

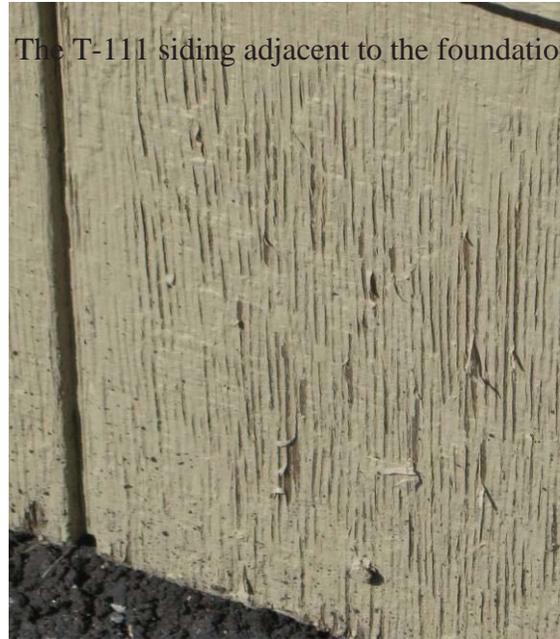


Photo 14 shows the typical condition of the T-111 siding at the base of the building.



Photo 15 shows the general condition of the handrails.

The top surfaces of the wood handrails, however, are heavily cracked (Photo 15).

Hangar J

Hangar J was repainted several years ago and is constructed of corrugated metal panels. Adhesion tests indicated that the coating is tightly adhered to the substrate. The coating is in good condition with only mild chalk (ASTM D4214: 6).

The hangar has painted galvanized steel doors some of which have wood frames. The coating on the doors has faded and is poorly bonded to the substrate. It is also heavily chalked (ASTM D42451: 2). The wood trim is heavily cracked.



Photo 16 (top) shows a general view of Hangar J. Photo 17 (bottom, left) shows the condition of the wood frames around the doors. Photo 18 (bottom, right) shows the condition of the coatings applied to the galvanized steel doors.

Hangar K

Hangar K is also constructed of corrugated siding with some opaque fiberglass panels inserted at a few locations (Photo 19). The corrugated panels have the original factory finish and are free of chalk. There is some galvanized steel trim included in the structure that is rusting.

There are textured aluminum doors with a factory finish on them which are also free of chalk.

The coating adhesion on the doors varies from excellent to poor. **Photo 19 shows a general view of Hangar K).**



Hangar L



Hangar L is constructed of shop painted corrugated siding. The corrugated panels have only mild chalk (Photo 20). There is some galvanized steel trim included in the structure that is rusting.

There are textured aluminum doors with a factory finish on them which are also free of chalk. The coating adhesion on the siding and doors is excellent.

Photo 20 shows a general view of Hangar L.

Hangar M

Hangar M, also constructed of corrugated panels has the original factory finish (Photo 21). The coating is tightly adhered to the surface and is free from chalk.



Photo 21 shows a general view of Hangar M.



Photo 22 shows the door coatings that have faded.

There are three doors (Photo 22) that are heavily chalked. The remainder of the doors has a factory finish. This coating is free of chalk and tightly adhered to the substrate.

Airport District Warehouse

Most of the warehouse siding has the original factory finish (Photo 23). This coating is free of rust and chalk and tightly adhered to the substrate. The end of the warehouse has been repainted and is also free from rust, chalk and other failures.

The door frames are unpainted and covered in tightly adherent pinpoint rust (Photo 24). The doors, while painted are rusty as well (Photo 25).



Photo 23 (top) shows a general view of the warehouse. Photos 24 and 25 (bottom, left and right) shows the rusted steel frames and doors (right).

Maintenance Building

The maintenance building and adjacent shed siding has the original factory finish (Photo 26). This coating is free of rust and chalk and tightly adhered to the substrate. The roll-up doors have the factory finish which is free of chalk.



Photo 26 shows a general view of the Maintenance Building.



The coating on the personnel door is heavily chalked and pinpoint rust is poking through at a number of locations (Photo 26).

