STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION

ADDENDUM NO. 2
FOR
HAWAII BELT ROAD
NANUE STREAM BRIDGE REHABILITATION
VICINITY OF HILO
DISTRICT OF HILO, ISLAND OF HAWAII
FEDERAL-AID PROJECT NO. BR-019-2(077)

December 13, 2024

This Addendum shall make the following amendment(s) to the Solicitations.

A. TABLE OF CONTENTS

1. Delete **TABLE OF CONTENTS** in its entirety and replace with attached **TABLE OF CONTENTS** dated r12/13/24.

B. SPECIAL PROVISIONS

1. Delete **SECTION 501 STEEL STRUCTURES** dated 10/31/24, in its entirety, and replace with attached **SECTION 501 STEEL STRUCTURES** dated r12/13/24.

2. Delete **SECTION 627 MANAGEMENT OF CONTAMINATED MATERIALS** dated 10/31/24, in its entirety, and replace with attached **SECTION 627 MANAGEMENT OF CONTAMINATED MATERIALS** dated r12/13/24.

3. Delete **SECTION 666 BLAST, CLEAN, AND PAINT EXISTING BRIDGE STEEL** dated 10/31/24, in its entirety, and replace with attached **SECTION 666 BLAST, CLEAN, AND PAINT EXISTING BRIDGE STEEL** dated r12/13/24.

4. Delete **SECTION 667 PREPARATION AND COATING OF GALVANIZED BRIDGE STEEL** dated 10/31/24, in its entirety, and replace with attached **SECTION 667 PREPARATION AND COATING OF GALVANIZED BRIDGE STEEL** dated r12/13/24.

5. Delete **SECTION 677 PENETRATING SEALER FOR BRIDGE DECKS** dated 10/31/24, in its entirety, and replace with attached **SECTION 677 PENETRATING SEALER FOR BRIDGE DECKS** dated r12/13/24.

6. Delete **SECTION 678 HYBRID POLYMER CONCRETE (HPC)** dated 10/31/24, in its entirety, and replace with attached **SECTION 678 HYBRID POLYMER CONCRETE (HPC)** dated r12/13/24.

C. PLANS

1. Delete **PLANS SHEET NO. 30 INDEX TO STRUCTURAL DRAWINGS** and replace it with the attached **PLANS SHEET NO. ADD. 30 INDEX TO STRUCTURAL DRAWINGS**.

2. Delete **PLANS SHEET NO. 34 STRUCTURAL GENERAL NOTES** and replace it with the attached **PLANS SHEET NO. ADD. 34 STRUCTURAL GENERAL NOTES**.

3. Delete **PLANS SHEET NO. 51 ABUTMENT NO. 2 ABUTMENT SECTIONS** and replace it with the attached **PLANS SHEET NO. ADD. 51 ABUTMENT NO. 2 ABUTMENT SECTIONS**.

4. Delete **PLANS SHEET NO. 55 BENT NO.1/TRESTLE NO. 1 MEMBER ELEVATIONS** and replace it with the attached **PLANS SHEET NO. ADD. 55 BENT NO.1/TRESTLE NO. 1 MEMBER ELEVATIONS**.

5. Delete **PLANS SHEET NO. 56 BENT NO.2/TRESTLE NO. 2 MEMBER ELEVATIONS** and replace it with the attached **PLANS SHEET NO. ADD. 56 BENT NO.2/TRESTLE NO. 2 MEMBER ELEVATIONS**.

6. Delete **PLANS SHEET NO. 85 DIAGONAL BRACE SCHEDULE** and replace it with the attached **PLANS SHEET NO. ADD. 85 DIAGONAL BRACE SCHEDULE**.

7. Delete **PLANS SHEET NO. 86 DIAGONAL BRACE SCHEDULE** and replace it with the attached **PLANS SHEET NO. ADD. 86 DIAGONAL BRACE SCHEDULE**.

8. Delete **PLANS SHEET NO. 88 DIAGONAL BRACE SCHEDULE** and replace it with the attached **PLANS SHEET NO. ADD. 88 DIAGONAL BRACE SCHEDULE**.

9. Delete **PLANS SHEET NO. 91 HORIZONTAL BRACE PLAN, ELEVATION AND SECTION** and replace it with the attached **PLANS SHEET NO. ADD. 91 HORIZONTAL BRACE PLAN, ELEVATION AND SECTION**.

10. Delete **PLANS SHEET NO. 92 HORIZONTAL BRACE SCHEDULE** and replace it with the attached **PLANS SHEET NO. ADD. 92 HORIZONTAL BRACE SCHEDULE.**

11. Delete **PLANS SHEET NO. 94 HORIZONTAL BRACE SCHEDULE** and replace it with the attached **PLANS SHEET NO. ADD. 94 HORIZONTAL BRACE SCHEDULE.**

12. Delete **PLANS SHEET NO. 99 DIAGONAL BRACE SCHEDULE** and replace it with the attached **PLANS SHEET NO. ADD. 99 DIAGONAL BRACE**

SCHEDULE.

13. Delete **PLANS SHEET NO. 108 COLUMN TO BRACE CONNECTION DETAILS** and replace it with the attached **PLANS SHEET NO. ADD. 108 COLUMN TO BRACE CONNECTION DETAILS.**

14. Delete **PLANS SHEET NO. 109 COLUMN TO BRACE CONNECTION DETAILS** and replace it with the attached **PLANS SHEET NO. ADD. 109 COLUMN TO BRACE CONNECTION DETAILS.**

15. Delete **PLANS SHEET NO. 110 COLUMN TO BRACE CONNECTION DETAILS** and replace it with the attached **PLANS SHEET NO. ADD. 110 COLUMN TO BRACE CONNECTION DETAILS.**

16. Delete **PLANS SHEET NO. 111 COLUMN TO BRACE CONNECTION DETAILS** and replace it with the attached **PLANS SHEET NO. ADD. 111 COLUMN TO BRACE CONNECTION DETAILS.**

17. Delete **PLANS SHEET NO. 112 COLUMN TO BRACE CONNECTION DETAILS** and replace it with the attached **PLANS SHEET NO. ADD. 112 COLUMN TO BRACE CONNECTION DETAILS.**

18. Delete **PLANS SHEET NO. 113 COLUMN TO BRACE CONNECTION DETAILS** and replace it with the attached **PLANS SHEET NO. ADD. 113 COLUMN TO BRACE CONNECTION DETAILS.**

19. Delete **PLANS SHEET NO. 114 COLUMN TO BRACE CONNECTION DETAILS** and replace it with the attached **PLANS SHEET NO. ADD. 114 COLUMN TO BRACE CONNECTION DETAILS.**

20. Delete **PLANS SHEET NO. 115 COLUMN TO BRACE CONNECTION DETAILS** and replace it with the attached **PLANS SHEET NO. ADD. 115 COLUMN TO BRACE CONNECTION DETAILS.**

21. Delete **PLANS SHEET NO. 116 BASE COLUMN TO BRACE CONNECTION DETAILS** and replace it with the attached **PLANS SHEET NO. ADD. 116 BASE COLUMN TO BRACE CONNECTION DETAILS.**

22. Delete **PLANS SHEET NO. 117 BASE COLUMN TO BRACE CONNECTION DETAILS** and replace it with the attached **PLANS SHEET NO. ADD. 117 BASE COLUMN TO BRACE CONNECTION DETAILS.**

23. Delete **PLANS SHEET NO. 118 BASE COLUMN TO BRACE CONNECTION DETAILS** and replace it with the attached **PLANS SHEET NO. ADD. 118 BASE COLUMN TO BRACE CONNECTION DETAILS.**

24. Delete **PLANS SHEET NO. 119 BASE COLUMN TO BRACE CONNECTION DETAILS** and replace it with the attached **PLANS SHEET NO. ADD. 119 BASE**

COLUMN TO BRACE CONNECTION DETAILS.

25. Delete **PLANS SHEET NO. 120 TOP COLUMN TO BRACE CONNECTION DETAILS** and replace it with the attached **PLANS SHEET NO. ADD. 120 TOP COLUMN TO BRACE CONNECTION DETAILS.**

26. Delete **PLANS SHEET NO. 121 BRACE TO BRACE CONNECTION DETAILS** and replace it with the attached **PLANS SHEET NO. ADD. 121 BRACE TO BRACE CONNECTION DETAILS.**

27. Delete **PLANS SHEET NO. 122 BRACE TO BRACE CONNECTION DETAILS** and replace it with the attached **PLANS SHEET NO. ADD. 122 BRACE TO BRACE CONNECTION DETAILS.**

28. Delete **PLANS SHEET NO. 123 BRACE TO BRACE CONNECTION DETAILS** and replace it with the attached **PLANS SHEET NO. ADD. 123 BRACE TO BRACE CONNECTION DETAILS.**

29. Delete **PLANS SHEET NO. 124 CONNECTION REFERENCE SCHEDULE** and replace it with the attached **PLANS SHEET NO. ADD. 124 CONNECTION REFERENCE SCHEDULE.**

30. Delete **PLANS SHEET NO. 125 CONNECTION REFERENCE SCHEDULE** and replace it with the attached **PLANS SHEET NO. ADD. 125 CONNECTION REFERENCE SCHEDULE.**

31. Delete **PLANS SHEET NO. 126 CONNECTION REFERENCE SCHEDULE** and replace it with the attached **PLANS SHEET NO. ADD. 126 CONNECTION REFERENCE SCHEDULE.**

32. Delete **PLANS SHEET NO. 127 CONNECTION REFERENCE SCHEDULE** and replace it with the attached **PLANS SHEET NO. ADD. 127 CONNECTION REFERENCE SCHEDULE.**

33. Delete **PLANS SHEET NO. 128 CONNECTION REFERENCE SCHEDULE** and replace it with the attached **PLANS SHEET NO. ADD. 128 CONNECTION REFERENCE SCHEDULE.**

34. Delete **PLANS SHEET NO. 165 GIRDER FRAMING PLAN – SPAN NOS. 1 AND 2** and replace it with the attached **PLANS SHEET NO. ADD. 165 GIRDER FRAMING PLAN – SPAN NOS. 1 AND 2.**

35. Delete **PLANS SHEET NO. 168 GIRDER FRAMING PLAN – SPAN NOS. 7 AND 8** and replace it with the attached **PLANS SHEET NO. ADD. 168 GIRDER FRAMING PLAN – SPAN NOS. 7 AND 8.**

36. Delete **PLANS SHEET NO. 170 GIRDER LINE G-1 DOWNSTREAM ELEVATION** and replace it with the attached **PLANS SHEET NO. ADD. 170**

GIRDER LINE G-1 DOWNSTREAM ELEVATION.

37. Delete **PLANS SHEET NO. 171 GIRDER LINE G-1 DOWNSTREAM ELEVATION** and replace it with the attached **PLANS SHEET NO. ADD. 171 GIRDER LINE G-1 DOWNSTREAM ELEVATION.**

38. Delete **PLANS SHEET NO. 172 GIRDER LINE G-1 DOWNSTREAM ELEVATION** and replace it with the attached **PLANS SHEET NO. ADD. 172 GIRDER LINE G-1 DOWNSTREAM ELEVATION.**

39. Delete **PLANS SHEET NO. 173 GIRDER LINE G-2 DOWNSTREAM ELEVATION** and replace it with the attached **PLANS SHEET NO. ADD. 173 GIRDER LINE G-2 DOWNSTREAM ELEVATION.**

40. Delete **PLANS SHEET NO. 174 GIRDER LINE G-2 DOWNSTREAM ELEVATION** and replace it with the attached **PLANS SHEET NO. ADD. 174 GIRDER LINE G-2 DOWNSTREAM ELEVATION.**

41. Delete **PLANS SHEET NO. 175 GIRDER LINE G-2 DOWNSTREAM ELEVATION** and replace it with the attached **PLANS SHEET NO. ADD. 175 GIRDER LINE G-2 DOWNSTREAM ELEVATION.**

42. Delete **PLANS SHEET NO. 176 GIRDER LINE G-3 DOWNSTREAM ELEVATION** and replace it with the attached **PLANS SHEET NO. ADD. 176 GIRDER LINE G-3 DOWNSTREAM ELEVATION.**

43. Delete **PLANS SHEET NO. 177 GIRDER LINE G-3 DOWNSTREAM ELEVATION** and replace it with the attached **PLANS SHEET NO. ADD. 177 GIRDER LINE G-3 DOWNSTREAM ELEVATION.**

44. Delete **PLANS SHEET NO. 178 GIRDER LINE G-3 DOWNSTREAM ELEVATION** and replace it with the attached **PLANS SHEET NO. ADD. 178 GIRDER LINE G-3 DOWNSTREAM ELEVATION.**

45. Delete **PLANS SHEET NO. 179 GIRDER LINE G-4 DOWNSTREAM ELEVATION** and replace it with the attached **PLANS SHEET NO. ADD. 179 GIRDER LINE G-4 DOWNSTREAM ELEVATION.**

46. Delete **PLANS SHEET NO. 180 GIRDER LINE G-4 DOWNSTREAM ELEVATION** and replace it with the attached **PLANS SHEET NO. ADD. 180 GIRDER LINE G-4 DOWNSTREAM ELEVATION.**

47. Delete **PLANS SHEET NO. 181 GIRDER LINE G-4 DOWNSTREAM ELEVATION** and replace it with the attached **PLANS SHEET NO. ADD. 181 GIRDER LINE G-4 DOWNSTREAM ELEVATION.**

48. Delete **PLANS SHEET NO. 188 IN-SPAN CROSS FRAME DEMOLITION SECTIONS** and replace it with the attached **PLANS SHEET NO. ADD. 188 IN-**

SPAN CROSS FRAME DEMOLITION SECTIONS.

49. Delete **PLANS SHEET NO. 189 IN-SPAN CROSS FRAME DEMOLITION SECTIONS** and replace it with the attached **PLANS SHEET NO. ADD. 189 IN-SPAN CROSS FRAME DEMOLITION SECTIONS.**

50. Delete **PLANS SHEET NO. 190 EXPANSION BEARING CROSS FRAME DEMOLITION SECTIONS** and replace it with the attached **PLANS SHEET NO. ADD. 190 EXPANSION BEARING CROSS FRAME DEMOLITION SECTIONS.**

51. Delete **PLANS SHEET NO. 191 FIXED BEARING CROSS FRAME DEMOLITION SECTIONS** and replace it with the attached **PLANS SHEET NO. ADD. 191 FIXED BEARING CROSS FRAME DEMOLITION SECTIONS.**

52. Delete **PLANS SHEET NO. 194 EXTERIOR BAY STRUT SECTIONS** and replace it with the attached **PLANS SHEET NO. ADD. 194 EXTERIOR BAY STRUT SECTIONS.**

53. Delete **PLANS SHEET NO. 195 INTERIOR BAY STRUT SECTIONS AND DETAILS** and replace it with the attached **PLANS SHEET NO. ADD. 195 INTERIOR BAY STRUT SECTIONS AND DETAILS.**

54. Delete **PLANS SHEET NO. 196 IN-SPAN, ELEVATION, AND FIXED BEARING CROSS FRAME SECTIONS** and replace it with the attached **PLANS SHEET NO. ADD. 196 IN-SPAN, ELEVATION, AND FIXED BEARING CROSS FRAME SECTIONS.**

55. Delete **PLANS SHEET NO. 203 LATERAL DIAGONAL BRACING DETAILS** and replace it with the attached **PLANS SHEET NO. ADD. 203 LATERAL DIAGONAL BRACING DETAILS.**

56. Delete **PLANS SHEET NO. 204 LATERAL DIAGONAL BRACING DETAILS** and replace it with the attached **PLANS SHEET NO. ADD. 204 LATERAL DIAGONAL BRACING DETAILS.**

57. Delete **PLANS SHEET NO. 205 LATERAL DIAGONAL BRACING DETAILS** and replace it with the attached **PLANS SHEET NO. ADD. 205 LATERAL DIAGONAL BRACING DETAILS.**

58. Delete **PLANS SHEET NO. 206 LATERAL DIAGONAL BRACING DETAILS** and replace it with the attached **PLANS SHEET NO. ADD. 206 LATERAL DIAGONAL BRACING DETAILS.**

59. Delete **PLANS SHEET NO. 207 TIE PLATE ELEVATIONS AND DETAILS AT BEARINGS** and replace it with the attached **PLANS SHEET NO. ADD. 207 TIE PLATE ELEVATIONS AND DETAILS AT BEARINGS.**

60. Delete **PLANS SHEET NO. 212 PAINT/CAULKING DETAILS** and replace it with the attached **PLANS SHEET NO. ADD. 212 PAINT/CAULKING DETAILS.**

61. Add and make a part of the **PLANS** the attached **PLANS SHEET NO. 123S-1 PAINT BLOCKING DETAILS AT BOLTED CONNECTIONS**.

The following is provided for information.

A. PRE-BID MEETING MINUTES

1. The attached **PRE-BID MEETING MINUTES** and **ATTENDANCE LIST** are provided for information.

B. RESPONSES TO REQUEST FOR INFORMATION (RFIs/QUESTIONS)

1. The attached **RESPONSES TO REQUEST FOR INFORMATION** are provided for information.

C. PERMITS

1. The attached "U.S. Army Corps of Engineers (USACE), Nationwide Permit Pre-construction Notification (PCN) with attachments" is provided for information. Permit was submitted to the USACE, and is pending.

2. The attached draft "Storm Water Pollution Prevention Plan (SWPPP) and In-Water Pollution Prevention Plan (IWPPP), Nanue Stream Bridge Rehabilitation, with attachments" is provided for information, and shall be completed by the selected Contractor during preconstruction.

D. REPORTS

1. The attached "Monitor Bridge Inspection Nanue Stream Bridge, March 18, 20, and 23, 2024" report is provided for information.

2. The attached "Routine Bridge Inspection Report, Nanue Stream, March 1 and 2, 2023" and additional photographs are provided for information.

3. The attached "Underwater Bridge Inspection Report, Nanue Stream Bridge, March 1, 2023" and additional photographs are provided for information.

4. The attached "Hawaii Department of Transportation Bridge Load Rating Summary" for Nanue Stream Bridge, dated May 5, 2015, is provided for information.

5. The attached Remedial Alternatives Analysis Report for Lead Impacted Soil at Nanue Bridge, Ninole, HI, August 2024" is provided for information.

Please acknowledge receipt of this **ADDENDUM NO. 2** by recording the date of its receipt in the space provided on **PAGE P-4** of the Proposal.

Henry Kennedy

Henry Kennedy
Engineering Program Manager

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677	Penetrating Sealer for Bridge Decks	677-1a – 677-12a
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Requirement of Chapter 104, HRS
Wages and Hours of Employees on Public Works Law

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Proposal Title Page

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Surety Bid Bond

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Amend Section 501 – Steel Structures to read as follows:

"SECTION 501 - STEEL STRUCTURES

501.01 Description. This section describes construction of new steel structures and rehabilitation to existing bridge structures.

501.02 Materials

Organic Zinc Primer Paint	666.02(B) and 667.02(B)B)
Epoxy Paint	666.02(B) and 667.02(B)B)
Fluoropolymer Top Coat Paint	666.02(B) and 667.02(B)B)
Bearing Devices and Related Materials	712.09
Zinc Coating	712.10 and
Structural Steel	713.01
Standard Fasteners	718.01
High-Strength Bolts and Studs	718.02

501.03 Construction.

(A) Preliminary Submittal Requirements. Prior to the preparation of structural steel shop drawings, the following preliminary documentation shall be submitted to the Engineer for review and approval a minimum of 45-days prior to initial preparation of the structural steel shop drawings.

(1) Survey. Survey results for foundation pedestals and soffit of girders at bearing locations. See Contract Drawings for additional information.

(2) Steel Detailer Certification. National Institute of Steel Detailing (NISD) Senior Detailer – Class I Bridge Certification

(3) Steel Fabricator Certification. AISC Intermediate (IBR) Bridge Fabricator Certification for the shop that will be fabricating the trestle structure.

(4) Welding Distortion Control Program. Acknowledgement letter stating that the fabrication shop has an in place and current welding distortion control program.

(B) Pre-Fabrication Submittal Requirements. After review and approval of the preliminary submittals, the following documentation shall

be submitted to the Engineer for review and approval a minimum of 45 days prior to fabrication taking place.

