

1 Make the following Section a part of the Standard Specifications:

2
3 **“SECTION 697– CLEAN AND PAINT EXISTING BRIDGE STEEL**

4
5 **697.01 Description of Work.** This work is for the refurbishment and
6 maintenance painting of the Hanalei Bridge Pratt Truss structure and the beneath
7 roadway Warren Truss structure. This specification discusses containment of the
8 bridge to prevent the escape of construction debris to the surrounding air,
9 Hanalei River and river banks and surrounding soil. It details power washing on
10 all structural steel to be painted, Near White Metal blasting and repainting of the
11 Warren Truss, and spot touch-up and overcoating of the Pratt Truss. Repainting
12 of the Warren truss will include the use of epoxy primers and a fluoropolymer
13 topcoat. Coatings used on the Pratt Truss will be single component moisture
14 cure urethanes (MCU). The Pratt Truss is currently galvanized steel with a 3
15 coat MCU system.

16
17 The Contractor awarded the work will be required to schedule, arrange and run a
18 pre-job conference to discuss the pertinent issues of the work. The contractor shall
19 be able to address the work schedule, containment, staffing, and discuss their
20 understanding of the specification. A walk-thru of the work site, if applicable, will
21 be part of the pre-job conference. At a minimum the Contractor’s field foreman and
22 QC representative shall be present.

23
24
25 **REFERENCE STANDARDS**

26
27 **American Society for Testing Materials (ASTM)**

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29 ASTM D-4285 “Standard Test Method for Indicating Oil and Water in
30 Compressed Air”

31 ASTM D-4940 “Standard Test Method for Conductimetric Analysis of Blasting
32 Media.

33 ASTM D-4417C “Standard Test Method for Field Measurement of Surface Profile
34 of Blast Cleaned Steel

35
36 **Society of Protective Coatings (SSPC), now AMPP**

37
38 SSPC Volume 1 “Good Painting Practices”

39 SSPC-SP-1 “Solvent Cleaning

40 SSPC -SP-2 “Hand Tool Cleaning”

41 SSPC-SP-3 “Power Tool Cleaning”

42 SSPC-SP-11 “Power Tool Cleaning to Bare Metal”

43 SSPC-PA-2 “Measurement of Dry Coating Thickness with Magnetic Gages”

44 SSPC-QP-1, “Standard Procedure for Evaluating the Qualifications of
45 Industrial/Marine Painting Contractors”

SSPC-Guide 6, "Guide for Containing Surface Preparation Debris Generated during Paint Removal Operations."
SSPC-TG-15, Field Methods for Extraction and Analysis of Soluble Salts on Steel and Other Nonporous Substrates

697.02 Material Requirements.

(A) General. In this Section, the words: coat; paint; coating and; painting are interchangeable. The word "system", when referencing coat or paint, means final product of several different, compatible coatings of paint. Specify the new paint or paint additive brand along with "or approved equal".

(1) The coating system for all steel surfaces to be painted on this project shall incorporate a custom system consisting of the following. The Pratt truss will be spot repaired and overcoated with a 3 coat Moisture Cured Urethane (MCU) system. The Warren Truss will be completely reblasted and coated with an organic zinc rich primer, an epoxy intermediate, and one topcoat of a FEVE fluoropolymer paint. For the Warren Truss, include a separate brush applied coat over all edges, corners, bolts, rivet heads, and weld seams (stripe coat).

NOTE: Recent inspection of the Pratt Truss has shown only minor areas of coating delamination to the galvanized layer. Such areas are to receive a 2 coat Moisture Cured Urethane (MCU) system consisting of the intermediate and topcoat system only, after proper surface preparation. Only areas where the galvanizing layer is corroded shall receive the full 3 coat MCU system.

(2) Do not mix manufacturers. The same manufacturer shall furnish the primer, intermediate, stripe, and topcoat.

(3) Color. Final colors shall match the existing cleaned coatings on the Hanalei Bridge; however the contractor's submission of color sample shall be submitted and approved in writing by the Engineer prior to the start of productive work. Photos of the existing bridge and color samples, along with any proprietary color references are all acceptable. The Engineer reserves the right to dictate the specific color scheme and sheen (gloss) to be applied.