Photo 26 shows the general condition of the personnel door on the Maintenance Facility.

Self Serve Facility

The self serve facility consists of a horizontal tank with a shed attached to the front of the tank. The coating is glossy and has only a few areas of rust that were likely caused by impact damage (Photo 27).

The applied coating is tightly adherent to the substrate and ranges between 8 and 11.4 mils in thickness.



Photo 27 shows a general view of the Self Serve Facility.

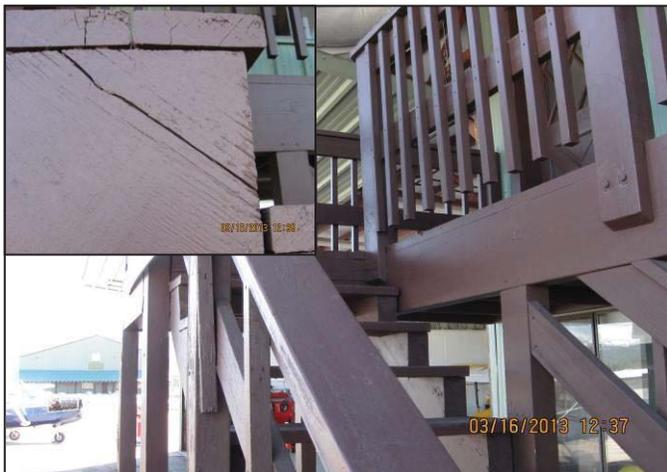
Hangar 2

Hangar 2 is sheathed in corrugated siding with the original factory finish (photo 28). There is good color retention and it is free of chalk. The doors are finished with a factory applied coating and are free of rust and chalk.

Attached to the building is a wooden structure that includes a first floor porch roof support structure, a stairway and a second floor porch. The coatings applied to the wood surfaces are in good condition as is the wood



Photo 28 shows a general view of Hangar 2.



substrate in most locations. The only areas of damage were found on the stair stringers which were moderately cracked (Photo 29).

Photo 29 shows a general view of the wood structure. The inset photo shows the cracking that was observed on the stairway stringers.

Administration Building

The administration building was recently constructed and the coatings are in excellent condition. The coating surfaces include structural steel, siding and stained wood (Photos 30 through 33).



Photo 30 (upper, right) shows a general view of the Administration Building. As indicated the painted surfaces on the building are in excellent condition. Photo 31 (upper, left) shows stained wood underneath a balcony, There was no evidence of coating failure or discoloration of the wood on these surfaces. Photo 32 (lower, left) shows an example of the painted steel which is also pristine. Steel surfaces are also found on the stairway structure. Photo 33 (lower, right) shows a general view of the railing that runs along the observation deck. It too is in good condition and free of rust.

Hangar 1

Hangar 1 is similar in construction to hangar 2 except that there is no stairway or second floor porch (Photo 34). The siding on the building has been repainted several times. There are numerous delaminations on the siding applied to the north façade. The coating adhesion on the siding varies depending upon the location. The coating applied to the north façade is poorly bonded while the coating on the other three facades is tightly adhered.



Photo 34 shows a general view of Hangar 1.

The roofing is raised seam panels that are likely Kynar coated. There is no evidence of rust or fading on these surfaces. The door coatings are free of rust and delaminations. The coatings are moderately chalked.

The coating has delaminated from the wood rafter tails on the first floor porch and the substrate is heavily cracked and is severely oxidized (Photo 35). Similar conditions were observed on plywood fascia pieces at the end of the porch. The eaves are unpainted (Photo 36). Coating adhesion varies on the wood surfaces from good to poor.



Photo 35 (left) shows the condition of the rafter tails. Note that most of the paint is gone and the substrate is heavily cracked. Photo 36 (right) shows the condition of the plywood on the southwest side of the building. The coating is delaminating and the substrate is degraded. Note that the eaves are unpainted.

Phoenix Hangar

Another corrugated sided structure, the Phoenix Hangar was repainted in 2012 (Photo 37). It is in excellent condition with no evidence of rust, delamination or chalking. There is a textured aluminum door with an original factory finish that has been repainted. The applied paint is in good condition. Coating adhesion is excellent.