(1) Shop Drawings. Submit detailed shop drawings required for steel fabrication.

Prepare shop drawings on sheets 36 inches long by 22 inches wide. Make 2-inch margin on left side of sheet and 1/2-inch margin on other three sides. Locate title block in lower right hand corner of each sheet. Title includes statement of contents of sheet, location of structure, project name, and project number, if any.

Submit shop drawings for review. The Engineer will return comments and corrections. Make corrections and resubmit all sheets for additional review until Engineer accepts shop drawings. Prepare and submit shop drawings at no increase in contract price or contract time. Changes to accepted shop drawings without written consent from the Engineer will not be allowed. Steel fabrication before shop drawing acceptance by the Engineer will not be allowed.

(a) Initial Centerline Drawings. Initial drawings showing the centerline of all columns and braces and their associated work points, brace level elevations, WP elevations and dimensions at top of column, elevation of top of column seat, WP elevations and dimensions at bottom of column, elevations at top of concrete foundation pedestal and any other pertinent information to establish the framework for what the developed shop drawings will be based on.

(b) Detailed Shop Drawings. Following approval of the initial drawings, prepare detailed shop drawings that will be required for steel fabrication. Due to the complexity of the structural elements and the battered column arrangement, the shop drawings shall be developed using both 2-dimensional and 3-dimensional software programs. The submittal packages shall be discretized into 5 different packages (based on the 5 different trestles) to make the review process more manageable. Additional shop drawings for other ancillary elements shall be submitted separately. Submit shop drawings to the Engineer for review and approval. The shop drawings shall include the following:

(1) Details for connections not dimensioned in the contract documents.

(2) Direction of rolling of plates where the contract documents require specific orientation.

(3) Procedures for creating holes in plates.

(4) Dimensions and details of erection plate (including placement of holes) in accordance with the requirements of the Contractor's Engineer.

(5) Dimensions for all gusset plates.

(6) Details that affect the shop drawings based on the specifics of the Erection Plan. Drilling/Welding to fabricated/painted members will not be allowed.

(7) Pretension connections and Slip-critical connections (if applicable) and connections subject to direct tension.

(8) Weld types, sizes, and details.

(9) Hardware types, size, grade, and tensioning requirements.

(10) Specification and grade of all structural elements including CVN testing requirements.

(11) Matchmark labeling and diagrams for all members.

(12) Surface Specifications and finish.

(13) Drainage holes (if needed) for galvanizing process.

The nominal width dimensions for the built-up trestle brace members are based on the dimensions between the double gusset plates welded to the trestle columns. The actual width dimensions for the built-up trestle brace members, as detailed on the shop drawings, shall be slightly less to account for the dry film thickness (DFT) of the hot-dip galvanized and painted members. Otherwise, painted surfaces of trestle brace may not fit between opening of painted double gusset plates during field erection. The steel detailer shall account for the mil thickness of galvanizing and maximum potential DFT of the final paint system when determining appropriate dimensions.

(2) Welder Certifications. AWS D1.5 Current Welder Certifications qualifying the welder for each type of weld, unless otherwise qualified by accompanying PQR.

(3) WPS. AWS D1.5 Welding Procedure Specifications (WPS)

(4) PQR. AWS D1.5 Procedure Qualification Records (PQR) to qualify necessary welding procedures, as required

(5) Welding Distortion Control Plan. Current and documented plan that details and specifies how to minimize or prevent distortion of welded assemblies for the trestle structure elements.

(6) Hardware Order List and Diagrams. Type, grade, size, finish, length, grip, etc. for all bolt assemblies.

(7) DTI Washer. Submit product literature for the DTI washer and any specific installation instructions and inspection criteria to follow.

(8) Acknowledgement Letter. Acknowledgement letter from galvanizing shop that dipping process includes centrifugally spun hardware and that threads are not chased.

(C) Pre-Fabrication/Construction Submittal Requirements. Before any fabrication or construction is to take place, the following documentation shall be submitted to the Engineer for review and approval.

(1) Mill Certs. Mill Certifications and Test Reports (including CVN testing) for steel shapes, plates, and hardware while indicating lot traceability numbers.

(2) Galvanizing Records. Galvanizing certification including lot traceability numbers.

(3) Rivet Removal Plan. The Contractor shall submit a work plan for how the rivets on the existing bridge superstructure will be removed. This plan must adequately describe and demonstrate the removal of a rivet without damaging the base metal. Use of torches will not be allowed.

(4) HS Bolting QC Inspector. Provide the name, contact information, and credentials for the designated Structural Bolting Inspector.

(5) QC Certified Welding Inspector (Shop). Provide the name, contact information, and credentials for the designated Certified Welding Inspector performing work at the fabrication shop.

(6) QC Certified Welding Inspector (Field). Provide the name, contact information, and credentials for the designated Certified Welding Inspector performing work in the field.

(7) Report of Full Size Trestle Trial Erection. Trial erection shall be performed in the fabrication shop using the complete Trestle No.1/Bent No. 1 structure. Assemble the entirety of the structure to ensure fit-up and geometry can be achieved. The report should include sufficient photos and measurements of key

components to ensure that overall geometry of the structure is maintained. Additionally, note clearance between trestle brace members and double gusset connection plates.

(8) Trestle Erection Plan. The Contractor is required to retain the services of a Structural Engineer licensed in the State of Hawaii, herein referred to as the Contractor's Engineer. The Contractor's Engineer is responsible for providing a detailed plan for the replacement of the steel trestles. The Contractor's Engineer shall be involved throughout the duration of the project and shall be responsible for ensuring construction is in accordance with their design.

The Contractor's Engineer is responsible for providing a detailed erection plan for the replacement of the steel structures. The erection plan and procedures shall provide complete details of the erection process including but not limited to:

(a) Temporary Falsework. Temporary falsework supports/bypass columns, bracing, guys, deadmen, overhead lifting gantry/trolley system and attachments to existing steel structure and concrete foundations.

(b) Sequence. Procedures and operations showing the sequencing of the element replacement.

(c) Lifting Points. Details showing how members will be picked including lift points and lifting devices. Lifting plan shall consider individual member masses and center of mass. Indicate how members will be lifted without damaging the finish coating.

(d) Lifting Equipment. Crane(s) make and model, mass, geometry, lift capacity, outrigger size, and reactions. Additionally, any overhead rolling gantry/trolley system used to maneuver bridge elements beneath the superstructure shall be detailed including their attachment to existing members.

(e) Crane Locations. Locations of cranes and trucks delivering material from bridge deck. Include structural analysis/load rating of existing bridge or temporary falsework to validate capacity for any specialty vehicles.

(f) Traffic Control Plan. Indicate what traffic control closure plan will be implemented during the different stages of trestle member replacement.

(D) During Fabrication/Construction Submittal Requirements. During fabrication and construction of the project, the following documentation shall be submitted to the Engineer for review and approval on a consistent and timely basis.

(1) QC Welding Inspection Reports. Daily inspection reports summarizing the inspection activities for the different welding operations. Reports shall include any NDT that was performed, including acceptance criteria. Reports shall indicate which structural members the welding work was performed on and the quantity of work completed.

(2) QC High Strength Bolting Inspection Reports. Daily inspection reports summarizing the inspection activities for the different bolting operations. Reports shall indicate the location where bolting work was performed and the quantity of work completed.

(E) Fabrication Shop Inspections. Give advanced notice of fabrication shop work, and work locations to the Engineer so QA testing and inspectional procedures may be arranged and prepared.

The fabrication shop shall be made available to the Engineer for QA inspection of material and workmanship. Allow inspectors free access to necessary parts of the work.

The Contractor shall provide a QC certified welding inspector (CWI). The CWI shall be responsible for inspection of materials, WPS qualification, equipment, welders/weld operator qualifications, production weld work, and any non-destructive testing (NDT) as required by AWS D1.5.

When the Engineer requires test specimens, certifications, or QC records the Contractor shall furnish specimens and certifications at no increase in contract price or contract time.

NDT shall be performed on specific welded elements in accordance with and at frequency intervals as indicated in Table 8.1 of AWS D1.5.

The QC CWI shall prepare daily welding inspection reports and NDT reports and submit them to the Engineer on a timely basis.

(F) Shop Work and Fabrication. Keep structural material clean and free from damage caused by improper handling during loading, transporting, and storage.

Furnish and follow methods and procedures for preparation, handling and inspection, shop assembly of material, and details of fabrication conforming to Section 6 – Steel Structures, in AASHTO LRFD Bridge Design Specifications.

Furnish and perform methods and procedures for shop welding in accordance with AWS D1.5 and AASHTO LRFD Bridge Design Specifications.

Electro-slag welding will not be allowed.

Steel plates for columns shall be cut and fabricated so that the primary direction of rolling is parallel to the column length. For column splice plates, the direction shall be parallel to the direction of the splice. For base plates, the direction shall be parallel to the centerline of the bent.

Abutting ends of compression members shall be faced accurately so that they bear evenly when in the Structure. On built-up column members, the ends shall be faced or milled after fabrication and prior to galvanizing.

The various pieces forming one built-up member shall be straight and close fitting, true to detailed dimensions, and free from twists, bends, open joints, or other defects.

Unless otherwise indicated, the ends of the lacing bars shall be rounded to a uniform radius as shown on the plans.

All welded connections shall receive full seal welding along all edges of faying surfaces to prevent moisture intrusion. Skip welding will not be allowed.

(G) Hot-Dip Galvanizing.

(1) General. Steel elements shall be hot-dip galvanized after fabrication is complete in accordance with ASTM A123 and Subsection 712.10 – Zinc Coating. Fabrication shall include shearing, punching, forming, bending, and welding. If sections need to be straightened after galvanizing, straighten without damaging spelter coating. Protect elements against hydrogen embrittlement in conformance with ASTM A143. Post-galvanizing quenching/passivation shall not be utilized for steel since it is going to paint.

Prior to hot-dip galvanizing, all welding flux and slag shall be completely removed using mechanical methods to ensure proper zinc adhesion. Vent holes may be provided in members for hot-dip zinc galvanized operation. Size and location of holes shall be determined by galvanizing contractor, unless otherwise shown on the drawings. Vent hole sizes and locations shall be included on the structural steel shop drawings. All holes, other than base plates, and where noted shall be filled with zinc plugs following galvanizing operation.

The galvanizer shall be responsible for visually examining all galvanized members after cooling and performing surface smoothing prior to the members leaving the shop. The surfaces

shall be free of all bumps, runs, drips, and dross particles that would otherwise affect the coating process.

(2) Repairing Damaged Zinc-Coated Surfaces. Repair zinc coating that has chipped off or been damaged in handling, transporting or welding. Thoroughly clean damaged zinc-coated surfaces by wire brushing damaged area. Remove sags, welds, and loose and cracked spelter coating. Paint cleaned area after completing the following procedures:

Apply coating material conforming to Federal Specification O-G-93, stick form, in accordance with method conforming to Annex A1 of ASTM A780. Prepare the surface of steel and heat coated surface with torch at sufficient temperature to melt repair material without damaging the surrounding zinc coating.

(3) Galvanized Hardware. All hardware, including bolts, anchor bolts, nuts and hardened washers shall be ASTM F2329 hot-dip zinc galvanized. Hardware shall be centrifugally cleaned post galvanizing. Nut threads shall be tapped oversized prior to galvanizing in accordance with ASTM A563 and are prohibited from being chased following the galvanizing process. DTI washers shall be mechanically zinc galvanized in accordance with ASTM B695, Class 55.

(H) Erection

(1) General. The Engineer will inspect erection work. The Contractor shall provide access to work site/facilities for thorough inspection of erection work

(2) Tools. The appropriate tools, machinery, and appliances, including drift pins, spud wrenches, fitting-up bolts, and hydraulic tension calibrators necessary for handling of work shall be on-site.

(3) Handling and Storing Materials. Place materials on skids above ground. Keep storage area clean and properly drained. Support long members such as columns and braces on skids. Place skids close enough together to prevent damage from deflection. Store kegs of bolts so that they are sealed and placed under cover out of the elements when not in use.

(4) Falsework. Design, construct, and maintain falsework to handle required loads. Submit plans and calculations for falsework stamped and signed by Hawaii Licensed Structural Engineer. Acceptance of the Contractor's plans by the Engineer does not relieve the Contractor or their Engineer responsibility for correctness and completeness of drawings and for fit of shop and field connections.

Support falsework off of existing concrete foundations and not the surrounding soil.

(5) Methods and Equipment. Before erection begins, submit proposed method of erection and proposed number and character of equipment. Submit erection procedures prepared, stamped, and signed by a Hawaii Licensed Structural Engineer who is familiar with heavy rigging. Do not begin work until written acceptance is received from the Engineer.

(6) Bearing and Anchorages. Do not place bearing plates upon bridge seat bearing areas that are improperly finished, deformed, or irregular. Set bearing plates level in exact positions with full and even bearing upon masonry. Place bearing plates on fabric or elastomeric pads as indicated in the Contract Documents.

(7) Straightening Bent Materials. Straighten plates, stiffeners, angles, and other shapes (as indicated on the contract drawings) by methods that will not produce fracture or other damage. Do not heat metal unless permitted by the Engineer. Submit proposed straightening procedures to the Engineer for review and approval.

After straightening bends or buckles, inspect metal carefully for fractures, by method other than visual, that is acceptable to the Engineer.

(8) Removal of Rivets. Any existing riveted connection with unacceptable section loss (see contract drawings for details) shall be replaced with an ASTM F3125, Grade A325, Type 1 pretensioned bolt with approval from the Engineer. Prior to insertion of the bolt, the existing hole shall be drilled to 15/16" diameter and cleaned with a wire brush.

(9) Assembling Steel. Assemble parts accurately, following match-marks. Handle material carefully so as not to bend, break, or damage the coating on members. Hammering that may damage or distort members will not be allowed. Clean bearing surfaces, as well as surfaces in permanent contact, before assembling members.

(10) Field Welding. Field welding for substructure erection shall not be permitted. Field welding of superstructure elements shall only be permitted as explicitly shown on the contract drawings. All welding shall conform to the latest ANSI/AASHTO/AWS D1.5 Bridge Welding Code. Welding shall be performed in accordance with a Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) as required in AWS D1.5. The WPS variables shall be within the parameters established by the filler-metal manufacturer.

All welding shall be done by certified welders in conformance with the Bridge Welding Code AWS D1.5 of the American Welding Society. All Welder Certifications, WPS's and supporting PQR's shall be submitted to the Engineer for review and approval prior to any welding being performed.

Welding shall be performed in such a manner to minimize warping and distortion of steel pieces being joined. Excessive concentrated heat being applied to steel pieces shall be avoided. All welded connections shall receive full seal welding along all edges of faying surfaces to prevent moisture intrusion.

All existing open holes left in the bridge superstructure shall be plug welded.

The Contractor shall provide a QC certified welding inspector (CWI). The CWI shall be responsible for inspection of materials, WPS qualification, equipment, welders/weld operator qualifications, production weld work, and any non-destructive testing (NDT) as required by AWS D1.5.

When the Engineer requires test specimens, certifications, or QC records the Contractor shall furnish specimens and certifications at no increase in contract price or contract time.

NDT shall be performed on specific welded elements in accordance with and at frequency intervals as indicated in Table 8.1 of AWS D1.5.

The QC CWI shall prepare welding inspection reports and NDT reports and submit them to the Engineer on a timely basis.

(11) Bolted Connections. Do not use bolted connection, except for field splices or as detailed in the contract documents. Use high-strength bolts, nuts, and washers of type and dimensions specified at locations indicated in the contract documents.

Matched Bolt Assemblies shall contain bolt, nut, and washer provided by the same supplier. Bolts shall be high-strength steel bolts conforming to ASTM F3125, Grade A325, Type 1. Use bolts that are long enough to extend entirely through nut, but not by more than 1/2 thickness of nut. Use two nuts for bolts in tension.

Bolts shall be ordered such that threads are excluded from the shear plane (i.e. outside of the grip). Diameter of bolt shall be as indicated on the contract drawings. Diameter of bolt holes shall be standard size, unless slotted or oversized holes are otherwise shown/permitted on the contract drawings.

Furnish bolted connections using the following provisions:

(a) General. Installation of all bolted assemblies shall be in accordance with the latest Research Council on Structural Connections (RCSC) Specification for Structural Joints Using High-Strength Bolts.

(b) Cleanliness. Clean contact surfaces for high-strength bolted connections of dirt, grease, paint, lacquer, and other material foreign to steel, before assembly.

(c) Washers. All bolt assemblies shall contain a hardened washer and only pretensioned bolt assemblies shall contain both a hardened washer and direct tension indicating (DTI) washer. Refer to contract drawings for the arrangement of hardened washer and DTI. If no direction is provided, refer to the RCSC guidelines.

(d) Snug-Tightened Joints. Where joints on the contract drawings are not specified as pretensioned or slip-critical, the bolted connection shall be brought to a snug-tightened condition where all of the plies in a connection have been pulled into firm contact by the bolts in the joint and all of the bolts in the joint have been tightened sufficiently to prevent the removal of the nuts without the use of a wrench. All bolt holes shall be aligned to permit insertion of the bolts without undue damage to the threads. Bolts shall be placed in all holes with washers positioned beneath the nut. Installation and tightening of the bolts shall progress in a systematic manner starting from the most rigid part of the joint until all bolts are completed.

(e) Pretensioned Joints. Where joints on the contract drawings are specified as pretensioined, the bolted connection shall utilize direct tension indicating (DTI) washers. (DTIs) shall be placed with the protrusions facing the bolt head when under the bolt head, or with the protrusions facing the nut when under the nut. DTIs shall be installed by a two person crew with one individual preventing the stationary element from turning and measuring the gap of the DTI to determine the proper tension of the bolt. All bolts in a connection shall be snug tightened prior to bringing any DTIs in the connection to a full load. Pretensioned bolts shall not be reused. Touching up or retightening previously tightened bolts which may have been loosened by the tightening of adjacent bolts shall not be considered as reuse, provided the snugging up continues from the initial position.

(1) Submit procedures for installation and specific inspection requirements for the direct tension indicator washers, as recommended by the manufacturer, to the Engineer.

(f) Other Tightening Procedures. Tightening of ASTM F3125 bolts by the calibrated wrench method will not be allowed. Tightening of ASTM F1554, Grade 105 anchor bolts shall be pretensioned by turn-of-nut method. See contract drawings for anchor bolt pretensioning.

(g) Nut Positioning. Locate nuts wherever practicable on side of member that will not be visible from the outside, or as otherwise shown in the contract drawings.

(h) Bolting Inspector. The Contractor shall provide a QC High Strength Bolting Inspector to ensure that all field bolted connection work in progress is in accordance with the specifications and standards. All inspection work, including material inspection, pre-installation verification testing, visual inspection, and tension checks shall be in strict accordance with RCSC's Specification for Structural Joints Using High-Strength Bolts.

The QC High Strength Bolting Inspector shall prepare daily inspection reports and submit them to the Engineer on a timely basis.

The work site shall be made available and accessible to the Engineer performing QA inspection, including any necessary work platforms or manlifts needed to access the joint locations.

(i) Material Inspection. The inspector shall verify the bolting materials and that they have proper markings and proper documentation. Verify that materials are properly stored. Verify adequate lubrication is present for the fastener components (if other than DTI methods are specified).

(j) Rotational Capacity Testing. The inspector shall observe the Rotational Capacity Testing. High strength bolt assemblies (bolt, nut, washer) shall be subjected to a rotational capacity test (AASHTO High Strength Bolts Procedures for Performing Rotational Capacity Test A325) prior to any erection activity. Each bolt size and length combination within a production lot shall be tested as an assembly. All tests shall be performed by the Contractor in the presence of the Inspector. Two specimens per lot shall be tested at the erection site immediately prior to installation, or whenever the Engineer deems it necessary.

(k) Pre-Installation Verification Testing. The inspector shall observe the pre-installation verification testing for each bolt size and length combination within a production lot.

(l) Snugging and Pretensioning. The inspector shall be present to observe that the bolted joints have been properly snugged tight and pretensioned such that the DTI has compressed to within acceptable range of the manufacturer and specification requirements.