(4) The Contractor shall submit color selection to the Engineer for review and final selection before ordering paint system products. Each coat of paint shall have distinctly contrasting shades of subsequent coats to be applied to aid in application and inspection.

(5) The Coating Manufacturer shall submit a Certificate of Compliance for the protective coatings stating that the Contractor can apply each coating between temperatures of 50-95F, and at relative humidity no greater than 85%. . The certification shall state that the paint system complies with the requirements specified herein.

(6) The Coating Manufacturer shall prepare the paint at the factory, ready for application. No field thinning or tinting will be allowed after shipping the paint.

(7) **Labeling.** Labels on containers shall show the exact title of the paint, the manufacturer's name, date of manufacture, date of expiration, the manufacturer's batch number, product code and the lot number if appropriate. Package the paint in new approved containers. Precautions concerning the handling and application of paint shall be shown on the label of all paint and clean-up solvent containers.

(B) Coatings Specified. Unless otherwise specified in accompanying specifications, coatings used shall be in accordance with the following coating scheme:

Warren Truss:

Surface Preparation: SSPC SP-10 Near-White Metal Blasting (2.0-3.5 mil profile)

Primer:	Sherwin Williams ZincClad 4100 (organic zinc rich primer) @ 2-6 mils DFT
Stripe Coat:	Sherwin Williams Macropoxy 646 (fast cure epoxy) @ 3-5 mils DFT
Intermediate:	Sherwin Williams Macropoxy 646 (fast cure epoxy) @ 3-10 mils DFT
Topcoat:	Sherwin Williams Fluorokem HS100 (FEVE Fluoropolymer) @ 3-4 mils DFT. The topcoat shall have a low gloss finish as described under section (C) Paint System Requirements below.

OR

Primer:	Tnemec 94 H ₂ O Hydrozinc (organic zinc rich primer) @ 2.5-3.5 mils DFT
Stripe Coat:	Tnemec Epoxoline II Series V69 (hi build polyamide epoxy primer) @ 4-6 mils DFT
Intermediate:	Tnemec Epoxoline II Series V69 (polyamide epoxy primer) @ 4-6 mils DFT

135 Topcoat: Tnemec Fluoronar Series 1072V (FEVE Fluoropolymer)
136 @ 2-3 mils DFT. The topcoat shall have a low gloss
137 finish as described under section (C) Paint System
138 Requirements below.
139

140 Pratt Truss

141 Surface Preparation: SP-2/SP-3/SP-11 Spot repair to existing sound coating
142 and defective areas.
143

144 The primer, intermediate and topcoat shall be a Moisture Cure Urethane
145 (MCU) and conform to the following scheme:
146

147 Primer: Single component zinc-rich component MCU, capable
148 of being applied at 3 mils minimum DFT. The VOC
149 shall be at or under 340 g/l (2.8 lbs/gal).
150

151 NOTE: The primer shall only be used on Pratt Truss bare steel touch-up
152 areas only.
153

154 Intermediate: Single component micaceous iron oxide (MIOX) filled
155 MCU, capable of being applied at 3 mils minimum DFT.
156 The VOC shall be at or under 340 g/l (2.8 lbs/gal).
157

158 Topcoat: Single component micaceous iron oxide (MIOX) filled
159 aliphatic MCU, capable of being applied at 2 mils
160 minimum DFT. The VOC shall be at or under 340 g/l
161 (2.8 lbs/gal). The topcoat shall have a low gloss finish
162 as described under section (C) Paint System
163 Requirements below.
164

165 Examples of MCU systems, meeting the above parameters are as follows,
166 however candidate coating systems are not limited to these:
167

168 Wasser High Tech Coatings

169 Primer: MC Zinc 100 @3-5 mils DFT (for bare steel areas only)
170 Intermediate: MC-Miomastic 100 @ 3-5 mils DFT
171 Topcoat: MC-Ferrox A @ 2-4 mils DFT
172

173 OR

175 Wasser High Tech Coatings

176 Primer: MC Zinc 100 @3-5 mils DFT (for bare steel areas only)
177 Intermediate: MC-Ferrox B 100 @ 3-5 mils DFT
178 Topcoat: MC-Ferrox A @ 2-4 mils DFT
179