Photo 37 shows a general view of the Phoenix Hangar.

EAA Building



Photo 38 shows a general view of the front of the building. The coating and wood on this façade is in good condition

The EAA Building is primarily faced with T-111 siding (Photo 38). The rear of the building has plywood applied to the façade. There is rough hewn wood trim around windows and doors and there is one roll-up garage door.

The front of the building is in good condition. There is no evidence of any coating delamination or damaged wood. The only evidence of damage is along the base of the building where the wood grain is lifting (Photo 38). The joint between the siding and the flashing is uncaulked and is allowing moisture to penetrate into the wood, subsequently resulting in coating delaminations and wood rot. The other sides of the building have many coating delaminations on the siding (Photo 39), the window trim (Photo 40) and the plywood (Photo 41). The plywood is degraded. Adhesion test conducted on the wood surfaces indicated poor coating adhesion in the heavily failed areas.



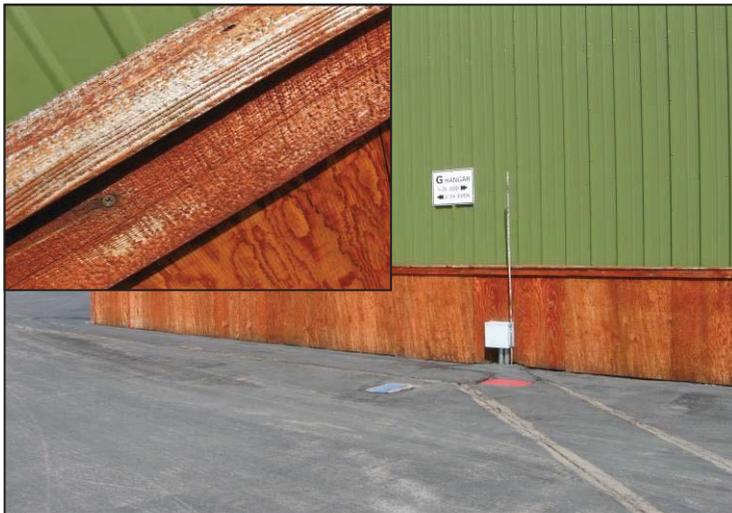
Photo 38 (upper, left) shows the condition of the siding where it meets the flashing. Photo 39 (upper, right) shows a delamination on the siding. Photo 40 (lower, left) shows delaminating wood trim. Photo 41 (lower, right) shows delaminations on the plywood.

Hangars F, G and H

Hangars F, G and H are sided with corrugated panels (Photo 42). The panels have the original factory finish. The coating is free of rust, has not faded and is not chalky.



Photo 42 shows a general view of Hangars F, G and H



Hangars F and G have stained wood and plywood wainscot at the south end of the building (Photo 43). The wood is oxidized and mildly cracked in some areas.

Photo 43 shows the wood wainscot on the back of the hangars. The stain has worn away in some areas and the wood is oxidized.

There are textured aluminum doors with the original factory finish. The coating is in good condition in most areas, but is worn away on some doors (Photo 44).



Photo 44 shows a door with worn factory finish.

Hangars C, D and E

Hangars C, D and E, while similar in construction to Hangars F, G and H, have been recently repainted. Maintenance painting work was completed on both the siding and the textured aluminum doors. The applied coatings appear to be in good condition with no evidence of rust or delaminations. However, the coatings applied to the siding and doors on Hangar D are poorly adhered to the substrate (Photos 45 and 46)). Adhesion tests conducted on representative areas of the siding and doors on Hangars C and E showed good coating adhesion in all areas tested. The only difference between the two conditions was that the coatings applied to Hangar D was several mils thicker than on Hangars C and E.



Photo 45 (left) shows the results of an adhesion test conducted on the siding on Hangar D. Photo 46 (right) shows a test conducted on an aluminum door.