(12) Assembling and Bolting. To begin bolting any field connection or splice, the Contractor shall install and tighten to snug-tight enough bolts to bring all parts into full contact with each other prior to tightening these bolts to the specified minimum tension. "Snug-tight" means either the tightness reached by (1) a few blows from an impact wrench or (2) the full effort of an ironworker using a spud wrench.

As erection proceeds, all field connections and splices for each member shall be securely drift pinned and bolted in accordance with the provisions described below before the weight of the member can be released. Field erection drawings shall specify pinning and bolting requirements that meet or exceed the following:

(a) Fifty percent of the holes in a single field connection and 50-percent of the holes on each side of a single joint in a splice plate shall be filled with drift pins and bolts. Thirty-percent of the filled holes shall be pinned. Seventy-percent of the filled holes shall be bolted and tightened to snug-tight. Once all these bolts are snug-tight, each bolt shall be systematically tightened to the specified minimum tension. "Systematically tightened" means beginning with bolts in the most rigid part, which is usually the center of the joint, and working out to its free edges. The fully tensioned bolts shall be located near the middle of a single field connection or a single splice plate. Drift pins shall be placed throughout each field connection and each field joint with the greatest concentration in the outer edges of a splice plate or member being bolted.

Prior to placement of any additional weight or adding of the next member, the joint must be completed by filling all remaining holes of the field connection or splice plate with bolts and tighten to snug-tight. Once all of these bolts are snug-tight, each bolt shall be systematically tightened to the specified minimum tension. After these bolts are tightened to the specified minimum tension, the Contractor shall replace the drift pins with bolts tightened to the specified minimum tension.

In lieu of the aforementioned method, the Contractor may opt to complete a field bolted connection or splice in a continuous operation before releasing the mass of the member or adding the next member. The Contractor shall utilize drift pins to align the

connection. The alignment drift pins shall fill between 15 and 30-percent of the holes in a single field connection and 15 to 30-percent of the holes on each side of a single joint in a splice plate. Once the alignment drift pins are in place, all remaining holes shall be filled with bolts and tightened to snug-tight, starting from near the middle and proceeding toward the outer gage lines. Once all of these bolts are snug-tight, the Contractor shall systematically tighten all these bolts to the specified minimum tension. The Contractor shall then replace the drift pins with bolts. Each of these bolts shall be tightened to the specified minimum tension.

The Contractor shall not perform touch-up painting of joints until the Engineer has inspected and accepted field bolting.

(I) Painting.

See Special Provisions Section 666 – Clean and Paint Existing Bridge Steel.

See Special Provisions Section 667 – Preparation and Coating of Galvanized Bridge Steel.

(J) Removal of Falsework. Upon completion of the erection process and before final acceptance of the structure by the Engineer, remove all falsework, temporary works items, extra materials, and rubbish.

501.04 Measurement.

(A) Steel will be paid on a lump sum basis. Measurement for payment will not apply.

(B) Refurbish Lifeline System will be paid on a lump sum basis. Measurement for payment will not apply.

(C) The Engineer will measure High Strength Bolt Assembly to Replace Corroded Rivets on a force account basis in accordance with Subsection 109.06 – Force Account Provisions and Compensation and as ordered by the Engineer.

(D) The Engineer will measure Additional Steel Repairs on a force account basis in accordance with Subsection 109.06 – Force Account Provisions and Compensation and as ordered by the Engineer."

501.05 Payment. The Engineer will pay for the accepted pay items listed below as shown on the proposal schedule. Payment shall be full compensation for furnishing, fabricating, galvanizing, delivering, erecting, and fastening steel bridge components and for materials, hardware, labor, inspection, equipment,

tools, temporary works (including falsework), Engineering design services, and incidentals necessary to complete the work.

Pay Item	Pay Unit
Steel for _____	Lump Sum
Refurbish Lifeline System	Lump Sum
High Strength Bolt Assembly to Replace Corroded Rivets	Force Account
Additional Steel Repairs	Force Account

The Engineer will pay for bridge bearings in accordance with and under Section 506 – Bridge Bearings.

The Engineer will consider galvanizing of structural steel, including hardware, forgings and castings, and the cost connected incidental to “Steel”. The Engineer will not make separate payment.”

END OF SECTION 501

Make the following section a part of the Standard Specifications:

"SECTION 627 – MANAGEMENT OF CONTAMINATED MATERIALS

627.01 Description. This section describes the following:

The soil investigation at the project area was conducted to identify the presence of the potential contaminants that may be encountered during the construction activities associated with the Nanue Bridge Repairs, Ninole, Hamakua, Hawaii project. Lead was detected at concentrations above the State of Hawaii, Department of Health (DOH) Tier 1 EAL for construction/industrial land use (800 mg/kg) in samples collected from 0-3", 3-6", and 6-9" below ground surface (bgs). Arsenic was also detected in concentrations that exceeded the HDOH Tier I EALs of 24 mg/kg. While the residential direct exposure is set to 23 mg/kg the highest exceedance was 32 mg/kg in DU8 at 6 to 9 inches bgs. Refer to the Nanue Bridge Remedial Alternative Analysis, dated August, 2024, prepared by EnviroQuest, Inc.

Soils impacted by lead may be encountered during the bridge rehabilitation project and shall be handled in accordance with this specification and State and Federal Regulations.

627.02 Materials. Not applicable.

627.03 Construction.

(A) Submittals Prior to Construction. Submit the following submittals a minimum of ten (10) working days prior to beginning the work:

(1) Construction – Environmental Hazard Management Plan (C-EHMP): A plan shall be submitted for review that describes the procedures, engineering controls and methods the Contractor will use during the excavation, temporary storage, handling, treatment, backfilling and disposal of soil at the project site. The plan should also include soil stockpiling, testing, backfilling procedures, personal protection requirements, work area isolation, construction barriers, wetting methods, decontamination procedures, and emergency procedures.

The plan shall include the names and qualifications of personnel who will be managing soil activities at the site. The plan should also include copies of current training and certification of all workers by an EPA-approved Hazardous Waste Operations and Emergency Response course, respirator fit testing documentation, and medical clearances.

(2) Proposed schedule of work and performance schedule.

(3) A sketch identifying the location of temporary soil stockpiling.

(B) Construction Requirements. Do not begin work until submittals detailed in **627.03(A)(1)** - **Construction – Environmental Hazard Management Plan (C-EHMP)** are completed and accepted in writing by the Engineer.

The Contractor shall examine the project site to understand conditions that may affect work and performance.

The Contractor shall supply all labor, materials, and equipment necessary for the removal, temporary storage, testing, handling, soil backfilling and management of soil to carry out the work in accordance with applicable Federal, State, and local regulations, and these specifications. On-site management and reuse of soil will be the main approach for dealing with soil that must be relocated during the construction of repairs to the bridge. Soil below the bridge is contaminated with lead and any excavation required to complete the construction activities will require workers to be trained and to follow the guidelines set forth in 40CFR 1910.

The anticipated remedial alternative for the lead impacted soil is to leave it in place under land use controls with periodic inspections and posting signs describing the hazard. Soil is assumed to contaminated with lead to a depth of at least 12 inches below the surface in the entire area of the DOT right-of-way. Soil disturbed during this activity is not required to be removed from the site in anticipation of the preferred remedial alternative for this site.

Soil excavation activities, trenching and any disturbance of lead containing soil may cause a potential exposure to Contractor's employees and the general public to fugitive dust. The routes of exposure of dusts are by inhalation, ingestion and dermal contact. The Contractor shall use engineering controls such as water spraying and wind barriers to control fugitive dust.

The Contractor shall provide a Qualified Environmental Professional (QEP) with at least 5 years of experience in the handling and management of soils impacted by hazardous chemicals to manage the project. Contractor shall be responsible for implementation of the engineering controls and conformance with the requirements of this specification. The QEP shall be responsible for monitoring and documentation of the engineering controls and conformance with the requirements of this specification.

(C) Submittals After the Construction. Submit the following submittals within 30 days after work is completed.

(1) Close-out Report shall include the following:

i. Laboratory results for any soils or groundwater subject to sampling.

ii. The Waste Manifest signed by the Contractor, waste transporter, and landfill operator. The total quantity of waste should also be included.

iii. A signed certificate stating that the removal and disposal of contaminated items were completed in accordance with the Contractor's approved Work Plan and all applicable rules and regulations.

iv. If required, any results from project air monitoring.

(D) References.

(1) Quality Standards. All work under this contract shall be performed in strict accordance with all applicable Federal, State, and local regulations, standards, and codes governing lead-impacted soil.

(2) The most recent editions of any relevant regulation, standard, document, or code shall be in effect. When conflict regarding the requirements or with these specifications arises, the most stringent requirements shall apply. Such documents include, but are not limited to, the following:

i. 29 CFR 1910, "Occupational Safety and Health Standards" (General Industry Standards)

ii. 29 CFR 1910.120, "Hazardous Waste Operations and Emergency Response"

iii. 29 CFR 1910.134, "Respiratory Protection"

iv. 29 CFR 1910.1000, "Air Contaminants"

v. 29 CFR 1910.1020, "Access to Employee Exposure and Medical Records"

vi. 29 CFR 1910.1200, "Hazard Communication"

vii. 29 CFR 1926, "Safety and Health Regulations for Construction" (Construction Industry Standards)

viii. 40 CFR 50, "National Primary and Secondary Ambient Air Quality Standards A"

ix. 40 CFR 122, "EPA Administered Permit Program: The National Pollutant Discharge Elimination System"

x. 40 CFR 261, "Identification and Listing of Hazardous Waste"

xi. 40 CFR 263, "Standards Applicable to Transporters of Hazardous Waste"

xii. 40 CFR 302, "Designation, Reportable Quantities, and Notification"

xiii. 49 CFR 172, Subpart E, "Labeling"

xiv. 49 CFR 172 Subpart F, "Placarding"

xv. 12-8-3-148.1, "State of Hawaii, Safety and Health Regulation for Construction" (Construction Industry Standard)

xvi. 12-202-33, "A Hawaii Occupational Safety and Health Standards"

xvii. HDOH, 2012. Evaluation of Environmental Hazards at Sites with Contaminated Soil and Groundwater, Volume 2: Background Documentation for the Development of Tier 1 Environmental Action Levels, Appendices 2-9. Fall 2011. Prepared by: Hawaii Department of Health, Environmental Management Division. Fall 2011 (Revised Fall 2017).

xviii. TGM, 2008, Technical Guidance Manual for the Implementation of the Hawaii State Contingency Plan, State of Hawaii Department of Health Hazard Evaluation and Emergency Response Office, Interim Final - in Effect October 31, 2018.

(E) Excavation and Disturbance of Soil. During the excavation and

disturbance of lead-containing soil, all workers, supervisory personnel, subcontractors and consultants must take precautionary measures as necessary to prevent exposure of Contractor's employees and the general public to the resulting soil dust.

(F) Contractor Training. Each employee shall be instructed for a minimum of 40 hours by a trained professional in hazardous materials operations and emergency response, awareness and work practices, safety and health precautions and the use and requirements for protective clothing, respirators, and equipment in accordance with 40CFR1910.120. A certificate of training, signed and dated by the trainer, shall be provided for each worker. The Contractor shall designate a competent person(s) to perform or supervise soil excavation and disturbance.

(G) Personal Protective Equipment.

(1) Protective Clothing. Furnish personnel involved in removal, handling, disposal of soil and contaminated items with impervious, disposable, whole body protective covering, face shields with goggles and impervious gloves. All the protective clothing shall be worn throughout the removal of contaminated items and shall be replaced as necessary.

(2) Respirators. Provide as a minimum, half-face respirators approved by the National Institute for Occupational Safety and Health (NIOSH), Department of Health and Human Services, with filters approved for use in atmospheres that contain lead.

(3) Warning Signs and Labels. Provide warning signs at approaches to the work area. Locate signs at such a distance that personnel may read the sign and take necessary precautions before entering the area. Provide and affix labels to Department of Transportation (DOT) approved waste drums and other containers of containing contaminated materials. The caution label must display the **following in bold print: Caution: May Contain Lead**. "No Smoking" signs, warning signs and labels shall be provided throughout the entire project and as deemed necessary by the QC.

(H) Polyethylene Sheeting. Sheet plastic shall be new, clear or black with at least 20-mil thickness. 6-mil plastic can be used to cover the stockpiles.

(I) General Work Procedures.

(1) Prior to beginning work, the Contractor and the QC shall discuss the approved Plan, including work procedures and safety

precautions. At the conclusion of the project, the Contractor shall submit a signed certificate stating that the removal and disposal of contaminated items were completed in accordance with the Contractor's approved Plan and all applicable rules and regulations.

(2) Contractor is responsible for providing their personnel with appropriate training and protective equipment while they are performing work and shall ensure compliance with any and all regulations concerning safety and health of their employees.

(3) Boundaries shall be established at each area where soil excavation/disturbance is to be performed. The area should be clearly identified to prevent unauthorized entry. Establish a control area by completely enclosing/roping-off the area where lead contaminated soil excavation, removal, stockpiling and disposal operations will be performed.

(4) Provide physical boundaries around the lead control area by roping off the area to ensure that airborne concentrations of contaminants will not reach their action levels and/or permissible exposure limits outside the control area.

(5) Caution signs shall be placed at the entrances to each work area, located such that approaching personnel may read the signs and take necessary precautions before entering the work area. No one will be permitted in the work area unless the person is provided with appropriate training and protective equipment and their presence is necessary to the removal work.

(6) There shall be no eating, smoking, drinking, or storing of food or drink within work areas.

(7) Select and conduct the removal procedure to minimize the potential spread of contamination. Handle contaminated items such that no skin contact occurs. Contaminated materials shall not be exposed to open flames or other high temperatures.

(8) Before exiting the controlled area and before food breaks, each worker will remove all personal protective equipment, place disposable items in a labeled, impermeable disposal bag, and then exit the area. Workers shall wash their hands thoroughly with a detergent soap to remove contamination. Boots shall be cleaned to minimize tracking of contaminated material from the work area.

(9) At the completion of work in an area, the work area shall be cleaned as necessary and all contaminated clothing, disposable

personal protective equipment surface coverings, and waste material shall be disposed of with the contaminated items.

(J) Soil Disturbance/Excavation. The Contractor shall notify the Engineer at least 10 working days prior to the start of excavation of lead impacted soil. Stage operations to minimize the amount of time lead impacted soil are exposed to the weather. Provide protection measures around the area of lead impacted soil to divert runoff of water from within the excavation boundaries. Runoff that comes in contact with lead impacted soil shall be retained onsite and shall not be allowed to drain off-site or into storm water conveyances systems.

(1) The Contractor's QEP shall be continuously on-site to inspect excavated soil to expedite the work.

(2) Prior to any disturbance/excavation activities, locate the area identified in the approved Work Plan where excavated soil will be stockpiled.

(3) Soil stockpiles shall be placed onto 20-mil plastic sheeting and covered with 6-mil plastic sheeting and secure the edges of the liner with a soil berm, stakes, or equivalent to contain potential surface water runoff.

(4) After the completion of construction activities, it may be necessary to relocate the excavated soil back to its original position to prevent future mobilization or slipping down the steep slope under the Nanue Bridge.

(5) Consideration of the way soil is removed from its current location (e.g., around the base of the concrete bent supports) and stockpiled is important. Measures must be taken to ensure that both temporarily and permanently relocated soil does not slip down the side of the slope and end entering the Nanue stream. Soil stockpiles shall be placed on 20-mil plastic sheeting and covered to protect from rain, wind, etc. Soil stockpiles shall be kept a maximum height of 12 inches to prevent slumping and drift due to the steep slope. In addition, stockpiles of contaminated soils shall be bermed on upper and lower edges to keep rainwater from entering the stockpile and from migrating away from the stockpiles and ultimately off-site

(6) If the soil removal exceeds a depth of 12 inches deep in any excavation, ideally this soil below this depth would be segregated from the soil from the upper 12 inches and replaced over the soil removed from the upper 12 inches at the end of the project to

prevent future exposure. Records of the areas that this type of soil replacement reverse stratigraphy must be kept and included in a final close-out report prepared by the QEP as identified in the C-EHMP.

(7) Removed soil shall be re-used or spread out at the site following completion of subsurface soil excavation activities.

(K) Final Cleanup.

(1) Maintain surfaces in the work area to be free of accumulations of contaminated materials. Restrict the spread of dust and debris, and to keep waste from being distributed over the work area.

(2) When work which disturbs contaminated soil has been completed, the Engineer will visually inspect the work area for evidence of contaminated materials and direct the Contractor to clean and remove remaining contaminated materials. The Contractor shall not dismantle the work area boundaries prior to authorization by the Engineer.

(3) Earthmoving equipment which contacts contaminated subgrade materials shall be cleaned with a water spray immediately upon completion of work. The wash location shall be located immediately adjacent to the contaminated soil excavation and all wash water shall be directed into the excavation.

(4) Green waste that is free of soil shall be removed offsite. Green waste with soil shall be managed onsite.

(L) Transportation and Disposal.

(1) Transportation or disposal of soil is not anticipated to be required as part of this project. Excess soil will be cleaned off of steel structural material before being removed from the site. No loose soil will be moved off the site with the steel members being hauled away for disposal. The steel members will be hauled away in lined roll-off's and shipped to the recycler on Oahu (e.g., Schnitzer Steel which has rebranded to Radius Recycling).

(2) Upon transportation and disposal, the Contractor shall submit copies of the waste shipping papers for both hazardous and non-hazardous wastes and Certificates of Disposal to the Engineer. The Contractor shall also include all waste shipping papers and Certificates of Disposal in the Completion Report.

(M) Air Monitoring.

(1) Air monitoring shall be conducted for at least three (3) full 8-hour shifts to establish a negative exposure assessment for worker's exposure to airborne lead. After the establishment of the negative workers exposure, periodic personal monitoring shall be conducted once every seven days to document worker exposure for the duration of the lead-contaminated soil work. Perimeter air monitoring shall be conducted throughout the entire duration of contaminated soil work.

(2) Submit air sampling results to the Engineer within five (5) working days after the samples are collected, signed by the testing laboratory employee performing the analysis.

(3) Perform personal and area monitoring during the contaminated soil work operation. Sufficient area monitoring shall be conducted at the physical boundary to ensure unprotected personnel are not exposed above action level (AL) and/or permissible exposure limit (PEL) at all times. If the outside boundary levels are at or exceed AL and/or PEL, work shall be stopped, and the Contractor and the Qualified Consultant shall immediately correct the condition(s) causing the increased levels and notify the Engineer immediately.

627.04 Measurement. The Engineer will measure clearing and grubbing, excavation, testing, and disposing of unsuitable material from work site in accordance with the applicable Sections.

Work under this section, excluding clearing and grubbing, excavation, testing, and disposing of unsuitable material, will be paid on a lump sum basis. Measurement for payment will not apply.

The Engineer will measure additional management of contaminated materials required and requested by the Engineer on a force account basis in accordance with Subsection 109.06 – Force Account Provisions and Compensation.

627.05 Payment. The Engineer will pay for the accepted clearing and grubbing, excavation, testing, and disposing of unsuitable material from work site under the applicable Sections.

The Engineer will pay for accepted pay items listed below at contract price per pay unit, 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 following pay item when included in proposal schedule:

Pay Item	**Pay Unit**
Management of Contaminated Materials	Lump Sum
Additional Management of Contaminated Materials	Force Account

An estimated amount for force account is allocated in proposal schedule under ‘Additional Management of Contaminated Materials’, but actual amount to be paid will be the sum shown on accepted force account records, whether this sum be more or less than estimated amount allocated in proposal schedule. The Engineer will pay for measures requested by the Engineer that are beyond scope of accepted Construction – Environmental Hazard Management Plan (C-EHMP) on a force account basis.”

END OF SECTION 627

Make the following Section a part of the Standard Specifications:

"SECTION 666– BLAST, CLEAN, AND PAINT EXISTING BRIDGE STEEL

666.01 Description. This section describes the materials and execution requirements for the field preparation and field coating work of the existing steel bridge superstructure. The work shall encompass all steel elements from concrete backwall at abutment no. 1 to concrete backwall at abutment no. 2.