180 OR

181 Sherwin Williams

182 Primer: Corothane I GalvaPack zinc primer @ 3-4 mils DFT (for
183 bare steel areas only)

184 Intermediate: Corothane I Ironox B @ 3-5 mils DFT

185 Topcoat: Corothane I HS Aliphatic Finish coat @ 2-3 mils DFT
186
187
188

189 **(C) Paint System Requirements.**
190

- 191 (1) For the Warren Truss, the topcoat shall be of Fluoropolymer
192 FEVE technology and selected from the following
193 manufacturers: Sherwin Williams (Fluorekem 100HS), and
194 Tnemec Company, Inc. (Fluoronar Series 1072V). The gloss
195 level shall be a matte finish, having a specular gloss of 10 or
196 below.
- 197 (2) For the Pratt Truss, the coatings (primer, midcoat and topcoat)
198 shall be Moisture Cured Urethane technology, to match the
199 existing coating scheme. The gloss level shall be a matte
200 finish, having a specular gloss of 10 or below.
201

202 In the event the supplier cannot provide the aforementioned coatings,
203 the Contractor shall submit for approval an alternate MCU coating
204 system for review. The submittal shall include documentation that the
205 currently specified system cannot be obtained, and the manufacturer's
206 literature / product data sheets of the alternate system detailing
207 percent volume solids, application parameters, recommended
208 thickness, and VOC, shall be submitted. This literature shall include a
209 reference list of equivalent structural projects where the proposed
210 paint system was used, detailing dates, facility owner and coating
211 applicator. No request for substitution will be considered that would
212 decrease film thickness and/or number of coats or offer a change in
213 the generic type of coating specified.
214

215 (3) When the proposed Paint System manufacturer's literature
216 requires a higher degree of surface preparation or a greater film
217 thickness than specified herein, that degree of surface preparation
218 and film thickness shall apply, at no additional cost to the State.
219

220 (4) The proposed paint system shall have a minimum of two years'
221 field exposure on similar structures.
222

223 (5) No substitution will be considered unless request for approval
224 has been submitted by the bidder and has been approved by the

Engineer at least 10 days prior to close of bids. The burden of proof of the merit of the proposed substitute is upon the proposer. The Engineer's decision of approval of disapproval of the proposed substitution shall be final.

697.03 Construction Requirements.

(A) General.

(1) The coating Contractor shall comply with the current, State, Federal and local laws and regulations pertaining to the protection of the environment in the performance of this type of work. These include but are not limited to regulations required by the State Department of Health (DOH), and Federal Environmental Protection Agency (EPA) rules and regulations.

(2) The coating Contractor shall comply with the current Federal Occupational Safety and Health Administration (OSHA) and Hawaii Occupational Safety and Health (HIOSH) requirements for worker protection and safety equipment during all work on this project.

(3) The painting contractor shall be certified to SSPC-QP-1, Field Application to Complex Marine and Industrial Structures.

(4) All surface preparation and painting operations shall be inspected by a NACE CIP Level 1 Basic coating inspector, to be supplied by the Contractor. At a minimum, the inspector shall be present for all checkpoints listed in this specification. Inspections shall detail environmental conditions throughout the working day, , coating processes used, surface preparation processes used, DFT coating thicknesses of each coat, recoat windows, discrepancies, corrective actions, coatings applied, and any other pertinent information listed on submittal forms..

(B) Site Preparations.

(1) The Contractor's work shall, at all times, be made accessible to the Engineer. Contractor shall provide all safety, fall protection, access and scaffolding needs for the Engineer. The Contractor shall make ground level or superstructure access to all bents using man-lifts, ladders and/or scaffolding or stairs.