Hangars A and B

Hangars A and B are sided with corrugated panels. The panels have the original factory finish. The coating is worn away in many areas on the southeast side of the hangars (Photo 47). The condition is worse on Hangar B. Galvanized steel is exposed where the coating has worn away.

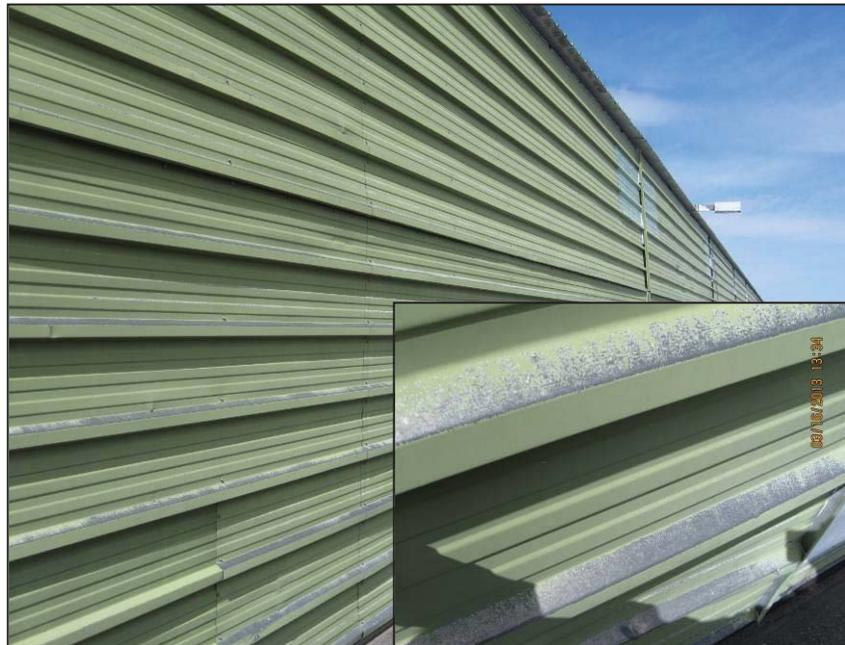


Photo 47 shows the condition of the siding on the southeast façade of Hangars A and B. Note the exposed galvanized steel.

Rust is beginning to form on the edges of the exposed galvanizing on Hangar A (Photo 48). Adhesion tests conducted adjacent to the worn areas indicated good coating adhesion.

There is also a wood wainscot on the southwest side of the hangars. The wood is similar in condition to the other wood on these hangars.



Photo 48 shows the rust that has formed on the edges of the galvanized steel.



The doors on the hangars have the original factory finish. The doors are glossy and free of chalk. However, the doors on Hangar A have a number of coating delaminations (Photo 49).

Photo 49 shows an example of the delaminations that were observed on the doors on Hangar A.

Generator Building

The Generator Building, another corrugated metal sided building appears to have been partially repainted at some time. There are two different colors on the panels (Photo 50). There is no evidence of rust. Adhesion tests indicated that the coating is tightly adhered to the substrate.



Photo 50 shows the condition of the corrugated siding on the Generator Building. Note the two different color paints.

Auto Rental Building



Photo 51 shows a general view of the Auto Rental Building.

The auto rental building is a wood structure with board and batten siding and large timber exposed rafters. There is also a wood porch erected in the front of the building (Photo 51).

The board and batten siding is coated with a thin layer of stain or paint. The underlying surface is showing through in many areas.

The exposed underside of the eaves is not coated (Photo 52). The wood is heavily oxidized (gray in color).



Photo 52 shows the unpainted wood under the eaves.



The rafter tails, while protected from rain with an aluminum collar, have significant coating delamination on the ends where they are exposed to weather. In addition the substrate is heavily cracked (Photo 53).

Photo 53 shows the condition of the rafter tails.

While attempts were made to fill in the cracks with what appears to be a trowel grade caulk, moisture still penetrates the coating film and continues to cause degradation of the wood substrate (Photo 54).



Photo 54 shows the results of spackling the rafter tails with a knife grade caulk.