The bridge superstructure will require containment to prevent the escape of construction debris to the surrounding air, soil, stream, and ocean. Bridge superstructure will require waterjet cleaning of all elements to be painted, near white metal blasting, and painting of the steel girders, cross frames, and other retained elements. The existing structure shall be initially blasted to a commercial blast clean condition to aid in visual evaluation of the retained steel and aid in removal of members marked for replacement. The near white metal blasting may commence once the new members are installed and all repair work has been completed. Painting of the retained superstructure steel will include the use of organic zinc primer, epoxy stripe coat, epoxy intermediate, and a fluoropolymer topcoat. In some cases, new girder cross frames and struts will be shop galvanized and shop painted with organic zinc primer. After installation in the field, they will be finish coated with a fluoropolymer topcoat in accordance with these specifications.

The Contractor awarded the work will be required to schedule, arrange and conduct a pre-job conference to discuss the pertinent issues of the work. The Contractor shall be able to address the work schedule, containment, staffing, and discuss their understanding of the specification. A walk-thru of the work site, if required, will be part of the pre-job conference. At a minimum, the painting Contractor's field foreman and Certified Coating Inspector (CCI) QC representative, the Engineer and any representatives of the Engineer shall be present.

REFERENCE STANDARDS

American Society for Testing and Materials (ASTM International)

ASTM A123/123M	"Zinc (Hot Dip Galvanized) on Iron and Steel Products"
ASTM C920	"Standard Specification for Elastomeric Joint Sealants"
ASTM D3276	"Standard Guide for Painting Inspectors (Metal Substrates)"
ASTM D4285	"Standard Test Method for Indicating Oil and Water in Compressed Air"
ASTM D4417	"Standard Test Method for Field Measurement of Surface Profile of Blast Cleaned Steel"
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”
ASTM D4940	“Standard Test Method for Conductimetric Analysis of Blasting Media”
ASTM F21	“Standard Test Method for Hydrophobic Surface Films by the Atomizer Test”

Association for Materials Protection and Performance (AMPP), previously The Society for Protective Coatings (SSPC)

SSPC Painting Manual Volume 1	“Good Painting Practice”
SSPC-PA 1	“Shop, Field, and Maintenance Coating of Metals”
SSPC-PA 2	“Procedure for Determining Conformance to Dry Coating Thickness Requirements”
SSPC-PA 17	“Procedure for Determining Conformance to Steel Profile/Surface Roughness/Peak Count Requirements”
SSPC-SP 1	“Solvent Cleaning”
SSPC-SP 2	“Hand Tool Cleaning”
SSPC-SP 3	“Power Tool Cleaning”
SSPC-SP 6	“Commercial Blast Cleaning”
SSPC-SP 10	“Near-White Metal Blast Cleaning”
SSPC-SP 11	“Power Tool Cleaning to Bare Metal”
SSPC-SP WJ-2	“Waterjet Cleaning of Metals – Very Thorough Cleaning (WJ-2)”
AMPP-QP 1	“Accreditation Program for Field Application of Coatings to Complex Industrial and Marine Structures”
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”

666.02 Materials.

(A) General. In this text, the words: coat; paint; coating; painting; coated; and painted are interchangeable. The word “system”, when referencing coat or paint, means final product of several different, compatible coatings of paint.

(1) Coating Overview. The coating system for all steel surfaces of the bridge superstructure (to include girders, struts, cross frames, deck drain pipes, crane rails, cable restrainer anchors/brackets, and other attached items not specified for removal) shall incorporate a custom system consisting of the following. Existing steel will be SSPC-SP 10 blast cleaned, and coated with an Organic Zinc Primer,

Epoxy Stripe Coat, Epoxy Intermediate, and Fluoropolymer Topcoat. New cross frames and struts will be Hot Dip Galvanized (HDG), SSPC-SP 16 blast cleaned, and will be shop coated with organic zinc primer, epoxy stripe coat, and epoxy intermediate prior to being shipped to the field. After installation, they will be coated in the field with the remaining Fluoropolymer topcoat.

(2) Color. Final topcoat color shall be in accordance with Federal Standard 595B Color 26493. Each coat of paint shall have distinctly contrasting color shades with subsequent coats to be applied to aid in application and inspection. The Contractor shall submit color selection to the Engineer for review and final approval before ordering paint system products.

(3) Sheen. Final topcoat sheen shall have a gloss finish, according to the manufacturer's product data sheets.

(4) Environmental Parameters. If there is a difference in application parameters (temperature, relative humidity, dew point) from the manufacturer of the coatings and those listed in this specification; this specification shall take precedence.

(5) Additives. The Coating Manufacturer shall prepare the paint at the factory, tinted, and ready for application. No tinting will be allowed after shipping the paint.

(6) 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, and product code. Package the paint in new and approved containers. Precautions concerning the handling and application of paint shall be shown on the label of all paint and clean-up solvent containers.

(7) VOC. All coatings used shall have a mixed VOC at or under 450 g/l (3.8 lbs/gal).

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

Existing Steel to Remain for Bridge Superstructure

Surface Preparation shall be SSPC-SP 10 Near-White Metal Blast Cleaned with a 2.0-4.0 mil anchor tooth profile.

Primer:	Zingametall Zinga 420 (organic zinc rich film galvanizing primer) @ 2.5-3.5 mils DFT

Mist Coat:	Tnemec Epoxoline II Series V69 (polyamidoamine epoxy) @ 1.0-1.5 mils DFT
Stripe Coat:	Tnemec Epoxoline II Series V69 (polyamidoamine epoxy) @ 2-3 mils DFT
Intermediate:	Tnemec Epoxoline II Series V69 (polyamidoamine epoxy) @ 4-6 mils DFT
Topcoat:	Tnemec Fluoronar Series 1070V (FEVE Fluoropolymer) @ 2-3 mils DFT

(C) Thinners, Cleaning Solvents, and Additives. Thinners, cleaning solvents, and additives shall be those recommended by the coating manufacturer. Cleaning solvents shall be used for cleaning of equipment. Thinners may not be added in amounts exceeding the limits set forth in the manufacturer's product data sheets (PDS).

(D) Substitutions.

(1) Substitutions. In the event the supplier cannot provide the aforementioned coating system or individual coating product, the Contractor shall submit for approval a proposed alternate zinc-epoxy-fluoropolymer coating system or equivalent individual product for review. The submittal shall include signed documentation that the currently specified product(s) cannot be obtained. Additionally, the Submittal shall include the manufacturer's literature/PDS of the alternate product(s) detailing percent volume solids, application parameters, recommended thickness, and VOC. This literature shall include a reference list of equivalent structural projects where the proposed paint system was used, detailing dates, facility owner and coating applicator. No request for substitution will be considered that would decrease film thickness and/or number of coats or offer a change in the generic type of coating specified.

(a) Do not mix manufacturers. Proposed paint product(s) shall be from the same manufacturer.

(b) When the proposed product(s) manufacturer's literature requires a higher degree of surface preparation or a greater film thickness than specified herein, that degree of surface preparation and film thickness shall apply, at no additional cost to the State.

(c) The proposed product(s) shall have a minimum of two years field exposure on similar structures.

(d) No substitution will be considered unless a request for approval 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 or disapproval of the proposed substitution shall be final.

666.03 Construction.

(A) General.

(1) Environmental Protection. The coating Contractor shall comply with the current Federal, State, and County 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) Worker Safety. 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) Accreditation. The field painting Contractor shall be accredited to AMPP-QP 1 – Field Application to Complex Industrial and Marine Structures.

(4) Best Practices. The Contractor shall paint the bridge 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 AMPP's Specification SSPC-PA 1, except where superseded by these specifications. If no recoat window is specified in the PDS, a minimum of 12 hours and maximum of 24 hours shall be observed as the applicable window.

(5) Quality of Finish. All coats shall be applied to a smooth even finish that is free of runs, drips, sags, dry-spray, overspray, and orange-peel. Pinholes, bubbles, and holidays are not acceptable.

(6) Environmental Conditions. All coats of paint shall be applied between ambient conditions of 50ºF – 90ºF and substrate temperatures under 100ºF. Relative humidity shall not exceed 85% during application and cure. During painting, substrate temperature must be at least 5ºF above the dew-point and rising. Do not paint when the air adjacent to the surface contains a fog, mist, dust, or other particulate matter. Do not perform coating operations during winds exceeding 15 mph. Adequate dust collection, containment and/or dust removal is required for this project. Proper ventilation shall be maintained during surface preparation, coating application, and cure. If environmental restrictions of the coating PDS differ from the specification requirements, the specification requirements shall take precedence.

(7) QC Inspection. All field performed surface preparation and painting operations shall be inspected by an AMPP CIP Level 2 (formerly NACE CIP Level 2) Certified 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 continual environmental conditions throughout the working day (environmental conditions shall be measured via a data logger with readings taken at maximum 4 hour intervals), coating processes used, surface preparation processes used, DFT coating thicknesses of each coat for existing steel, recoat windows, discrepancies, corrective actions, coatings applied, and any other pertinent information listed on PDS and inspection forms.

(8) QC Checkpoints. The coating Contractor shall inform the Engineer at least 48 hours 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 so long as written approval has been obtained by the Engineer and the Contractor documents all required QC data.

(9) Paint Manufacturer's Representative. At the start of production work, a technically competent representative from Zingametall, supplied by the Contractor, shall be on site to observe all operations of cleaning, surface preparation, and application of primer and mist coat. The representative needs only be present for these operations during the coating of the first work zone which encompasses one bay and one span of the bridge.

(B) Site Preparations.

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

(2) Wood Removal. Contractor will be responsible for removal of existing wood board inspection planks supported on cross frame bottom chords and struts.

(3) Lifelines. The stainless steel lifeline anchors and wire rope which runs along each girder span (upstream side and downstream side of each girder) shall be removed prior to surface preparation, and re-installed with new hardware in their same locations after final girder painting has cured. Lifeline anchors shall be abrasive blast cleaned, galvanized, and painted with the full coat system. Lifeline cables shall be abrasive blast cleaned.

(C) Containment of Work and Protection of the Environment.

(1) Underdeck Platform. The underdeck platform, that will be used to provide access to the necessary work areas within each superstructure span, shall be incorporated as a part of the overall containment system. This underdeck platform may be used to provide access to the bridge superstructure to perform other various contract repair work items, as needed.

(2) Containment. To protect the surrounding natural environment and work environment, the Contractor will be required to contain the superstructure (existing steel girder spans) work area so that there is no escape of wash water effluent, paint debris, abrasive blast media or dust, and any other construction debris to the surrounding area. In addition, care should be taken to contain any overspray to escape into the surrounding environment, above and under the structure. Containment material shall be water impermeable and with a rigid floor construction to aid in collection of spent wash water and accumulated abrasives.

(3) Class. The contractor shall construct the containment, or multiple containments, capable of containing all material as described above. The contractor shall incorporate SSPC-Guide 6, containment Class 1A or 2A into their design submittals.

(4) Maintenance. Wash water effluent and discharged abrasives shall be removed on an ongoing basis throughout the project as to not interfere with ongoing operations. Containment of the work area shall be maintained and repaired as needed throughout the duration of construction and shall remain in place until the final coat of paint has been cured, inspected, and accepted by the Engineer.

(D) Surface Cleaning and Preparation. All sources of compressed air used for cleaning, blow down, or painting shall be tested daily and verified to be clean, dry, and oil free per ASTM D4285 blotter test.

(1) Cleaning. Before any surface preparation, remove all visible and non-visible contaminants (oil, grease, wax, weld slag, flux residue, dirt, dust, biological growth, etc.) by methods specified in SSPC-SP 1 Solvent Cleaning and SSPC-SP WJ-2/NACE WJ-2 Low Pressure Water Cleaning (LPWC) at minimum working pressures of 1,000 psi, not to exceed 3,000 psi using fresh water. For the purposes of this specification, fresh water shall be defined as local potable water quality. Water break tests, per ASTM F21, shall be performed only if inspector/owner suspects that certain areas of the bridge may still be contaminated by non-visible contaminants. Locations near grease-filled cable restrainers at expansion joints shall be investigated.

(a) For tight crevices, additional means above LPWC may be necessary to remove tightly adherent pack rust, dirt and biological growth. Hand tools such as scrapers and Greenie pads, in accordance with SSPC-SP 2, may be necessary to achieve a contaminant-free surface.

(2) Blow Down. Blow with compressed air or vacuum the cleaned surfaces to remove any standing water and to aid in drying surfaces prior to mechanical methods of surface preparation.

(3) Initial Blast Cleaning. Blast the entire superstructure steel clean to an SSPC-SP 6 Commercial Blast Clean condition to aid in visual evaluation of the remaining steel. Inform the Engineer if any exposed steel locations need additional assessment due to observable defects.

(a) If after blast cleaning, areas of weld spatter remain on any surface of the steel, the Contractor shall remove it in accordance with SSPC-SP 3.

(4) Steel Repairs. Perform all contract specified steel repairs, including cross-frame/strut replacement, lateral diagonal bracing removal, tie plate removal, drainpipe repairs, rivet/bolt replacement, plug welding all open holes, etc.

(a) The steel repair work shall be done in a timely manner to avoid significant rust-back of the bare steel. Rust back shall not be allowed to progress beyond Rust Grade C, when referencing SSPC-VIS 1. However, any form of pitting of the base metal is unacceptable. If the Contractor allows significant rust-back to occur, the Engineer may require the Contractor to reblast and/or modify future blasting schedules to encompass a smaller work area.

(5) Edge Treatment. Some edges of existing steel to remain may show signs of "knife edge corrosion" where the steel has thinned due to corrosion. Where such sharp edges occur, the Contractor shall radius them with power tools to a 2-3 mm radius edge.

(6) Final Blast Cleaning. Blast the entire superstructure steel clean in accordance with SSPC-SP 10 Near White Metal Blast Clean condition immediately prior to paint. The final blast profile shall have an anchor tooth profile of 2.0 – 4.0 mils, and shall be accomplished with an approved abrasive of sufficient grit size and Moh's Hardness to achieve the proper profile. Profile shall be in conformance with SSPC-PA 17 and checked per ASTM D4417 Method C at random locations to ensure proper technique. At least 5 profile measurements shall be taken per 1,000 ft^2 of surface blasted.

(a) Final blasting shall not be performed when the relative humidity in the work area exceeds 85%. The surface temperature of the steel shall be at least 5^oF above the dew point temperature of the surrounding air during surface preparation.

(b) Final blasting shall be performed to stay within pre-determined work zones. Work zones shall be established based on the phasing requirements of the contract documents and the time constraint/limitations of the Contractor. Between bays, zone boundaries shall occur along the soffit of the interior girders. Between spans, zone boundaries shall occur at the ends of the girder or at the tie plates.

(c) During final blasting, the Contractor shall take care to provide sufficient taping/masking/shielding to newly installed

HDG bolts, HDG drain pipe outlets, and cross frames/struts with HDG, primer, and epoxy intermediate finish. Shielding shall prevent any damage to the coated finish from grit rebound or errant blast streams.

(d) The surfaces of all galvanized bolt assemblies (nuts, washers, and bolts) shall be prepared via a light hand wire brushing.

QC Checkpoint – SSPC-SP 10 and Profile

(7) Workspace Cleanup. The Contractor shall clean the work space within the work zone of all dust, debris, spent abrasives, wash water, and other deleterious materials that could contaminate the work area and affect coating operations.

(8) Blow-Down. Blow with compressed air or vacuum the blasted surfaces to ensure all dust is removed prior to painting.

(9) Check Cleanliness. After SSPC-SP 10 cleaning, verify substrate cleanliness immediately prior to primer application. Ensure all lubrication on high strength pretensioned nut assemblies is removed. Ensure no abrasive blast media remains embedded in the surface of the steel. Clean in accordance with SSPC-SP 1 if not clean prior to application of primer.

QC Checkpoint – Cleanliness

(10) Test Chlorides. 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 5 $\mu g/cm^2$ chlorides as measured with any method detailed in SSPC-Technology Guide 15. A minimum of 1 measurement shall be made for each 1,000 ft^2 of surface washed. Surface conductivity may be substituted for chlorides. Conductivity shall measure less than 42 µS/cm.

QC Checkpoint – Chlorides/Conductivity

(E) Application of Primer. Application of primer shall begin no later than 4 hours from the finish of the SSPC-SP 10 blasting and profiling operation.

(1) Concrete Masking. Mask adjacent edges where steel comes in contact with concrete deck, abutments, and creep blocks so as to avoid paint overspray onto concrete. Maintain masking throughout entire painting operation.

(2) Application Method. Apply primer via conventional spray or airless spray utilizing approved equipment that is standard to the industry and according to the instruction of the paint manufacturer. Only for areas deemed inaccessible via spray (such as bearing assemblies and girder soffit at abutments), the Contractor is permitted to utilize brush coating via extension brushes if needed.

(3) Break Lines. Primer coat break lines shall be located at the boundaries of the work zones. Subsequent primer coats shall be applied flush to the previously applied break lines. The Contractor shall take care to prevent overspray from subsequent primer coats onto previously painted and cured intermediate and topcoats.

(4) Measurements. Coating applicators shall use wet film thickness (WFT) gages periodically during application to ensure proper application thicknesses. After sufficient cure time, dry film thickness readings shall be taken with a calibrated electronic gage in accordance with SSPC-PA 2. Where DFT 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.

(5) Holiday Inspection. After cure of primer, accomplish a visual holiday inspection and rectify any discrepancies as directed by the Engineer.

QC Checkpoint – Primer

(F) Application of Mist Coat. Application of mist coat shall begin a minimum of 4 hours after primer is touch-dry but no more than 24 hours after primer is touch-dry.

(1) Application Method. Apply mist coat via conventional spray or airless spray utilizing approved equipment that is standard to the industry and according to the instruction of the paint manufacturer. Only for areas deemed inaccessible via spray (such as bearing assemblies and girder soffit at abutments), the Contractor is permitted to utilize brush coating via extension brushes if needed.

(2) Break Lines. Mist coat break lines shall be located along the same break lines as the primer.

(3) Measurements. Coating applicators shall use wet film thickness (WFT) gages periodically during application to ensure proper application thicknesses. After sufficient cure time, dry film thickness readings shall be taken with a calibrated electronic gage in accordance with SSPC-PA 2. Where DFT 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.

(4) Holiday Inspection. After cure of mist coat, accomplish a visual holiday inspection and rectify any discrepancies as directed by the Engineer.

QC Checkpoint – Mist Coat

(G) Application of Caulking and Surfacing Epoxy.

(1) Caulking. After applicable dry-to-recoat time of the mist coat, as described in its PDS, all faying surfaces including but not limited to: girder bottom flange cover plate to bottom flange, girder bottom/top flange to web, girder splice plates, riveted stiffener to girder web, and cross frame/strut gusset plate connections to the stiffener shall be caulked. See contract drawings for additional details pertaining to caulk application.

(a) Caulk shall be a compatible, paintable, flexible, industrial grade, moisture cured, single-component, urethane or hybrid based caulking compound in accordance with ASTM C920, Type S, Grade NS, Class 50. Caulk shall be able to be applied without the need for an additional primer. Acceptable material is Sherwin Williams Loxon H1 Sealant.

(b) Caulk shall be applied from a gun and tooled into the joint to create a ¼" min and ½" maximum thick bead.

(c) Caulk must reach full cure according to the manufacturer's cure schedule prior to application of the stripe coat of paint. Cure time shall be based on actual temperatures and relative humidity measured at the bridge site.

(d) Caulk shall have a distinctly contrasting color to the epoxy intermediate coat.

(2) Surfacing Epoxy. After applicable dry-to recoat time of the mist coat, as described in its PDS, all steel elements to remain that exhibit moderate to heavy surface pitting, as determined by the Engineer, shall be filled with a surfacing epoxy.

(a) Surfacing Epoxy shall be a compatible, paintable, industrial grade, two-component, modified polyamine epoxy produced by the same manufacturer of the intermediate coat. Acceptable material is Tnemec Series 215.

(b) Surfacing Epoxy shall be applied using trowels so that the finish surface is even with the face of the base metal. Finish material using rubber floats to produce a smooth and uniform looking surface.

(c) Surfacing Epoxy shall not be allowed to exceed maximum to recoat window time prior to application of the intermediate coat of paint.