270 **(C) Containment of Work and Protection of the Environment**

- 271
- 272 (1) In order to protect the surrounding natural environment and
- 273 work environment, the Contractor will be required to contain
- 274 each work area so that there is no escape of water-wash
- 275 effluent, paint debris, abrasive blast media or dust, and any
- 276 other construction debris to the surrounding area. In addition,
- 277 care should be taken to contain any overspray to escape into
- 278 the surrounding environment, above and under the structure.
- 279 The contractor shall construct a containment, or multiple
- 280 containments, capable of containing all material as described
- 281 above. The contractor shall incorporate SSPC Guide 6 into
- 282 their design submittals.
- 283 (2) Containment material shall be water impermeable where water
- 284 washing will take place, and with rigid floor construction to aid
- 285 in collection of spent abrasive where abrasive blasting will take
- 286 place.
- 287 (3) Wash water effluent shall be removed on an ongoing basis
- 288 throughout the project as to not interfere with ongoing
- 289 operations. Containment of the work area shall remain in place
- 290 until the final coat of paint has been cured, inspected, and
- 291 accepted by the Engineer.
- 292

293 **(D) Surface Cleaning and Preparation.** The coating Contractor shall

294 prepare the bridge steel as specified below:

295

- 296 (1) Before any surface preparation, remove all visible and non-
- 297 visible contaminants described herein by methods specified in SSPC-
- 298 SP1 Solvent Cleaning. General cleaning shall be accomplished using
- 299 Low Pressure Water Cleaning (as defined in SSPC WJ-2/NACE WJ-2)
- 300 at minimum working pressures of 1000 psi, not to exceed 3000 psi
- 301 using fresh water. For the purposes of this specification, fresh water
- 302 shall be defined as local potable water quality.
- 303

304 (NOTE: For the above deck Pratt truss structure and below deck

305 transom beam, additional means above LPWC may be necessary

306 to remove tightly adherent dirt and moss. Hand tools such as

307 scrapers and Greenie pads may be necessary to achieve a

308 contaminant-free surface.) Care must be taken to not damage

309 tightly adherent coatings.

310

311 (NOTE: All sources of compressed air shall be tested daily and

312 verified to be clean, dry, and oil free per ASTM D-4285.)

313

(2) Vacuum or air blow-down (using clean, dry and oil-free air) shall be used to remove any standing water and to aid in drying surfaces prior to mechanical methods of surface preparation.

(3) Surface preparation of all Warren Truss steel shall be in accordance with Society of Protective Coatings standard SSPC-SP-10 Near White Metal Blasting. Blast profile shall be an anchor tooth profile of 2.0 – 3.5 mils, and shall be accomplished with an approved abrasive of sufficient grit size to achieve the proper profile.

(4) After power washing the Pratt Truss surfaces, perform a thorough SP-2/SP-3 Hand Tool/Power Tool surface preparation over all steel surfaces to ensure only tightly adherent coatings remain. In areas of coating delamination, feather edge existing tightly adherent coatings to base layers with by SP-2 or SP-3 methods.

(5) After SP-2/SP-3 cleaning, surfaces to be cleaned may require an additional SP-1 solvent cleaning prior to painting.

NOTE ON QC CHECKPOINTS - Coating Contractor shall inform Engineer at least 2 days prior to QC Checkpoint operations. In the event the Engineer is not present at the requested time, the Contractor may proceed to the next evolution, provided that Contractor documents QC data on the required data sheets, and written approval is obtained from the Engineer.

QC Checkpoint - Cleanliness

All surfaces to be prepared shall meet the requirements of SSPC-SP-1 Solvent Cleaning. Surfaces shall be cleaned so that chloride measurements taken on the washed steel measure under 10 µg/cm² chlorides as measured with any method detailed in SSPC Technology Guide 15. A minimum of 1 measurement shall be made for each 1000 ft² of surface washed. Surface conductivity may be substituted for chlorides. Conductivity shall measure less than 100 µS/cm.

QC Checkpoint - Chlorides

(E) Surface Preparation and Coating Application for Touch-up areas.

A touch-up area is any area on the steel which includes a surface defect such as a gouge, scrape, or any area that has been damaged during the handling, transportation, ongoing bridge construction, or surface preparation

that has damaged the primer and exposed bare steel. Areas burned by torch cutting and welding are also included as touch-up.