The front porch surfaces are stained. Except for the handrails the wood is in good condition. The handrails, however, are heavily cracked (Photo 55).



Photo 55 shows the condition of the handrails on the porch.

DISCUSSION

When the field assessment data is analyzed, four clear categories of conditions were observed. Each is discussed separately below.

Category 1 – Degraded Substrates

This category includes substrates that have degradation. On steel surfaces, rust is present. However, in no area examined was rusting severe. There was no evidence of section loss or excessive pitting.

Some of the wood surfaces were heavily degraded. Much of the coating had delaminated or was worn away. The exposed wood was cracked and oxidized.

Category 2 – Unsightly Appearances

This category includes components that have worn coatings, delaminated coatings or faded coating. However, there is no degradation of the underlying substrate. This category also includes substrates that currently appear acceptable but because of poor coating adhesion are likely to degrade over the next five years.

Category 3 – Coatings and Substrate in Good Condition

Many of the coatings were in good condition. The surfaces retained good color and gloss. There was no evidence of any coating failures, however, the coating colors were not consistent with the other structures around them or there was evidence that failures could occur at some time in the future (poor coating adhesion).

Category 4 – Recently Painted

These surfaces were recently painted and maintenance painting is not anticipated in the near future.

These categories were then assigned priorities with Category 1, degraded substrates, receiving the highest priority. The priorities identify the period in which the maintenance painting work should be completed. The priorities allow enough time to budget and plan the work, and provide reasonable assurance that significant degradation will not occur until the maintenance is performed. Table 2 – Painting Priorities, provides a brief summary of the each priority and the applicable basis.

Table 2 – Painting Priorities

Category	Basis	Priority
1	Degraded Substrate or Significant Coating Failure	Within 2 years
2	Unsightly or Aesthetically Displeasing	Two to Five Years
3	Substrate and Coatings in Generally Good Condition	Five to Ten Years
4	Recently Painted – Coating in Excellent Condition	Ten to Twenty Years

Table 3 – Maintenance Painting Recommendations, appended to the report, provides the priority for each of the structures and components that were investigated. It should be noted that since several structures may have components with differing priorities it will likely be cost effective to perform the maintenance painting of all of the surfaces at the same time. For instance, Hangar 1 has rust on some of the siding and is recommended to be painted within the next 2 years. The doors however are in good condition and do not require painting for five to ten years. It would be cost effective to paint the doors at the same time as the siding is painted.

MAINTENANCE PAINTING RECOMMENDATIONS

The maintenance painting work can be performed under three different scenarios: Spot Repair (Including the Removal of Poorly Adhered Coatings) and Overcoat¹, Replacement of Substrates, Prime and Paint and Removal and Replacement of Existing Coatings. Since there are different methodologies necessary for the different substrates, separate discussions are included below for each substrate.

It is anticipated that all painting operations except complete coating removal and replacement can be accomplished by either airport maintenance personnel with some assistance from a coating professional or from a commercial painter. As such, the requirements for surface preparation are described as opposed to reference to industry standards.

¹ Spot repair alone can be substituted for spot repair and over coating. However, the repairs will likely be noticeable. Spot repairs should never be performed when the surface area requiring repair exceeds 10% to 15% of the surface of the structure.

Substrates that require complete removal and replacement should be performed by an industrial painter since the surface preparation methodology are more complex. The surface preparation requirements for this section refer to the applicable industry standards.

It is recommended that the paint be purchased through a technical representative of one of the major commercial/industrial paint manufacturers such as Tnemec, Sherwin Williams or Carboline. The technical representatives are knowledgeable in the appropriate coatings to use so that they are compatible with the existing coatings.

Over Coating Factory Finished Siding and Aluminum Doors

As is the case for all painting operations, the first step should always be cleaning of the surfaces. This is best accomplished by pressure water washing at pressures of at least 5000 psi. At these pressures, any loose coating that is present should be removed. This is a very important step since some of the textured aluminum doors have coatings that are adhered to the substrate, while others have coatings that are not bonded very well. The pressure water washing should be accompanied by scrubbing with Scotch-Brite pads.