(d) Surfacing Epoxy shall have a distinctly contrasting color to the intermediate coat.

QC Checkpoint – Caulking and Surfacing Epoxy

(H) Application of Stripe Coat.

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

(2) Application Method. All stripe coating shall be accomplished by brush using the unthinned material and 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 AMPP's Specification SSPC-PA 1, except where superseded by these specifications.

(3) Locations. Striping shall be applied to ALL edges, corners, crevices, rivets, nuts, bolts, caulk lines, weld seams, faces of pitted steel, areas that have been resurfaced with epoxy, and tight metal-to-

metal joints. Stripe coat shall have a distinctly contrasting color to mist coat and intermediate coat to aid in determining coverage. During application, immediately brush out any runs, drips, sags, or puddles. Stripe coating shall cover all edges of the steel members, extending approximately ½" on either side of the edge. Stripe coating shall be uniform in appearance.

(4) Holiday Inspection. Verify stripe coat is applied to all required surfaces. After cure, accomplish a visual holiday inspection and rectify any discrepancies as directed by the Engineer.

QC Checkpoint – Stripe Coat

(l) Application of Intermediate and Topcoat.

(1) Cleaning. Prior to application of both the intermediate and topcoat, verify all surfaces are clean and contaminant free according to SSPC-SP 1.

(2) Application Method. Apply intermediate coat via conventional spray or airless spray. Apply topcoat via conventional spray only. All techniques shall utilize approved equipment that is standard to the industry and according to the instruction of the paint manufacturer. Only for areas deemed inaccessible via spray (such as bearing assemblies and girder soffit at abutments), the Contractor is permitted to utilize brush coating via extension brushes if needed.

(3) Break Lines and Step Backs. Intermediate coat break lines shall be located along the same break lines as the primer/mist coat. Topcoat break lines shall be stepped back from the break lines of the intermediate coat. Topcoat step back distance shall be sufficient enough to allow for paint overlap when applying subsequent intermediate coats from adjacent work zones. The Contractor shall take care to prevent overspray from subsequent intermediate coats onto previously painted and cured topcoats.

(4) Measurements. Coating applicators shall use wet film thickness (WFT) gages periodically during application to ensure proper application thicknesses. 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 DFT 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.

(5) Cure/Recoat Times. Sufficient cure 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 or coating manufacturer, the Contractor shall re-clean surfaces before restarting painting operations.

(6) Holiday Inspection. After cure of both the intermediate and topcoat, accomplish separate visual holiday inspections and rectify any discrepancies as directed by the Engineer.

QC Checkpoints – Intermediate and Topcoat

(J) Surface Preparation and Coating Application for Repair Areas. A repair area is any area on the steel which includes a surface defect such as a gouge, scrape, or any area that has been damaged due to torching, welding, cutting, handling, transportation, or ongoing bridge construction that has adversely affected the applied primer, intermediate, or topcoat.

(1) Surface Preparation. Prepare damaged area(s) to sound coating/steel. If any single repair area is under 4 in^2 or has not exposed the bare steel beneath, utilize methods in accordance with SSPC-SP 2 Hand Tool Cleaning, SSPC-SP 3 Power Tool Cleaning as approved by the Engineer. If any single repair area is greater than or equal to 4 in^2 or has exposed bare steel, utilize methods in accordance with SSPC-SP 11 Power Tool Cleaning to Bare metal with a surface profile of 2.0 – 4.0 mils. Note that rotary disc sanding will destroy existing galvanizing or 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) Feathered Edges. Ensure that the surrounding area is tightly adhered intact coating and feathered (beveled) smooth to eliminate rough edges. Coatings are considered tightly adhered if an edge cannot be lifted with a dull putty knife.

(3) Cleaning. Remove any dust, residue, or debris prior to application of paint repairs according to SSPC-SP 1.

(4) Paint Application. 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 these specifications. Care shall be taken to apply coatings within the confines of the repair area and to ensure coatings are layered in the correct order. Application of primer over previously applied intermediate/topcoat or intermediate over previously applied topcoat will lead to adhesive bond failure.

(a) Adhere to Subsections 666.03(E) – Application of Primer and 666.03(I) – Application of Intermediate and Topcoat, where applicable for all areas.

(5) Inspection. All areas repaired shall be verified for completeness by the Engineer prior to final acceptance.

QC Checkpoint – Repairs

(K) Cleanup and Disposal. Any existing components that were removed prior to blasting (such as superstructure lifelines) shall be reinstalled in their original locations. 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 various contract items.

QC Checkpoint – Final Acceptance

The Engineer shall have the right to reject all work which is not in compliance with the contract documents.

(J) Submittals.

(1) Product Data Sheets (PDS). The Contractor shall submit paint, caulking (joint sealant), and surfacing epoxy manufacturer's PDS including the selected color of each product. Additionally, submit the manufacturer's written warranty for each individual product including the conditions limiting the warranty.

(2) Safety Data Sheets (SDS). The Contractor shall submit the corresponding manufacturer's SDS for each material supplied, including the thinning/cleaning solvents.

(3) Certificate of Conformance (COC). The Contractor shall submit signed COC's for all materials used under this specification. COC's for abrasive media shall list abrasive cleanliness testing results

per ASTM D4940. COC's for coatings shall include a letter from the manufacturer stating that their product must be applied between temperatures of 50º-100ºF, and at a relative humidity of no greater than 85%.

(4) Abrasive. The Contractor shall submit the type and size of abrasive, along with any pertinent documentation indicating the Moh's Hardness values for the abrasive used in blasting operations.

(5) Coating Contractor's AMPP-QP 1 Accreditation. The Contractor shall submit a copy of their current, up-to date AMPP-QP 1 Accreditation.

(6) Coating Contractor's Quality Control (QC) Reports. The Contractor shall maintain daily surface preparation and coating inspection reports in accordance with details of the AMPP QP 1 Contractor Accreditation. The reports shall indicate every item inspected at each required QC checkpoint and detail the work performed, noting areas prepared/painted, environmental conditions throughout the day (Including 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. Photos detailing general work area and any applicable details shall be included in daily reports. A weekly report shall be compiled from the daily reports and submitted to the Engineer on a weekly basis.

(7) Sample QC Report. 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. This sample report shall be formatted specifically for this project with all required inspection fields contained herein.

(8) Coating Contractor's Work Plan. No more than eight weeks from the start of production work, the contractor shall submit a Coating Work Plan, detailing a timetable of significant events for the entire bridge painting process. The work plan, at a minimum, will detail coating contractor's name and location, days and working hours, traffic control sequences utilized, dates of mobilization, dates of underdeck platform and containment erection, preparation and coating activities, specific equipment and methods used, final acceptance and demobilization. Work Plan shall be in keeping with the phasing requirements as stipulated in the contract plans.

(9) AMPP CCI Credentials. Submit the name and resume of the designated AMPP Certified Coating Inspector – Level 2, detailing their past work history, durations, and inspection activities.

(10) Underdeck Platform and Containment Design. Submit plans showing the details for the underdeck platform and containment structure that will be used for access, cleaning, and painting operations of the bridge superstructure. Plans shall indicate the details for how the underdeck platform will be supported from the existing bridge, the class of containment (per SSPC-Guide 6), details of materials, construction, framing, penetrability, joints, ventilation, air-handling equipment, and lighting. Provide calculations for the structural adequacy of the underdeck platform and containment structure. Furthermore, the existing bridge structure shall be checked for any concentrated loads imposed by the underdeck platform that may cause weak axis plate bending, torsion, punching shear, or other behaviors that the bridge does not typically experience during normal operation. The design shall take into consideration all dead loads, live loads (due to personnel, materials, equipment, spent wash water, accumulated abrasives, etc.), and all potential environmental loads. Imposed loads shall be in keeping with an appropriate and nationally recognized design guide or specification approved by the Engineer. The plans and calculations shall be stamped by a Professional Structural Engineer licensed in the State of Hawaii.

666.04 Measurement.

(A) Clean and Paint Existing Bridge Steel Superstructure Members will be paid on a lump sum basis. Measurement for payment will not apply. Removal and disposal of pressure washing water, abrasive debris, and the use of an AMPP Certified Coating Inspector shall be considered incidental.

(B) The Engineer will measure Radius Edges of Existing Steel Bridge Members to Remain per liner foot in accordance with the contract documents.

(C) The Engineer will measure Caulk Edges of Faying Surfaces and Application of Surfacing Epoxy on a force account basis in accordance with Subsection 109.06 – Force Account Provisions and Compensation and as ordered by the Engineer.

666.05 Payment. The Engineer will pay for the accepted pay item listed below at contract price per pay unit, 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 the proposal schedule:

Pay Item	Pay Unit
Clean and Paint Existing Bridge Steel Superstructure Members	Lump Sum
Radius Edges of Existing Steel Bridge Members to Remain	Linear Foot
Caulk Edges of Faying Surfaces and Application of Surfacing Epoxy	Force Account

The requirements of Specification Section **104.07 Variations in Estimate Quantities** is not applicable to the pay item for Radius Edges of Existing Steel Bridge Members to Remain. This quantity may vary by as much as 40% before an adjustment in the contract price can be made.

Payment for work under this Specification does not cover installation, maintenance, and removal of underdeck work platform beneath the bridge superstructure. Underdeck work platform shall be covered under Section 209.

END OF SECTION 666”

Make the following Section a part of the Standard Specifications:

"SECTION 667 - PREPARATION AND COATING OF GALVANIZED BRIDGE STEEL

667.01 Description. This section describes the materials and execution requirements for the shop preparation and shop coating work of new hot-dip galvanized (HDG) bridge components.

The substructure trestles, tie plates, bearing assemblies, lateral diagonal bracing, and plaque shall be new galvanized steel, brush-off blasted, and painted with an organic zinc primer, epoxy stripe coat, epoxy intermediate, and a fluoropolymer topcoat completely in the shop. After installation in the field, bolted connections shall be touch-up painted.

Struts and cross-frames connected to the superstructure (marked for replacement) shall be new galvanized steel, brush-off blasted, and painted with an organic zinc primer, epoxy stripe coat, and epoxy intermediate in the shop. After installation in the field, the members shall be coated with the remaining fluoropolymer topcoat system at the same time that the bridge girders are painted.

The Contractor awarded the work will be required to schedule, arrange, and conduct a pre-job conference to discuss the pertinent issues of the work. The Contractor shall be able to address the work schedule, staffing, and discuss their understanding of the specification. At a minimum, the painting Contractor's QC Manager, Certified Coating Inspector (CCI) QC Representative, the Engineer and any representatives of the Engineer shall be present.

REFERENCE STANDARDS

American Society for Testing and Materials (ASTM International)

ASTM A123/123M	"Zinc (Hot Dip Galvanized) on Iron and Steel Products"
ASTM A153	"Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware"
ASTM D3276	"Standard Guide for Painting Inspectors (Metal Substrates)"
ASTM D4285	"Standard Test Method for Indicating Oil and Water in Compressed Air"
ASTM D4417C	"Standard Test Method for Field Measurement of Surface Profile of Blast Cleaned Steel"
ASTM D4940	"Standard Test Method for Conductometric Analysis of Blasting Media.
ASTM D6386	"Preparation of Zinc (Hot Dip Galvanizing) Coated Iron and Steel Product and Hardware Surfaces for Painting"
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”
ASTM E376	“Standard Practice for Measuring Coating Thickness by Magnetic-Field or Eddy Current (Electromagnetic) Testing Methods.”
ASTM F21	“Standard Test Method for Hydrophobic Surface Films by the Atomizer Test”
ASTM F2329	“Standard Specification for Zinc Coating, Hot-Dip, Requirements for Application to Carbon and Alloy Steel Bolts, Screws, Washers, Nuts, and Special Threaded Fasteners.”

Association for Materials Protection and Performance (AMPP), previously The Society of Protective Coatings (SSPC)

SSPC Painting Manual Volume 1	“Good Painting Practice”
SSPC-PA 1	“Shop, Field, and Maintenance Coating of Metals”
SSPC-PA 2	“Procedure for Determining Conformance to Dry Coating Thickness Requirements”
SSPC-SP 1	“Solvent Cleaning”
SSPC-SP 2	“Hand Tool Cleaning”
SSPC-SP 3	“Power Tool Cleaning”
SSPC-SP 10	“Near-White Metal Blast Cleaning”
SSPC-SP 11	“Power Tool Cleaning to Bare Metal”
SSPC-SP 16	“Brush-Off Blast Cleaning of Coated and Uncoated Galvanized Steel, Stainless Steels, and Non-Ferrous Metals”
AMPP-QP 1	“Accreditation Program for Field Application of Coatings to Complex Industrial and Marine Structures”
AMPP-QP 3,	“Accreditation Program for Shop Application of Complex Protective Coatings”

667.02 Materials.

(A) General. In this text, the words: coat; paint; coating; painting; coated; and painted are interchangeable. The word “system”, when referencing coat or paint, means final product of several different, compatible coatings of paint.

(1) Coating Overview. The coating system for all new steel (to include the entire substructure, bearing assemblies, cross frames, struts, tie plates, and anchor bolts) shall incorporate a custom system consisting of the following: New steel will be galvanized, SSPC-SP 16

blast cleaned, and coated with an Organic Zinc Primer, Epoxy Stripe Coat, Epoxy Intermediate, and Fluoropolymer Topcoat.

(2) Color. Final topcoat color shall be in accordance with Federal Standard 595B Color 26493. Each coat of paint shall have distinctly contrasting color shades with subsequent coats to be applied to aid in application and inspection. The Contractor shall submit color selection to the Engineer for review and final approval before ordering paint system products.

(3) Sheen. Final topcoat sheen shall have a gloss finish, according to the manufacturer's product data sheets.

(4) Environmental Parameters. If there is a difference in application parameters (temperature, relative humidity, dew point) from the manufacturer of the coatings and those listed in this specification; this specification shall take precedence.

(5) Additives. The Coating Manufacturer shall prepare the paint at the factory, tinted, and ready for application. No tinting will be allowed after shipping the paint.

(6) 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, and product code. Package the paint in new and approved containers. Precautions concerning the handling and application of paint shall be shown on the label of all paint and clean-up solvent containers.

(7) VOC. All coatings used shall have a mixed VOC at or under 450 g/l (3.8 lbs/gal).

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

HDG Steel Substructure and New Superstructure Steel

All new pieces shall be Hot-Dip Galvanized at a certified galvanizer. Surface Preparation shall be SSPC-SP 16 Brush-Off Blast Cleaned with a 1.5-3.0 mil anchor tooth profile. Coatings shall be shop-applied.

Primer:	Zingametall Zinga 420 (organic zinc rich film galvanizing primer) @ 2.5-3.5 mils DFT
Mist Coat:	Tnemec Epoxoline II Series V69 (polyamidoamine epoxy) @ 1.0-1.5 mils DFT

Stripe Coat:	Tnemec Epoxoline II Series V69 (polyamidoamine epoxy) @ 2-3 mils DFT
Intermediate:	Tnemec Epoxoline II Series V69 (polyamidoamine epoxy) @ 4-6 mils DFT
Topcoat:	Tnemec Fluoronar Series 1070V (FEVE Fluoropolymer) @ 2-3 mils DFT

(C) Thinners, Cleaning Solvents, and Additives. Thinners, cleaning solvents, and additives shall be those recommended by the coating manufacturer. Cleaning solvents shall be used for cleaning of equipment. Thinner may not be added in amounts exceeding the limits set forth in the manufacturer's product data sheets (PDS).

(D) Hot-Dip Galvanizing.

(1) Standards. Hot-dip galvanizing practices shall be in accordance with ASTM A123/A123M, A153/A153M, and F2329.

(2) Quenching. Water quenching or chromate conversion coating shall not be used as these processes interfere with paint adhesion and surface preparation.

(E) Substitutions.

(1) Substitutions. In the event the supplier cannot provide the aforementioned coating system or individual coating product, the Contractor shall submit for approval a proposed alternate zinc-epoxy-fluoropolymer coating system or equivalent individual product for review. The submittal shall include signed documentation that the currently specified product(s) cannot be obtained. Additionally, the Submittal shall include the manufacturer's literature/PDS of the alternate product(s) detailing percent volume solids, application parameters, recommended thickness, and VOC. This literature shall include a reference list of equivalent structural projects where the proposed paint system was used, detailing dates, facility owner and coating applicator. No request for substitution will be considered that would decrease film thickness and/or number of coats or offer a change in the generic type of coating specified.

(a) Do not mix manufacturers. Proposed paint product(s) shall be from the same manufacturer.

(b) When the proposed product(s) manufacturer's literature requires a higher degree of surface preparation or a greater film thickness than specified herein, that degree of surface

preparation and film thickness shall apply, at no additional cost to the State.

(c) The proposed product(s) shall have a minimum of two years field exposure on similar structures.

(d) No substitution will be considered unless a request for approval 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 or disapproval of the proposed substitution shall be final.

667.03 Construction. The work of this section shall comply with ASTM D6386.

(A) General.

(1) Environmental Protection. The coating Contractor shall comply with the current Federal, State, and County 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) Worker Safety. The coating Contractor shall comply with the current Federal Occupational Safety and Health Administration (OSHA) and the local State Occupational Safety and Health requirements in which the shop is located for worker protection and safety equipment during all work on this project.

(3) Accreditation. The shop painting Contractor shall have their facility accredited to AMPP-QP 3 (Enclosed Shop) – Accreditation Program for Application of Complex Protective Coatings at the time of work. All procedures and documentations performed with regards to the coating of galvanized pieces shall be in accordance with the facility's established procedures documented as part of their QP 3 accreditation. The field painting Contractor responsible for touch-up painting of bridge elements after they have left the shop and for touch-up painting of field bolted connections shall be accredited to AMPP-QP 1 – Accreditation Program for Field Application of Coatings to Complex Industrial and Marine Structures.

(4) Best Practices. The Contractor shall paint the bridge components 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 AMPP's Specification SSPC-PA 1, except where superseded by these specifications. If no recoat window is specified in the PDS, a minimum of 12 hours and maximum of 24 hours shall be observed as the applicable window.

(5) Quality of Finish. All coats shall be applied to a smooth even finish that is free of runs, drips, sags, dry-spray, overspray, and orange-peel. Pinholes, bubbles, and holidays are not acceptable.

(6) Environmental Conditions. All coats of paint shall be applied in a controlled shop environment between ambient conditions of 50°F – 90°F and substrate temperatures under 100°F. Relative humidity shall not exceed 85% during application and cure. During painting, substrate temperature must be at least 5°F above the dew-point and rising. Do not paint when the air adjacent to the surface contains a fog, mist, dust, or other particulate matter. Adequate dust collection, containment and/or dust removal is required for this project. Proper ventilation shall be maintained during surface preparation, coating application, and cure. If environmental restrictions of the coating PDS differ from the specification requirements, the specification requirements shall take precedence. Bridge components shall remain in the controlled shop environment for the duration of surface preparation, coating and cure.

(7) QC Inspection. All shop/field performed surface preparation and painting operations shall be inspected by an AMPP CIP Level 2 (formerly NACE CIP Level 2) Certified 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 continual environmental conditions throughout the working day, coating processes used, surface preparation processes used, DFT coating thicknesses of each coat applied to galvanized steel, recoat windows, discrepancies, corrective actions, coatings applied, and any other pertinent information listed on PDS and inspection forms.

(8) QC Checkpoints. The coating Contractor shall inform the Engineer at least 48 hours 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 so long as written

approval has been obtained by the Engineer and the Contractor documents all required QC data.

(9) Paint Manufacturer's Representative. At the start of production work, a technically competent representative from Zingametall, supplied by the Contractor, shall be present at the shop to observe all operations of cleaning, surface preparation, and application of primer and mist coat. The representative needs only be present for these operations during the coating of the first several bridge components.

(10) Accessibility. The Contractor's shop shall be made accessible to the Engineer at all times.

(B) Surface Inspection and Smoothing.

(1) Inspection. Upon initial arrival of steel to the shop, the coating Contractor shall inspect members to verify suitability of the galvanized surfaces to receive paints prior to the commencement of surface preparation and paint application. Measure and document the initial average dry film thickness (DFT) of the galvanizing using a calibrated electronic gage in accordance with SSPC-PA 2. Report, in writing, to the Engineer or his designated representative any conditions or deficiencies with the base galvanizing that may affect proper application or overall performance.