(1) Prepare damaged area(s) to sound coating or steel using methods described in SSPC-SP-2 Hand Tool Cleaning, SSPC-SP-3 Power Tool Cleaning,. If damaged area is to bare steel, ensure that the exposed steel has a surface profile of 2.0 – 3.5 mils profile, using methods described in ASTM D4417C. Note that rotary disc sanding will destroy existing profile on the steel, so establishment of a profile by mechanical impact tooling such as needle guns, Bristle Blasters™, or roto-peens will be necessary.

(2) Ensure that the surrounding area to intact coating is feathered smooth to eliminate rough edges.

(3) Any single repair area under 4 in² may be repaired with SP-2/SP-3 methods, as approved by the Engineer. Any repair area over 4 in² bare rusting steel shall be prepared in accordance with SP-11. For touch-up on Pratt Truss, care shall be taken to not destroy or remove underlying galvanizing layer on the underlying steel. If galvanizing is removed, zinc based primer shall be used in the touch-up process.

(4) Remove any dust, residue and debris prior to paint touch-up according to SP-1.

(5) Apply touch-up coats of the entire selected coating system if the damage exposes bare substrate steel. Application shall be by brush to specified thicknesses, in accordance with manufacturer's Product Data Sheet (PDS)

(6) Follow Subsection "(G) Application Requirements (Primer, Intermediate and Topcoat)" for application of coats.

QC Preparation and Application for Touch-Up areas - All areas on the Pratt and Warren Truss prepared and touched-up shall be verified for completeness by the Engineer prior to application of the Topcoat.

QC Checkpoint – Touch-Up

(F) Application of Stripe Coat (for Warren Truss)

(1) Prior to strip coating, verify all surfaces are clean and contaminant free according to SSPC SP-1.

(2) All stripe coating shall be accomplished by brush. Striping shall be applied to all edges, crevices, nuts, bolts, weld seams and tight metal-to-metal joints, with the selected epoxy intermediate coating. Stripe coat shall be of distinctly contrasting color of intermediate and topcoat to aid in determining coverage. During application, immediately brush out any runs, drips, sags or puddles. Stripe coating shall cover all edges of the structure, extending approximately ½" on either side of the edge, where applicable.

(3) Galvanized nuts and bolts, if applicable, shall be wire brushed, solvent wiped and striped and painted as described herein.

QC Checkpoint – Stripe Coat

Verify stripe coat is applied to all applicable surfaces with no visible holidays and in accordance with good painting practice as detailed in SSPC PA-1.

(G) Application Requirements (Prime Coat, Intermediate, and Topcoat), where applicable for all areas.

(1) The Contractor shall paint the bridge repair areas according to the best practices of the trade, in conformance with the recommendations of the coating manufacturer as delineated in the Product Data Sheets, observing all recommended environmental conditions, recoat windows, wet and dry film thicknesses, and in conformance with applicable portions of the Steel Structures Painting Council Specification SSPC-PA 1, except where superseded by these specifications.

(2) Coating applicators shall use wet film thickness (WFT) gages periodically to ensure proper application thicknesses. Periodic WFT measurements shall be made during paint application utilizing an approved wet film thickness gage. After sufficient cure time, dry film thickness readings shall be taken with a calibrated electronic gage, of each coat in accordance with SSPC- PA-2. DFT measurements shall not be made in areas of stripe coat, as these will be higher than specified ranges. Where thickness measurements fall below the specified minimum, make additional application of paint as necessary to meet the thickness required, at no additional cost to the State.

QC Checkpoints- Intermediate and Topcoat

Verify substrate cleanliness immediately prior to prime coat application. Clean in accordance with SSPC SP-1 if not clean prior to application of prime coat.

After cure of prime coat, accomplish a visual holiday inspection and rectify any discrepancies according to the Engineer.

Verify substrate cleanliness immediately prior to intermediate application. Clean in accordance with SSPC SP-1 if not clean prior to application of intermediate coat.

After cure of intermediate coat, accomplish a visual holiday inspection and rectify any discrepancies according to the Engineer.

Verify substrate cleanliness immediately prior to topcoat application. Clean in accordance with SSPC SP-1 if not clean prior to application of topcoat.

After cure of topcoat, accomplish a visual holiday inspection and rectify any discrepancies according to the Engineer.