If there are any areas of exposed substrate, the surrounding intact tightly adhering coating should be feathered (sanded smooth). Any dust and debris that is created as a result of the sanding should be thoroughly removed.

Areas of exposed substrate should be spot primed with an epoxy primer. All surfaces (spot primed and prepared factory finishes) should then be finished with two coats of adhesion promoting acrylic formulated for application over finished metal siding.

Over Coating Previously Painted (Good Condition) Wood

Wood surfaces should be scraped and sanded. Areas of exposed substrate should be sanded to remove any oxidized (gray) wood. The surrounding intact tightly adhering coating should be feathered (sanded smooth) and all glossy paints should be sanded to create a haze of scratches across the entire surface. Pressure water washing at low pressures (less than 3000 psi) can be used to remove the debris. The cleaned wood should be allowed to thoroughly dry. The exposed substrate and existing coating should be primed and finished with two coats of exterior acrylic paint.

Spot Repair and Over Coating Steel and Galvanized Steel Surfaces

This approach would be used on steel or galvanized steel surfaces with tightly adherent existing coatings and limited area of spot rust. All oil and grease should be removed in accordance with SSPC SP-1, Solvent Cleaning. Pressure water washing should be performed at 5000 to 10,000 psi. Areas of rust should be power tool cleaned with the intent of removing all loose rust. Tightly adherent rust is acceptable to remain on the surface.

The edges of the surrounding coating should be feathered smooth. Glossy tightly adherent coating should be sanded to create a haze of scratches across the entire surface.

Any areas of smooth unweathered galvanized steel should be treated with a phosphoric acid based etchant and thoroughly cleaned once the etching process is complete.

The prepared surfaces and the existing coating should be primed with a surface tolerant epoxy penetrating primer and finished with one coat of high performance acrylic.

Spot Repair and Over Coating Concrete

All oil and grease should be removed in accordance with SSPC SP-1, Solvent Cleaning. Pressure water washing should be performed at 5000 to 10,000 psi. The coating surrounding areas of exposed concrete should be sanded smooth. Glossy tightly adherent coating should be sanded to create a haze of scratches across the entire surface.

Areas of exposed concrete should be primed with a concrete primer. All surfaces should be finished with one coat of acrylic paint.

Substrate Replacement, Priming and Finish Coating

This approach is applicable to wood substrates that are too degraded to successfully coat. When the wood is heavily cracked and rotted, the cracks permit moisture penetrate in the wood and coating delaminations result. The pores of rotted wood are sealed and so the paint can't penetrate and the adhesion of new paint is poor. While one alternative to substrate replacement is to spackle the surfaces with a knife grade caulk, the service life of this approach is short (perhaps only one year).

New wood surfaces should be pressure water washed to remove all contaminants (grease, oil, dirt, dust, etc.) and allowed to dry. Any areas of damaged wood should be sanded smooth, however, it is not the intent to sand rough hewn wood.

The prepared surfaces should be primed with an oil based primer and then over coated with two coats of exterior acrylic paint.

Removal and Replacement of Existing Coating System

This approach is applicable for the steel tanks and the seismic rods at the Fuel Farm. The existing coatings are poorly adhered and there is mill scale on the substrate which is likely to disbond if not removed.

All surfaces should be cleaned by pressure water washing at pressures between 5000 and 10,000 psi. All oil and grease should be removed in accordance with SSPC SP-1, Solvent Cleaning. This standard permits the use of solvents and detergents for oil, grease and dirt removal.

At the completion of the cleaning operations, the existing coating should be removed and the surfaces prepared by abrasive blasting in accordance with SSPC SP-6, Commercial Blast Cleaning.

As an option, Commercial Grade Power Tool Cleaning, SSPC SP-15, can be used on the seismic rods where abrasive blasting may be difficult. SSPC SP-15 is the power tool cleaning equivalent to Commercial Blast Cleaning. The standard includes both a cleanliness requirement and a profile standard.

The prepared surfaces should be primed with an organic zinc rich primer and then coated with an epoxy intermediate coat and a polyurethane finish coat.