(2) Surface Smoothing. Perform surface smoothing of zinc. Zinc high spots, such as metal drip lines, shall be removed by cleaning with hand tools or power tools as described in SSPC Surface Preparation Specification SSPC-SP 2 or SSPC-SP 3. The zinc shall be removed until it is level with the surrounding area, taking care that the base galvanized layer is not damaged.

QC Checkpoint – Surface Smoothing

(C) Surface Cleaning and Preparation. All sources of compressed air used for cleaning, blow down, or painting shall be tested daily and verified to be clean, dry, and oil free per ASTM D4285 blotter test.

(1) Cleaning. Before any surface preparation, remove all visible and non-visible contaminants (oil, grease, wax, dirt, dust, or residue left from galvanizing process, etc.) by methods specified in SSPC-SP 1 Solvent Cleaning. Water break tests, per ASTM F21, shall be performed to ensure removal of contaminants prior to surface

preparation and coating. Tests shall be performed at random locations covering no less than 10% of the surface.

(2) Blasting. Blast all galvanized steel surfaces clean in accordance with SSPC-SP 16 Brush Off Blast Clean condition immediately prior to paint. The final blast profile of the galvanizing shall have an anchor tooth profile of 1.5 – 3.0 mils.

(a) Use rapid nozzle movement to roughen the HDG texture, as per ASTM D6386.

(b) Abrasive size and nozzle pressure shall be adequate to achieve the desired profile without damaging or eroding the HDG coating. No more than 0.8 mils of galvanizing is permitted to be removed in the process which exceeds the requirements of ASTM D6386. This parameter shall be closely monitored throughout the blasting process with periodic DFT readings of the galvanizing to ensure proper blasting technique and conformance to these specifications.

(c) Abrasives used shall be clean and uniformly graded, free of oil, soluble salts, and other similar substances.

(d) Abrasives shall have a hardness less than 5.0 on the Mohs scale and a particle size that falls within the mesh range of 50 - 100 unless other acceptable blast media is indicated within these specifications.

(e) Acceptable blast media shall be Jetmag 35-70 (Synthetic Olivine Pyroxene Sand), Starblast AlZiBlast 60/100 (Aluminosilicate Mineral Sand), or Barton 100 HPA Fine (Garnet).

(f) Due to the intricate assembly of the steel components, adjusting stand-off distance will prove difficult. It is important that the appropriate abrasive is selected that will allow the blaster to achieve the intended results.

(g) Steel components with difficult access, such as the interior of built-up column and bracing elements with closely spaced lacing or batten plates should consider blast cleaning using an internal pipe centrifugal blasting tool.

(h) All abrasives shall be tested for cleanliness per ASTM D4940 prior to use.

(i) Submit abrasive material, indicating type, size, and Moh's hardness to the Engineer for review and approval.

(j) Visually examine all blasted surfaces to ensure completeness of surface preparation. Random profile measurements shall be made according to ASTM D4417 Method C at random locations. At least 5 profile measurements shall be taken per 1,000 ft^2 of surface blasted.

(k) Measure and document the average DFT of the galvanizing using a calibrated electronic gage in accordance with SSPC-PA 2 to ensure preservation of the original galvanized thickness and to establish a baseline thickness to be used for evaluating the final coating system.

(l) Small areas that have been over blasted to bare steel or have removed more than 0.8 mils of galvanizing shall be touch-up repaired per ASTM A780 using zinc based solders. Application of a zinc rich paint will not be an acceptable repair procedure. The limits of what constitutes a small area shall be set forth by the requirements of ASTM A123. Repair areas shall be brush-off blasted again to reprofile the surface.

(m) Any areas that have been over blasted to bare steel or have removed more than 0.8 mils of galvanizing and exceed the tolerances of a small area (as defined by ASTM A123) shall not be accepted. The coating Contractor shall repair the steel element as directed by the Engineer at no increase in cost to the State.

QC Checkpoint – SSPC-SP 16 and Profile

(3) Blow Down. Blow with compressed air or vacuum the blasted surfaces to ensure all dust is removed prior to painting.

(4) Check Cleanliness. After SSPC-SP 16 cleaning, verify substrate cleanliness immediately prior to primer application. Ensure no abrasive blast media remains embedded in the surface of the galvanizing. Clean in accordance with SSPC-SP 1 if not clean prior to application of primer.

QC Checkpoint – Cleanliness

(D) Application of Primer. Application of Primer shall be made within 24 hours of beginning the SSPC-SP 16 blasting and profiling operation.

(1) Application Method. Apply primer via conventional or airless spray utilizing approved equipment that is standard to the industry and according to the instruction of the paint manufacturer.

(2) Areas with Difficult Access. The interior of the steel components with difficult access, such as built-up column and bracing elements with closely spaced lacing or batten plates shall be painted using an internal pipe centrifugal coater. For other areas, such as bearing assemblies or between stiffeners of column seats, the Contractor is permitted to utilize brush coating via extension brushes if needed.

(3) Measurements. Coating applicators shall use wet film thickness (WFT) gages periodically during application to ensure proper application thicknesses. After sufficient cure time, dry film thickness readings shall be taken with a calibrated electronic gage in accordance with SSPC-PA 2. Where DFT 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.

(4) Holiday Inspection. After cure of primer, accomplish a visual holiday inspection and rectify any discrepancies as directed by the Engineer.

QC Checkpoint – Primer

(E) Application of Mist Coat. Application of mist coat shall begin a minimum of 4 hours after primer is touch-dry but no more than 24 hours after primer is touch-dry.

(1) Application Method. Apply mist coat via conventional spray or airless spray utilizing approved equipment that is standard to the industry and according to the instruction of the paint manufacturer.

(2) Areas with Difficult Access. The interior of the steel components with difficult access, such as built-up column and bracing elements with closely spaced lacing or batten plates shall be painted using an internal pipe centrifugal coater. For other areas, such as bearing assemblies or between stiffeners of column seats, the

Contractor is permitted to utilize brush coating via extension brushes if needed.

(3) Measurements. Coating applicators shall use wet film thickness (WFT) gages periodically during application to ensure proper application thicknesses. After sufficient cure time, dry film thickness readings shall be taken with a calibrated electronic gage in accordance with SSPC-PA 2. Where DFT 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.

(4) Holiday Inspection. After cure of mist coat, accomplish a visual holiday inspection and rectify any discrepancies as directed by the Engineer.

QC Checkpoint – Mist Coat

(F) Application of Stripe Coat.

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

(2) Application Method. All stripe coating shall be accomplished by brush using the unthinned material and 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 AMPP's Specification SSPC-PA 1, except where superseded by these specifications.

(3) Locations. Striping shall be applied to ALL edges, corners, crevices, weld seams, and tight metal-to-metal joints. Do not stripe coat bolt holes. Stripe coat shall have a distinctly contrasting color to mist coat and intermediate coat to aid in determining coverage. During application, immediately brush out any runs, drips, sags, or puddles. Stripe coating shall cover all edges of the steel members, extending approximately ½" on either side of the edge. Stripe coating shall be uniform in appearance.

(4) Holiday Inspection. Verify stripe coat is applied to all required surfaces. After cure, accomplish a visual holiday inspection and rectify any discrepancies as directed by the Engineer.

QC Checkpoint – Stripe Coat

(G) Application of Intermediate and Topcoat.

(1) Cleaning. Prior to application of both the intermediate and topcoat, verify all surfaces are clean and contaminant free according to SSPC-SP 1.

(2) Application Method. Apply intermediate coat via conventional spray or airless spray. Apply topcoat via conventional spray only, except as otherwise allowed in these specifications. All techniques shall utilize approved equipment that is standard to the industry and according to the instruction of the paint manufacturer.

(3) Areas with Difficult Access. The interior of the steel components with difficult access, such as built-up column and bracing elements with closely spaced lacing or batten plates shall be painted using an internal pipe centrifugal coater. For other areas, such as bearing assemblies or between stiffeners of column seats, the Contractor is permitted to utilize brush coating via extension brushes if needed.

(4) Blocking/Masking. After the application of the intermediate coat, block paint surfaces at the ends of the components where field bolted connections occur so as to prevent application of the topcoat. Blocking shall be done using suitable means that will not damage the underlying intermediate coat upon removal. Masking material shall be removed from the painted surface within 48 hours of topcoat application. Refer to the contract drawings for details pertaining to paint blocking. After erection, the paint blocked surface and galvanized bolts shall be touch-up painted with the remaining topcoat in accordance with this specification.

(5) Measurements. Coating applicators shall use wet film thickness (WFT) gages periodically during application to ensure proper application thicknesses. After sufficient cure time, dry film thickness readings shall be taken with a calibrated electronic gage in accordance with SSPC-PA 2. Where DFT 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.

(6) Cure/Recoat Times. Sufficient cure 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 or coating manufacturer, the Contractor shall re-clean surfaces before restarting painting operations.

(7) Holiday Inspection. After cure of both the intermediate and topcoat, accomplish separate visual holiday inspections and rectify any discrepancies as directed by the Engineer.

QC Checkpoints – Intermediate and Topcoat

(H) Shipping and Transportation. Prior to leaving the shop, each painted piece shall be sufficiently wrapped and padded to protect the components from ocean-borne chloride contamination and damage due to rubbing/impact with other transported components.

(I) Surface Preparation and Coating Application for Repair Areas. A repair area is any area on the steel which includes a surface defect such as a gouge, scrape, or any area that has been damaged due to handling, transportation, ongoing bridge construction, or Engineer approved in-field modification to steel element that has adversely affected the applied hot-dip galvanizing, primer, intermediate, or topcoat.

(1) Surface Preparation. Prepare damaged area(s) to sound coating/galvanizing using methods described in SSPC-SP 2 Hand Tool Cleaning, SSPC-SP 3 Power Tool Cleaning. Ensure that the galvanized layer beneath the paint is not damaged during preparation. Damaged galvanizing will need to be repaired per ASTM A780 using zinc-based solders.

(2) Feathered Edges. Ensure that the surrounding area is tightly adhered intact coating and feathered (beveled) smooth to eliminate rough edges. Coatings are considered tightly adhered if an edge cannot be lifted with a dull putty knife.

(3) Cleaning. Remove any dust, residue, or debris prior to application of paint repairs according to SSPC-SP 1.

(4) Paint Application. Apply touch-up coats of the entire selected coating system if the damage exposes the galvanized substrate. Application shall be by brush to specified thicknesses, in accordance with these specifications. Care shall be taken to apply coatings within

the confines of the repair area and to ensure coatings are layered in the correct order. Application of primer over previously applied intermediate/topcoat or intermediate over previously applied topcoat will lead to adhesive bond failure.

(a) Adhere to Subsections 667.03(D) – Application of Primer and 667.03(G) – Application of Intermediate and Topcoat, where applicable for all areas.

(5) Inspection. All areas repaired shall be verified for completeness by the Engineer prior to final acceptance.

QC Checkpoint – Repairs

(J) Surface Preparation and Touch-Up Painting of Field Bolted Joints. Immediately prior to touch-up application of paint to any field bolted connection, all galvanized bolt assemblies (nuts, washers, and bolts) shall be prepared via a light hand wire brushing taking care not to damage surrounding paint. Follow brushing, clean all surfaces of existing paint within the blocked/masked area and any surfaces of bolt assemblies in accordance with SSPC-SP 1. Ensure all lubrication on high strength pretensioned nut assemblies is removed. The surface of the bolted joint shall be dry prior to coating.

(1) Bolted Connections at Bridge Superstructure, Bearings, and Anchor Bolts.

(a) Following installation of cross frames and struts at bridge superstructure (but prior to field application of spray applied topcoat), paint via brush, all galvanized bolted connections with one coat of the epoxy intermediate.

(b) Following installation of lateral diagonal bracing, tie plates, cable restrainer anchors, and plaque at bridge superstructure and bridge bearings, paint via brush, all galvanized bolted connections with one coat of the epoxy intermediate and one coat of the fluoropolymer topcoat. The Contractor shall take care when applying the intermediate coat to avoid overcoating with the previously applied topcoat as this will lead to adhesive bond failure.

(c) Following installation of trestle columns, paint via brush, all damaged ends of the threaded connections for the anchor bolts at the concrete pedestals. Depending on severity of

damage, the Contractor shall apply either individual coats or the entire specified system. Contractor shall take care when applying the coats to avoid overcoating with the previously applied topcoat as this will lead to adhesive bond failure.

(2) Bolted Connections at Substructure Trestle Joints.

(a) Following bolt installation at column splice and brace to column gusset connections, mask the edges of the previously applied topcoat to ensure application remains within the confines of the blocked area. No overspray onto the previously applied topcoat shall be allowed.

(b) If previously applied epoxy intermediate is less than 60 days old, apply one coat of the epoxy intermediate and one coat of the fluoropolymer topcoat via spray application. Ensure complete coverage of the entire paint blocked area and the surface of all bolts, nuts, washers.

(c) If previously applied epoxy intermediate is greater than 60 days old, the surface of the previously applied intermediate epoxy will need to be sanded back to sound coating but shall not damage the underlying primer coat. Edges of sanded surface shall be feathered back (beveled) to create a smooth transition. Apply one coat of the epoxy intermediate and one coat of the fluoropolymer topcoat via spray application. Ensure complete coverage of the entire paint blocked area and the surface of all bolts, nuts, and washers.

(d) Adhere to Subsection 667.03(G) – Application of Intermediate and Topcoat, where applilcable for all areas.

QC Checkpoint – Touch-Up Field Bolted Connections

(K) Submittals.

(1) Product Data Sheets (PDS). The Contractor shall submit paint manufacturer's PDS including the selected color of each product. Additionally, submit the manufacturer's written warranty for each individual product including the conditions limiting the warranty.

(2) Safety Data Sheets (SDS). The Contractor shall submit the corresponding manufacturer's SDS for each material supplied, including the thinning/cleaning solvents.

(3) Certificate of Conformance (COC). The Contractor shall submit signed COC's for all materials used under this specification. COC's for abrasive media shall list abrasive cleanliness testing results per ASTM D4940. COC's for coatings shall include a letter from the manufacturer stating that their product must be applied between temperatures of 50º-100ºF, and at a relative humidity of no greater than 85%.

(4) Galvanizing. The Contractor shall submit a letter from the hot-dip galvanizer that post- treatment quenching will not be used in the galvanizing process.

(5) Abrasive. The Contractor shall submit the type and size of abrasive, along with any pertinent documentation indicating the Moh's Hardness values for the abrasive used in blasting operations.

(6) Coating Contractor's AMPP-QP 3 Shop Accreditation. The Contractor shall submit a copy of their current, up-to date AMPP-QP 3 Accreditation.

(7) Field Coating Contractor's AMPP-QP 1 Accreditation. The Contractor performing the field touch-up work for bolted joints and field repairs shall submit a copy of their current, up-to date AMPP-QP 1 Accreditation.

(8) Coating Contractor's Quality Control (QC) Reports. The Contractor shall maintain daily surface preparation and coating inspection reports in accordance with details of the AMPP QP 3 Contractor Accreditation. The reports shall indicate every item inspected at each required QC checkpoint and detail the work performed, noting areas prepared/painted, environmental conditions throughout the day (Including 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. Photos detailing general work area and any applicable details shall be included in daily reports. A weekly report shall be compiled from the daily reports and submitted to the Engineer on a weekly basis.

(9) Sample QC Report. 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. This sample report shall be formatted specifically for this project with all required inspection fields contained herein.

(10) Coating Contractor's Work Plan. No more than eight weeks from the start of production work, the contractor shall submit a Coating Work Plan. The work plan, at a minimum, will detail coating contractor's name and location, preparation and coating activities, specific equipment and methods used, how work pieces will be supported in the shop during painting operation and how these areas will be sufficiently coated after support removal, how abrasive blasting operation will be accomplished so as to minimize damage to galvanized surface, how operations will take place in areas of difficult access, and final acceptance.

(11) Blast Operator Resume. The Contractor shall submit a resume of blast operators that will be working on the job and a list of ten projects that they have successfully completed for SSPC-SP 16 surface preparation in the past 5 years.

(12) AMPP CCI Credentials. Submit the name and resume of the designated AMPP Certified Coating Inspector – Level 2, detailing their past work history, durations, and inspection activities.

667.04 Measurement.

(A) Clean and Paint New Bridge Steel Trestles will be paid on a lump sum basis. Measurement for payment will not apply. Paint Blocking, use of an AMPP Certified Coating Inspector, and preparation of components for shipping shall be considered incidental.

(B) Clean and Paint New Bridge Steel Cross Frames, Struts, Tie Plates, and Lateral Diagonal Bracing will be paid on a lump sum basis. Measurement for payment will not apply. Touch-up painting of field bolted connections for these components, use of an AMPP Certified Coating Inspector, and preparation of components for shipping shall be considered incidental.

(C) Touch-Up Paint Bolted Connections at Trestles After Erection shall be in accordance with Subsection 667.03 Construction (J) (2) and will be paid on a lump sum basis. Measurement for payment will not apply. Equipment/Work platforms needed to gain access to the bolted connection locations shall be considered incidental.

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

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

Pay Item	Pay Unit
Clean and Paint New Bridge Steel Trestles	Lump Sum
Clean and Paint New Bridge Steel Cross Frames, Struts, Tie Plates, and Lateral Diagonal Bracing	Lump Sum
Touch-Up Paint Bolted Connections at Trestles After Erection	Lump Sum

END OF SECTION 667”

Make this Section a part of the Standard Specifications:

"SECTION 677 – PENETRATING SEALER FOR BRIDGE DECKS

677.01 Description. This work consists of providing all labor, materials, and equipment required to prepare, clean, and apply a penetrating epoxy sealer system to concrete bridge decks.

677.02 Materials.

(A) Penetrating Sealer. All materials shall be virgin; free of secondary components, volatile solvents, and external/conventional flexibilizers. Component batches shall be interchangeable. Epoxy sealer shall be a solvent-free 0-VOC, two-component, 100% solids, moisture insensitive, low viscosity, low modulus epoxy penetrating sealer. Epoxy shall meet the current ASTM C881 and AASHTO M235, Type III, Grade 1, Classes B & C specifications and the requirements listed in Table 1 below.

Table 1 – Two-Component Resin Binder Requirements

Property	Requirement	Test Method
Viscosity	<150 cps	ASTM D2393
Tensile Properties, 7 day cure	Tensile Strength >1,000 psi (12.4 MPa)	ASTM D638
	Tensile Elongation: 50%	
Compressive Properties, 7 day cure	Compressive Strength: >2,500 psi (20.9 MPa)	ASTM D695
	Compressive Modulus: <130,000 psi (620 MPa)	
Bond Strength	250 psi (2.0 MPa)	ASTM C1583/ACI 503R
Thermal Compatibility	Pass	ASTM C884
Water Absorption	0.2% (24 hr)	ASTM D570
Chloride Ion Permeability	0.0 coulomb	AASHTO T277
Gel Time (60 g mass)	>15 minutes	
Tack Free Time (73º F or 23º C)	2 to 5 hours	

- A test report* consisting of a certification by an *AASHTO resource/CCRL* accredited independent testing laboratory showing compliance with the requirements of this specification and material properties. Include the laboratory's accreditation and the certification of the technician that performed the test for the test method performed with the test results.

- Product data sheets and specifications from the manufacturer showing instructions, application recommendations, methods, and product properties.

*Dated within 90 days of contract award.

Table 2 - Working Time

Surface Temperature (ºF)	Maximum Working Time* (minutes)
50	50
60	40
70	30
80	20
90	10
100	8
110	6
120	4

*Includes mix time, resin binder and aggregate placement.
Note: Consult manufacturer for surface temperatures exceeding 120ºF.

(B) Topping Aggregate. Furnish aggregate meeting the requirements listed in Table 3 – Topping Aggregate Properties and Table 4 – Gradation for Topping Aggregate below unless otherwise specified by the Engineer. Deliver the aggregate to the construction site in unopened bags or super sacks labeled clearly for identification. Provide aggregate that is virgin, clean, dry, and free from foreign matter. Ensure aggregate meets the requirements in Table 3 – Topping Aggregate Properties and Table 4 – Gradation for Topping Aggregate. Ensure aggregate is angular, consists of natural silica sand, basalt, or other nonfriable aggregate, and contains less than 0.5 percent moisture when tested in accordance with ASTM C 566. A sample of the aggregate lot/batch shall be supplied upon request.