Verify DFT readings of prime, intermediate and topcoats in accordance with SSPC PA-2, according to the DFT schedule listed for the selected coating system.

(3) Sufficient time shall elapse between successive coats to permit them to dry properly for recoating. Consult specific Product Data Sheet (PDS) for proper cure times. If any appreciable time elapses between painting operations, as judged by the Engineer, the coating manufacturer or Contractor shall re-clean surfaces before restarting painting operations.

(4) Apply coatings via airless spray utilizing approved equipment standard to the industry according to the instruction of the paint manufacturer. Topcoats shall be applied by airless spray to a smooth even finish free of runs, drips, sags, dry-spray, orange-peel, and holidays. (All stripe coating of the Warren Truss, and localized touch-up, as on the Pratt Truss, shall be applied by brush.)

(H) Submittals.

(1) Paint Manufacturer's Product Data Sheet (PDS). The Contractor shall submit paint manufacturer's paint product data sheet with their written warranty, including the conditions limiting the warranty. Product Certificates of Conformance

(CoC's) shall accompany all material used under this specification and shall be submitted. Any alternate materials, as described above shall be submitted to the Engineer for review at least 7 days prior to the start of production work.

(2) **Paint Manufacturer's Safety Data Sheets (SDS).** The contractor shall submit the corresponding SDS for each material supplied, including intermediate, stripe, and topcoats, along with thinning/cleaning solvents.

(3) **Abrasive.** If applicable, type and size of abrasive, along with any pertinent documentation and Certificates of Conformance shall be submitted for the abrasive used in abrasive blasting operations. The CoC for the abrasive media shall list abrasive cleanliness testing results per ASTM D4940.

(4) **Coating contractor's Quality Control (QC) reports.** The Contractor shall maintain daily surface preparation and coating inspection reports in accordance with details of the QP-1 Contractor Certification. The reports shall detail the work performed, noting areas prepared/painted, environmental conditions throughout the day (to include Substrate Temperature, Ambient Temperature, Dew Point, and Relative Humidity), product applied, batch numbers, date of manufacture, acceptance criteria, QC data, notes and any problems encountered. A weekly report shall be compiled from the daily reports and submitted to the Engineer on a weekly basis. A sample blank copy of the daily inspection report to be used shall be submitted to the Engineer prior to the start of production work.

(5) **Coating Contractor's Work Plan.** Within two weeks of starting production work, the contractor shall submit a Coating Work Plan, detailing a timetable of significant events for the entire bridge repainting process. The work plan, at a minimum, will detail coating contractor name and location, days and working hours, traffic flow disruptions, dates of mobilization, dates of containment erection, preparation and coating activities, specific equipment and methods used, and abrasive media (if applicable) data sheets, final acceptance and demobilization.

(6) **Name and resume of proposed NACE CIP Level 1 Basic coating inspector.** This shall include details of past inspection activities.

(7) **Containment Design.** Details of the level of Class and containment (per SSPC Guide 6), details of materials of construction, framing, penetrability, joints and ventilation, and lighting, if applicable. See Special Provisions Section 209 for additional information regarding the necessary BMP's, containment, and work platform as well as for measurement and payment information.

(I) **Cleanup and Disposal.** The Contractor shall clean up the entire project site of painting, cleaning debris, containment, masking material, BMP's and other debris caused by the Contractor's operations, before receiving final payment. This work shall be considered incidental to the other contract items.

QC Checkpoint- Final Acceptance

697.04 Measurement.

(A) Clean and paint existing steel members will be paid on a lump sum basis. Measurement for payment will not apply. Removal and disposal of power washing water and debris, and the use of a NACE CIP Level 1 Basic coating inspector shall be considered incidental to cleaning and painting steel members.

697.05 Payment. The Engineer will pay for the accepted pay item listed below at contract price per lump sum, as shown in the proposal schedule. Payment will be full compensation for work prescribed in this section and contract documents.

The Engineer will pay for the following pay item when included in proposal schedule:

Pay Item	Pay Unit
Clean and Paint Existing Steel Members – _____	Lump Sum

END OF SECTION 697"