Table 3 – Topping Aggregate Properties

Property	Test Method	Requirements
Gradation	ASTM C136	See Table 4
Moisture	ASTM C566	<0.5%
MOHS Hardness	MOHS Scale	≥7.0
Micro-Deval, maximum	AASHTO T327	<10%
Absorption	ASTM C127	<2.0%

Table 4 – Gradation for Topping Aggregate

Armorstone	992-3 - #14 x #50
Sieve size	Individual % Retained
No. 12	0 – 0.1
No. 14	0 – 10
No. 16	0 – 25
No. 20	10 – 70
No. 30	10 – 90
No. 40	0 – 40
No. 50	0 – 5
No. 60	0 – 0.5
No. 100	0 – 0.5
Pan	0

(C) Storage and Handling. All materials shall be delivered in their original unopened containers bearing the manufacturer's label, specifying date of manufacturing, batch number, trade name, and quantity. Each shipment of resin binder shall be accompanied by a Safety Data Sheet (SDS).

The material shall be stored to prevent damage by the elements and to ensure the preservation of their quality and fitness for the work. The storage space shall be kept clean, cool, covered, and dry per manufacturer's recommendations.

Stored materials shall be inspected prior to their use, and shall meet the requirements of this Specification at the time of use.

Any material which is rejected based on failure to meet the required tests or that has been damaged to a point where it is unsuitable for use shall be immediately replaced at no additional cost to the State.

The Contractor shall arrange to have the material supplier furnish technical service related to application of material and health and safety training for personnel who are to handle the penetrating sealer.

Any recycled topping aggregates shall meet the same requirements listed in Table 3 – Topping Aggregate Properties and Table 4 – Gradation for Topping Aggregate. Recycled topping aggregates shall be stored separately from new topping aggregates.

677.03 Construction.

(A) Submittal Requirements. Prior to the Just-In-Time Training (JITT) and the start of this work, provide 6 copies (2 copies for Highways Division Materials Testing and Research Branch (HWY-L)) of the following submittals in one complete set for acceptance. Clearly indicate the section the material is being submitted for, including the test method identification, table it is located on in the section, name of the product and its manufacturer on pertinent submittals. No work that is related to these submittals shall be performed until written acceptance has been received.

(1) Name and contact information of the resin binder and aggregate manufacturer's technical representative and other key personnel.

(2) A warranty on the products provided by the epoxy binder manufacturer. Warranty shall be for a minimum of 10 years.

(B) Quality Control (QC) Plan. Submit a QC Plan to the Engineer for acceptance a minimum of 30 days prior to the installation and the Just-In-Time Training (JITT). Resubmittal of the document will require another 30 days for each resubmittal. Discuss the QC Plan requirements at the JITT and progress meetings. The JITT shall not be held unless the QC Plan is accepted 30 days before the scheduled JITT date. Work shall not start on the penetrating sealer, including the test application, until the JITT has been completed and the QC Plan and the Work Plan have both been accepted. The QC Plan shall contain at a minimum the following information:

(1) Names and contact information for key personnel, project superintendent, and lead technician responsible for field quality control sampling and testing.

(2) Location of resin binder production plants and batch production records.

(3) Location of aggregate production plants and batch production records.

(4) Proposed method of installation at each location identified to receive surfacing.

(5) Resin binder and aggregate manufacturer's material information including:

(a) Recommended placement instructions with adjustments for Hawaii's ambient weather conditions.

(b) Mixing instructions.

(c) Recommended installation temperatures.

(d) Anticipated gel and cure times at various expected ambient temperatures for all sites.

(e) Methods of safe storage and handling.

(f) Applicable installation and material limitations.

(g) Disposable methods for excess mixed resin binder and associated components.

(h) Means and methods for recycling of aggregates. QC/QA testing to ensure recycled aggregates meet requirements listed in Table 3 – Topping Aggregate Properties and Table 4 – Gradation for Topping Aggregate.

(i) Production plant location contact information for the quality control/quality assurance (QC/QA) personnel where additional information can be requested concerning record keeping methods, inspection methods, equipment calibration records, and accreditation certificates.

(j) Test reports of bond strengths shall be submitted once every 2 weeks.

The QC Plan shall designate a QC Manager, who shall be present at the jobsite and have full authority to request any action necessary for the operation of the QC Plan providing it complies with the contract documents and acceptance of the Engineer.

The QC Manager shall be certified in all test methods used and be responsible for the required field quality control in sampling and testing in conformance with the accepted quality control plan, test methods and contract documents. All sampling shall be performed in the presence of the Engineer. All testing must be performed by certified personnel. The certification must be for the test methods used. The Engineer is not responsible and shall not be regarded as part of the Contractor's QC team. It is the responsibility of the Contractor and the QC Manager to ensure that the test procedure being used is compliant with the test method standard. Inspections are performed for the exclusive benefit of the State. The inspection of or the failure to inspect the work shall not relieve the Contractor of obligations to fulfill the contract as prescribed, to correct defective work, and to replace unsuitable or rejected materials regardless of whether payment for such work has been made. The

Engineer has the right to reject the test if the Engineer feels that it is non-compliant, e.g., the technician who performed the test is not certified or the material testing laboratory is not accredited to perform the required tests. Maintain and have available upon request, the current test standard methods documentation being used, referenced documents, complete records of sampling, testing, corrective actions, and quality control inspection results.

A technical representative from the resin binder manufacturer shall be present at the JITT, Test Application, e.g., deck repair, surface preparation, installation and acceptance of the penetrating sealer, and at the construction site for at least the first two days of the penetrating sealer installation.

(C) Work Plan. Submit a Work Plan to the Engineer for approval 30 days prior to the JITT. No installation work shall start until the Work Plan is accepted and discussed in the JITT. Discuss the Work Plan requirements at the progress meetings. The Work Plan shall contain at a minimum the following information:

(1) Detailed information on all equipment and materials that will be used for all aspects of the work.

(2) Method of surface preparation and required surface condition for adequate bonding.

(3) Method of crack repair and defective concrete repair of existing concrete deck.

(4) Construction during inclement weather. Plan for the occurrence of rain, moisture in the pavement, and temperature requirements for the materials being used.

(5) Mixing ratio and application rates for resin binder and aggregate. Refer to Table 2 – Working Time.

(6) Paving Plan (Jointing Plan, Installation sequence, Direction of Paving, etc.).

(7) Application Method.

(8) Curing time and requirements for opening to traffic.

(9) Testing for bond.

(10) Corrective actions that will be taken for unsatisfactory installation practices. Any corrective actions that have not been discussed in this submittal shall be submitted for approval by the Engineer.

If any work during the entirety of the project does not comply with or follow the approved work plan, a new work plan shall be submitted and approved prior to any work resuming.

(D) Just-In-Time-Training. JITT shall be held and shall conform to Section 695 – JUST IN TIME TRAINING.

(E) Equipment. For the epoxy penetrating sealer, provide a distribution system or distributor capable of accurately blending the epoxy resin and hardening agent, and uniformly and accurately applying the epoxy materials at the specified rate to the bridge deck in such a manner as to cover 100 percent of the work area. Provide a fine aggregate spreader capable of uniformly and accurately applying dry aggregate to cover 100 percent of the epoxy material. Provide a self-propelled vacuum truck to remove all loose aggregate.

(1) For hand applications, provide calibrated containers, a-Jiffy® type mixer for mixing, and equipment or tools suitable for applying the epoxy. Aggregate shall be broadcast by hand until refusal onto the wet epoxy.

(2) For mechanical applications, provide meter-mixing equipment that will automatically and accurately proportion the components in accordance with the manufacturer's recommendations and will mix and continuously place the penetrating sealer. Ensure the operation proceeds in such a manner that will not allow the mixed materials to segregate, dry, be exposed or otherwise harden in such a way as to impair the retention and bonding of broadcasted aggregate.

(F) Surface Preparation. Remove entire AC overlay on the existing bridge prior to starting surface preparation for the existing concrete bridge deck. Surface preparation shall conform to the following requirements:

(1) The existing concrete deck shall be roughened by shotblasting or approved equal. If HPC is not placed within 48 hours of shotblasting then the existing concrete deck will need to be shotblasted again at no extra cost to the State.

(2) Sweep the surface clean with a vacuum sweeper. Then blow the surface clean with oil-free compressed air to remove dust and laitance.

(3) Clean and prepare cracks greater than 0.010-inches wide per resin binder manufacturer's recommendations.

(4) Clean and prepare divots/depressions per resin binder manufacturer's recommendations.

(5) All laitance, contaminants, paint, markers, and foreign material that may be detrimental to the bonding of the new overlay must be removed from the existing concrete surface.

The Contractor shall take extra care not to damage the existing expansion joints during the surface preparation of the existing concrete deck.

An approved moisture meter shall be used to check the moisture in the existing substrate prior to application of any surface treatment. An equal or better method may be submitted to the Engineer for approval. A maximum moisture reading of under 3% will be allowed. If rain occurs for more than 10 minutes no application of penetrating sealer will be allowed for the remainder of the work shift.

During surface preparation and application, precaution shall be taken to assure that traffic is protected from rebound, dust and construction activities. Dust in the air at night may become an opaque vision barrier to motorists due to headlights and floodlights. The Contractor must not allow this to happen. Appropriate shielding shall be provided as required and as directed by the Engineer at no additional cost. The Contractor shall provide suitable protection as needed to protect all exposed areas not to receive penetrating sealer such as parapets, drains, etc. All damage and defacement resulting from the application shall be cleaned and, or repaired to the Engineer's satisfaction at no additional cost to the State.

(G) Test Application. The test application shall be a part of the production location before starting production work. Resin binder manufacturer's representative shall be present during the test application. The test application shall meet the following requirements:

(1) Install a minimum of 1000 square feet.

(2) Construct using the same method and equipment as the production work.

(3) Construct an additional test application for each method proposed for the production work.

(4) Replicate field conditions, including ambient and surface temperatures, time period, anticipated for production work.

(5) Demonstrate surface preparation method as outlined in the QC plan.

(6) Demonstrate that the data management system is capable of documenting ambient and surface temperatures, quantities of resin binder and aggregate, coverage rates and reporting application rates in real time.

(7) Determine the initial set time for the resin binder.

The Contractor shall perform three pull-off tests on the trial pour in accordance with ASTM C1583 Standard Test Method for Tensile Strength of Concrete Surfaces and Bond Strength or Tensile Strength of Concrete Repair and Overlay Materials by Direct Tension (Pull-off Method) and the manufacturer's recommendations. The pull-off tests shall have a minimum tensile bond strength of 250 psi at 24 hours or 100% substrate failure. The Contractor shall record the pull-off test results and the amount of any failure into the base concrete, and shall provide written documentation of the test results. The Engineer will designate the location of the pull-off tests. After the completion of the tests, repair all test areas using penetrating sealer and topping aggregate.

The Contractor shall not begin construction operations at the site receiving penetrating sealer until receiving approval of the completed test application. If the test application is rejected then the Contractor shall perform another test application at no additional cost or contract time to the State. Rejected test application shall be removed per Subsection 105.12 - Removal of Non-Conforming and Unauthorized Work.

(H) Placement.

(1) Mixing.

(a) Hand Mixing. Precondition material to 75°-85°F before using. Measure and mix one part by volume of Part A with one part by volume of Part B for three minutes with a low speed (< 450 rpm) drill using a jiffy mixer or paddle. Mix only as much material as can be used within the pot life. Air, material, and surface temperature must be a minimum of 50°F (10°C) prior to mixing or installation. The Contractor shall limit hand applications and only use it where absolutely necessary. Hand applications must be approved by the Engineer prior to starting work.

(b) Mechanical Mixing. Application equipment shall be calibrated, self-propelled, and capable of continuously and thoroughly blending the resin binder components to the ratio recommended by the manufacturer. For mechanical applications consult material manufacturer for proper mixing and dispensing equipment.

(2) Application. Expansion joints, drains and grates shall be adequately isolated to prevent any penetrating sealer from entering drainage and joint systems. The penetrating sealer discharged from the mixer shall be uniform in composition and consistency. Mixing capability shall be such that initial and final finishing operations can proceed at a steady pace.

Continuous application must be performed by approved, calibrated, self-propelled application equipment capable of continuously and thoroughly blending the resin binder components to the ratio recommended by the manufacturer. An equal or better method may be submitted to the Engineer for approval. After the epoxy mixture has been prepared, immediately distribute evenly and work into concrete with a squeegee or approved equal for a minimum of 5 minutes for maximum penetration. Keep ponding epoxy into cracks until refusal. Existing surface profile of substrate shall be factored into volume calculations. All tines and surface irregularities shall be filled with this material. Penetrating sealer shall have a minimum thickness of 25-30 mils. Verify thickness using a Wet-Mil film thickness gauge for each placement at 700 square feet intervals and at the discretion of the Engineer. Thickness measurements shall not be taken in the tines, but on the surface of the concrete (top of the tines).

The continuous application equipment shall have an aggregate distribution system capable of mechanically placing aggregate into the wet resin binder evenly across the full width of the installation. The application equipment shall install the penetrating sealer at a minimum application rate of 240 square feet per minute. An equal or better method may be submitted to the Engineer for approval. Ensure the topping aggregate is applied uniformly within the working time.

Ensure handling and mixing of the epoxy resin and hardening agent is performed in a safe manner to achieve the desired results in accordance with the manufacturer's recommendations or as directed by the Engineer. Do not place penetrating sealer when the concrete surface is less than 50 degrees Fahrenheit (F) or ambient air temperature is forecast to fall below 50 degrees F within 8 hours of application. Do not place penetrating sealer materials if weather or surface conditions are such that the material cannot be properly handled, placed, and cured according to the manufacturer's requirements and the specified requirements for traffic control. Penetrating sealer shall only be placed after the existing concrete is cleaned according to Subsection 677.03 (F) - Surface Preparation.

Ensure no bleed through or wet spots are visible once the topping aggregate is applied. Minimize all foot traffic on the uncured epoxy and ensure any foot traffic will only be done with steel spiked shoes approved by the Engineer. Do not allow traffic or equipment on the penetrating sealer surface during the curing period. Remove all loose aggregate after the curing period with a vacuum or broom without tearing or damaging the surface. Perform a final sweep of loose aggregates and debris from the areas adjacent to the applied penetrating sealer within end of work shift. Ensure all expansion joints are free of loose aggregate, epoxy and other debris.

For repairing individual cracks follow manufacturer's recommendations on mixing and placement.

(3) Curing. Traffic and construction equipment shall not be permitted on the completed penetrating sealer for 3 hours after placement or until the penetrating sealer is tack free whichever is later.

(I) Testing. Test for any raveling, delamination, streaking, or bond test failure according to the manufacturer's recommendations. A minimum of three pull-off tests at locations selected by the Engineer shall be performed for each placement. Testing will be performed in accordance with ASTM C1583 Standard Test Method for Tensile Strength of Concrete Surfaces and Bond Strength or Tensile Strength of Concrete Repair and Overlay Materials by Direct Tension (Pull-off Method) and the manufacturer's recommendations. A passing test occurs when the failure of the concrete substrate or bond strength is above 250 psi at 24 hours. Fill cored holes with penetrating sealer material approved by the Engineer. A passing substrate failure is when more than 50% of the substrate covers the specimen being tested. Fill cored holes with material approved by the Engineer.

(J) Acceptance and Corrective Action. The completed penetrating sealer shall be free of any smooth or wet areas such as those resulting from insufficient quantities of topping aggregate. Completed surface must smooth out the existing deck to achieve a uniform thickness, texture and appearance.

Correct all defects in material and work, as directed, at no additional cost to the Engineer, according to the following:

(1) Remove and replace any penetrating sealer that the Engineer determines has any raveling, delamination, streaking, or bond test failure. Removal and replacement shall be in accordance with the manufacturer's recommendations and accepted by the Engineer.

(2) Ensure the minimum replacement is the full lane width and the length of the defect plus five lane feet on the up-station and down-station side of the edge of the defect area and as accepted by the Engineer.

Replaced areas will be retested and evaluated for acceptance or further corrective action.

(3) Any roadway features disturbed, damaged or defaced by the work or the Contractor's operations shall be restored with the same materials and design as directed by the Engineer at no additional cost to the State.

The Engineer shall have the right to reject all work which is not in compliance with the requirements of the drawings and specifications. Rejected work shall be removed per Subsection 105.12 – Removal of Non-Conforming and Unauthorized work.

677.04 Measurement. Penetrating sealer will be measured per square foot as shown on the plans and contract documents.

Crack Repair will be paid on a force account basis in accordance with subsection 109.06 – Force Account Provisions and Compensation.

677.05 Payment. The Engineer will pay for the accepted quantities of penetrating sealer complete in place at the contract unit price per square foot. Payment for JITT shall be considered as incidental for this section. The Engineer will pay for the accepted crack repairs on a force account basis in accordance with subsection 109.06 – Force Account Provisions and Compensation. Payment will be full compensation for the work prescribed in this section and the contract documents.

Payment will be full compensation for furnishing and placing all materials, and for furnishing all equipment, labor, and incidentals necessary to complete the work as specified.

No separate or additional payment will be made for preparing road surface, placing materials in final position, sweeping or for the minimum testing of the materials and placement as defined in this specification.

No separate or additional payment will be made for reinstallation and retesting of penetrating sealer where the initial installation was determined to be defective.

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

Pay Item	**Pay Unit**
Penetrating Sealer _____	Square Foot
Additional Penetrating Sealer for Filling Top of Deck Cracks	Force Account"

END OF SECTION 677

Make the following Section a part of the Standard Specifications:

"SECTION 678 – HYBRID POLYMER CONCRETE (HPC)

678.01 Description. The work shall include the furnishing of all labor, materials, equipment and any other related miscellaneous items necessary to completely construct all HPC as shown on the plans and as specified herein.

HPC shall be 100% solids, thermosetting hybrid polymer concrete and composed of the following four components: two-component reactive hybrid polymer resin binder, a blend of specified aggregates to be mixed with the resin binder, and topping aggregate.

678.02 Materials.

(A) Two-component Resin Binder. The resin binder shall be solvent-free, 0-VOC, moisture-insensitive, two-component reactive thermoset polymer binder conforming to the following requirements in Table 1 – Physical Requirements for HPC Resin Binder:

Table 1 – Physical Requirements for HPC Resin Binder

Quality Characteristic	Test Method	Requirement
Viscosity (RV2 @ 20 RPM)	ASTM C881 / AASHTO M 235	1000 – 1500 cP
Flash Point	ASTM D3278	>250° F
VOC Content	ASTM D2369*	<10 g/L
Gel Time	C881 / AASHTO M 235	10 minutes minimum
Tensile Strength (7 days)	ASTM D638, Type I Specimen	1500 – 2500 psi
Tensile Elongation	ASTM D638	40% minimum at 7 days
Adhesion to Concrete	ASTM C1583 (ACI 503R)	250 psi or 100%
		substrate failure at 24 hrs
Water Absorption (24 hrs.)	ASTM D570	0.5% maximum
Type D Hardness	ASTM D2240	60 – 80
Thermal Compatibility	ASTM C884	PASS
Chloride Ion Permeability	AASHTO T277	<10.0 Coulombs
Compressive Modulus	ASTM C579	<450,000 psi
(7 day)	(Extended)	

*Method E, 55-60 mil thickness

-No volatile chemical odors
-No explosive catalysts or ingredients allowed
-Material must be MADE IN THE USA

(B) Aggregates. The aggregate for the HPC shall conform to this section and conform to the following:

(1) Gradation shall be in accordance with Table 2 – Gradation for HPC Aggregate.

Table 2 – Gradation for HPC Aggregate

Sieve size	Percentage passing
1/2"	100
3/8"	98-100
No. 4	77-100
No. 8	60-82
No. 16	34-56
No. 30	5-25
No. 50	0-15
No. 100	0–7
No. 200	0–3

(2) The aggregate absorption shall not exceed 1.5% as determined by AASHTO T 85 or as otherwise approved by the Engineer.

(3) At the time of mixing with the resin, the moisture content of the aggregate, as determined by AASHTO T 255, shall not exceed one half of the aggregate absorption.

(4) The HPC aggregate temperature must be between 45 deg. F and 100 deg. F at the time of mixing.

(C) Topping Aggregate. Furnish aggregate meeting the requirements listed in Table 3 – Topping Aggregate Properties and Table 4 – Gradation for Topping Aggregate unless otherwise specified by the Engineer. Aggregate shall be a dull black in color. Deliver the aggregate to the construction site in bags or super sacks labeled clearly for identification. Provide aggregate that is virgin, clean, dry, and free from foreign matter. A sample of the aggregate lot/batch shall be supplied upon request.

Table 3 – Topping Aggregate Properties

Test Data Description	Test Procedure	Requirements
Gradation	ASTM C136	See Table 4
Moisture	ASTM C566	<0.5%
MOHS Hardness	MOHS Scale	≥7.0
Micro-Deval, maximum	ASTM D6928	<10%
Absorption	ASTM C128	<2%

Table 4 – Gradation for Topping Aggregate

Armorstone	9800-2 - #4 x #16
Sieve size	Percentage passing
No. 4	100
No. 8	30-75
No. 16	0-5

(D) Storage and Handling. All materials shall be delivered in their original unopened containers in new undamaged condition, bearing the manufacturer's label, specifying date of manufacturing, batch number, trade name, and quantity. Each shipment of resin binder shall be accompanied by a Safety Data Sheet (SDS).

The material shall be stored to prevent damage by the elements and to ensure the preservation of their quality and fitness for the work. The storage space shall be kept clean, covered, cool and dry.

Stored materials shall be inspected prior to their use, and shall meet the requirements of this Specification at the time of use.

Any material which is rejected because of failure to meet the required tests or that has been damaged so as to cause rejection shall be immediately replaced at no additional expense to the State.

The Contractor shall arrange to have the material supplier furnish technical service related to application of material and health and safety training for personnel who are to handle the HPC.

Any recycled topping aggregates shall meet the same requirements listed in Table 3 – Topping Aggregate Properties and Table 4 – Gradation for Aggregate Topping. Recycled topping aggregates shall be stored separately from new topping aggregates.

678.03 Construction Requirements. Conform to the requirements of Section 503 – Concrete Structures and Section 601 – Structural Concrete in these specifications.

(A) Submittal Requirements. Prior to the Just-In-Time Training (JITT) and the start of this work, provide 6 copies (2 copies for Highways Division Materials Testing and Research Branch (HWY-L)) of the following submittals in one complete set for acceptance. Indicate clearly the name of the product and its manufacturer on pertinent submittals. No work that is related to these submittals shall be performed until written acceptance has been received. Submit all items listed to the Engineer for approval 30 days prior to installation.

(1) A warranty on the entire overlay system provided by the manufacturer. Warranty shall be for a minimum of 10 years.

(2) Work Plan. Submit a Work Plan to the Engineer for approval 30 days prior to the JITT, pre-construction meeting, and pre-installation meeting, whichever is earliest. No installation work shall start until the Work Plan is accepted and discussed in the JITT, pre-construction meeting, and pre-installation meeting. Discuss the Work Plan requirements at the pre-construction, pre-installation, and progress meetings. The Work Plan shall contain detailed step by step procedures for all aspects of the work and at a minimum the following information:

(a) Detailed information on all equipment, materials, and staging areas that will be used for all aspects of the work.

(b) Method of surface preparation and required surface condition for adequate bonding. The procedure shall include the method and materials used to contain, collect, and dispose of the concrete debris generated by the scarifying process, including provisions for protecting adjacent traffic from flying debris.

(c) Method of crack repair/defective concrete repair of existing concrete deck prior to placement of HPC.

(d) Method of determining surface profiles.

(e) The HPC mix design and the estimated curing time based on anticipated temperatures.

(f) Paving plan (Jointing Plan, Installation sequence, Direction of Paving, etc.). Construction joints shall be located away from the wheel path.

(g) Method of placement (handling, mixing, consolidating, finishing, curing, and texturing) of HPC. This includes placing topping aggregate.

(h) Detailed step by step procedures for testing bond, compressive strengths, and delaminations.

(i) Construction during inclement weather. Plan for the occurrence of rain, moisture and temperature requirements for the materials being used.

(j) Corrective actions shall be taken for unsatisfactory installation practices. Any corrective actions that have not been

discussed in this submittal shall be submitted for approval by the Engineer.

If any work during the entirety of the project does not comply with or follow the approved Work Plan, a new work plan shall be submitted and approved prior to any work resuming.

(3) Quality Control (QC) Plan. Submit a QC Plan to the Engineer for acceptance a minimum of 30 days prior to the installation and the JITT. Resubmittal of the document will require another 30 days for each resubmittal. Discuss the QC Plan requirements at the JITT, pre-construction, pre-installation, and progress meetings. The JITT shall not be held unless the QC Plan is accepted 30 days before the scheduled JITT date. Work shall not start on the HPC overlay test application, until the JITT has been completed and the QC Plan and the Work Plan have both been accepted. The QC Plan shall contain at a minimum the following information:

(a) Names and contact information for key personnel, project superintendent, and lead technician responsible for field quality control sampling and testing. Submit the laboratory's accreditation for the test method used and the technician's and the QC Manager's certification for all the test methods used.

(b) The name of the manufacturer of the HPC materials including the name and phone number of the Manufacturer's Technical Representative.

(c) Certificates of compliance and test reports for all materials used in the HPC mix.

(d) Manufacturer's written instructions for the installation of the overlay system and the storage of all overlay materials.

This shall include means and methods for recycling of aggregates. Quality Control (QC)/Quality Assurance (QA) testing to ensure recycled aggregates meet requirements listed in Table 3 – Topping Aggregate Properties and Table 4 – Gradation for Aggregate Topping.

(e) Information on the HPC including shelf life, working times, pot life (at anticipated ambient temperatures) and placement rates.

(f) Detailed plans and procedures to be in compliance with Section 107 - Legal Relations and Responsibility to Public including complying to noise variances, and controlling of work to

appropriately minimize dust and air borne debris from cleaning and roughening the substrata, mixing and placing HPC, and cleaning operations, and to prevent water runoffs.

(g) Planned actions to maintain adherence to limitations and requirements of the following variables with regards to HPC work:

(1) Equipment and traffic control near or on work areas during placement and curing operations

(2) Inclement weather

(3) Moisture and temperature requirements for the materials being used

(h) Produce test reports of compressive strengths and bond strengths, during the progress of the work. Reports shall be submitted once every 2 weeks.

The QC Plan shall designate a QC Manager, who shall be present at the jobsite and have full authority to request any action necessary for the operation of the QC Plan providing it complies with the contract documents and acceptance of the Engineer.

The QC Manager shall be certified in all test methods used and be responsible for the required field quality control in sampling and testing in conformance with the accepted quality control plan, test methods and contract documents. All sampling shall be performed in the presence of the Engineer. All testing must be done at an accredited material testing laboratory performed by certified technicians. The accreditation and certification must be for the test methods used. The Engineer is not responsible and shall not be regarded as part of the Contractor's QC team. It is the responsibility of the Contractor and the QC Manager to ensure that the test procedure being used is compliant with the test method standard. Inspections are performed for the exclusive benefit of the State. The inspection of or the failure to inspect the work shall not relieve the Contractor of obligations to fulfill the contract as prescribed, to correct defective work, and to replace unsuitable or rejected materials regardless of whether payment for such work has been made. The Engineer has the right to reject the test if the Engineer feels that it is non-compliant, e.g., the technician who performed the test is not certified or the material testing laboratory is not accredited to perform the required tests. Maintain and have available upon request, the current test standard methods documentation being used, referenced documents, complete

records of sampling, testing, corrective actions, and quality control inspection results.

A technical representative from the resin binder manufacturer shall be present at the JITT, Test Application, e.g., deck repair, surface preparation, installation and acceptance of the HPC overlay, and at the construction site for at least the first two days of the HPC overlay installation.

(B) General. The HPC manufacturer shall have a representative on the job site for the startup of the project. The HPC representative must report any work or materials that may result in non-compliant work to the Engineer, who may suspend any item of work that is suspect and does not meet the requirements of this specification. Resumption of work will occur only after the manufacturer's representative and the Engineer are satisfied that appropriate remedial action has been taken by the Contractor. No work shall proceed and materials will not be accepted if manufacturer's technical representative is not on site for the startup of the project.

During surface preparation and application, precaution shall be taken to assure that traffic is protected from rebound, dust and construction activities. Dust in the air at night may become an opaque vision barrier to motorists due to headlights and floodlights. The Contractor must not allow this to happen. Appropriate shielding shall be provided as required and as directed by the Engineer at no additional cost. The Contractor shall provide suitable protection as needed to protect all exposed areas not to receive HPC such as parapets, drains, etc. All damage and defacement resulting from the application shall be cleaned and, or repaired to the Engineer's satisfaction at no additional cost to the State.

(C) Equipment. Use a continuous automated volumetric mixer. Mechanically operated mixers or hand mixing may only be used as a backup during repairs, or for applications less than a cubic yard. Follow manufacturer's recommendations. The Contractor must submit all mechanical and hand application methods for approval by the Engineer prior to starting any work.

When mixing and applying manually, mix only the amount of material that can be used within its pot life. Proportion each liquid component carefully into a clean pail or drum. Mix thoroughly for 3 minutes with a Jiffy mixer on low speed (400-600rpm). To prepare HPC, slowly add 200-250 lbs. of the engineered aggregate to every 4-gal of mixed polymer. Mix only until all aggregate is wetted out. Manufacturer's representative shall be present during hand mixing operations.

(D) Just -In-Time Training. JITT shall conform to Section 695 – JUST IN TIME TRAINING.

(E) Pre-Operational Conference. Schedule a meeting with the Contractor, and supplier's representatives involved in the construction operation of the HPC and the Engineer, at a mutually agreed time, to discuss and verify the methods of accomplishing all phases of the HPC operations, contingency planning, and standards of workmanship for the completed items of work. Include the Contractor's superintendents, foremen, subcontractors, and supplier's technical representatives, and all key personnel involved with the HPC work as attendees of the pre-operation conference. Do not begin placement of HPC before the Engineer accepts the pre-operational conference as completed.

(F) Surface Preparation. Use the procedures of ICRI (International Concrete Repair Institute) Guideline No. 03730 "Guide for Surface Preparation for the Repair of Deteriorated Concrete Resulting from Reinforcement Steel Corrosion" and ICRI Guideline 03732 "Selecting and Specifying Concrete Surface, Surface Preparation for Sealers, Coatings and Polymer Overlays" sections of ACI 546.14 "Guide for Concrete Repair". The Contractor shall be responsible for any falsework requirements, debris, noise and pollution control on and below the repair area.

The concrete surface shall be prepared by removing all material which may act as a bond breaker between the existing surface and the HPC.

The textured or scarified pavement preparation method shall remove all dirt, oil and other foreign materials, as well as any unsound concrete or laitance from the surface and edges against which new HPC is to be placed. The concrete surface may require retexturing where penetration of foreign material is evident. No contamination of the retextured or scarified concrete surface shall be permitted.

The surface preparation shall meet the following requirements:

(1) New Pavement. On new concrete, the surface shall be given a very rough texture while still plastic by use of a wire comb or other approved texturing device which will produce a bondable surface acceptable to the engineer.

(2) Existing Pavement or Bridge Deck. On existing concrete, the surface shall be prepared by shot blasting or approved equal. Pneumatic chipping tools weighing 15 pounds or less or an approved equal may be used for areas where the Contractor is unable to shot blast upon approval of the Engineer. Produce a concrete substrate surface with a minimum roughness of approximately ¼-inch amplitude or an ICRI concrete surface profile (CSP) of 7. The preparation method shall not produce a polished or slick surface.

(3) Existing concrete containing previously placed repair materials. On existing concrete with previously placed unsound or magnesium

phosphate repair products, these materials shall be removed prior to placing the HPC. The Contractor shall follow Section 680 – Defective Concrete Repairs. The exposed concrete surface shall meet the requirements contained in Subsection 678.03(F)(2) of this specification.

(4) Existing Concrete with Penetrating Sealer and aggregate topping. Remove all loose sand/aggregate. Clean surface to be free of any dust, dirt, oil, and debris prior to placing any HPC. Penetrating sealer with aggregate topping shall be considered unclean and contaminated if the surface has not been shotblasted within 48 hours. Surface shall be cleaned prior to placing HPC overlay.

The Contractor shall take extra care not to damage the existing expansion joints during the surface preparation of the existing concrete deck.

An approved moisture meter shall be used to check the moisture in the existing substrate prior to application of any surface treatment. An equal or better method may be submitted to the Engineer for approval. A maximum moisture reading of under 3% will be allowed. If rain occurs for more than 10 minutes no application of penetrating sealer will be allowed for the remainder of the work shift.

During surface preparation and application, precaution shall be taken to assure that traffic is protected from rebound, dust and construction activities. Dust in the air at night may become an opaque vision barrier to motorists due to headlights and floodlights. The Contractor must not allow this to happen. Appropriate shielding shall be provided as required and as directed by the Engineer at no additional cost. The Contractor shall provide suitable protection as needed to protect all exposed areas not to receive penetrating sealer such as parapets, drains, etc. All damage and defacement resulting from the application shall be cleaned and, or repaired to the Engineer's satisfaction at no additional cost to the State.

(G) Trial Pour. The Contractor shall place a trial pour of HPC using the approved equipment and procedures as detailed in the approved work plan. The Contractor shall notify the Engineer of the time and location of the trial pour at least seven (7) calendar days prior to the scheduled trial pour.

The trial pour may be a part of the production location before starting production work. HPC manufacturer's representative shall be present during the trial pour. The trial pour shall meet the following requirements:

(1) Install a minimum of 11 ft (lane width) x 112 ft (length) x 1½ inch (thickness) trial overlay. 112 foot length is based off of typical length between expansion joints. Trial overlay shall be from expansion joint to expansion joint.

(2) Shall be constructed using the same method and equipment as the production work.

(3) Shall construct an additional trial pour for each method proposed for the production work.

(4) Shall replicate field conditions, including ambient and surface temperatures, time period, anticipated for production work.

(5) Shall demonstrate surface preparation method as outlined in the Work Plan.

(6) Shall demonstrate that the data management system is capable of documenting ambient and surface temperatures, quantities of resin binder and aggregate, coverage rates and reporting application rates in real time.

(7) Determine the initial set time for the HPC overlay.

The Contractor shall perform three pull-off tests on the trial pour in accordance with ASTM C1583 Standard Test Method for Tensile Strength of Concrete Surfaces and Bond Strength or Tensile Strength of Concrete Repair and Overlay Materials by Direct Tension (Pull-off Method) and the manufacturer's recommendations. The pull-off tests shall have a minimum tensile bond strength of at least 250 psi at 24 hours or a substrate failure. A passing substrate failure is when more than 50% of the substrate covers the specimen being tested. The Contractor shall record the pull-off test results and the amount of any failure into the base concrete, and shall provide written documentation of the test results. The Engineer will designate the location of the pull-off tests. After the completion of the tests, repair all test areas using HPC and aggregate topping.

The Contractor shall perform three compressive strength tests on the trial pour in accordance with ASTM C579 Standard Test Methods for Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes and manufacturer's recommendations. The HPC samples shall have a minimum compressive strength of 1000 psi at 24 hours and 3000 psi at 7 days. The Contractor shall record the strengths for each sample and shall provide written documentation of the results.

The Contractor shall not begin construction operations at the site receiving the HPC until receiving approval of the completed trial pour. If the trial pour is rejected then the Contractor shall perform another trial pour at no additional cost or contract time to the State. Rejected trial pour shall be removed per Subsection 105.12 - Removal of Non-Conforming and Unauthorized Work.

(H) Traffic and Equipment Control on Bridge.

(1) Equipment, vehicles, and personnel, etc. shall not contaminate the prepared deck surface.

(2) Equipment shall not be located on spans undergoing deck HPC work unless approved by the Engineer.

(3) The Contractor shall not permit compressors or other equipment that produce vibrations on the span undergoing deck HPC work.

(4) Vehicular traffic shall not exceed a 35-mph speed limit on the bridge span during HPC placement and curing.

(5) The bridge deck shall not be used as a storage area for equipment or for stockpiling materials. Loads exceeding eight tons shall not be used on the bridge unless approved by the Engineer.

(I) Placement of HPC. After surface preparation, concrete surfaces shall be structurally sound, clean, free of dirt, powdered concrete, loose mortar particles, paint, film, protective coatings, efflorescence, laitance, and other matter detrimental to proper adhesion of the new HPC. The Contractor shall ensure proper cleanliness. Work surfaces must be free of ridges, fins or sharp projections. All reinforcing bars in the repair area shall be made free of all scale and loose rust by using either powered rotary wire bristle brush or abrasive blasting. Needle gunning may be used as preliminary step for removal of loose rust. Do not overly vibrate the reinforcing bars.

Expansion joints, drains and grates shall be adequately isolated prior to placing the HPC as approved. HPC shall not affect the design and function of the expansion joints, drains, and grates. Do not place HPC within 6 feet of another area where the deck surface is being prepared.

The HPC discharged from the mixer shall be uniform in composition and consistency. Mixing capability shall be such that initial and final finishing operations can proceed at a steady pace.

The hybrid polymer resin binder in the HPC shall be 12-15 percent by weight of the dry aggregate. The Contractor shall determine the exact percentage as approved by the Engineer.

The HPC overlay shall be placed at a minimum thickness of 3/4 inch.

Any falsework and formwork required shall be considered incidental to this work.

(J) Hot Weather Concreting. Do not place HPC where ambient

temperature is above 90 degrees F unless design mix and placement method conform to ACI 305 R-20 Hot Weather Concreting. When ambient temperature is above 90 degrees F, cool reinforcing steel, forms, and other surfaces to below 90 degrees F with approved methods by the Engineer before placing of HPC.

(K) Finishing HPC. Finishing equipment shall be capable of consolidating the HPC, striking off the HPC to the final grade, and providing the thickness and cross-sections as shown in the contract documents.

For repairs or placements of less than 2 cubic yards or areas inaccessible to self-propelled finishing equipment, finish while the HPC is plastic and workable using a roller screed, air screed, or approved equal. The Contractor has the option of using other methods of finishing HPC as long as the selected method leaves a uniform, level finish, free of slick or puddled resin areas. Engineer must approve methods prior to constructing trial overlay. Finish the HPC to meet the requirements of Subsection 678.03(N) Surface Testing.

Topping aggregate. The Contractor shall use methods and equipment for broadcasting the surface topping aggregate on to the plastic, in-place HPC overlay material in accordance with the manufacturer's recommendations. Aggregate topping shall be initiated immediately after final finishing operations of the HPC overlay and while the HPC surface is still wet to ensure proper embedment of the aggregate topping. Sweep, vacuum, or blow excess aggregate topping from surface after the HPC is tack-free.

(L) Curing. Traffic and construction equipment shall not be permitted on the HPC for at least 3 hours after placement and until the HPC surface is tack free. Refer to HPC technical data sheet curing schedule for estimated cure times.

(M) Construction Joints. Use construction joints only with the acceptance of the Engineer and in accordance with the Contract documents.

(N) Surface Testing. The finished HPC shall conform to the following requirements when tested by the Contractor in the presence of the Engineer within 14 days following the placement of HPC:

(1) Surface Flatness. The surface of the HPC shall not vary more than 1/8 inch under a 10-foot straightedge placed parallel to the traffic lanes. Construction joints shall not vary more than 1/8 inch under a 10-foot straight edge.

(2) Surface Condition. The surface of the HPC shall be sound and free from delaminations and cracks greater than 0.01 inch in width.

(O) Testing HPC.

(1) A minimum of three compressive strength tests shall be performed for each LOT. A LOT shall be one day's production per mixing and placement method and once every maximum of 10 cubic yards of HPC. When more than one production facility or continuous volumetric mixers is used for the same mix design, apply the sampling and testing frequency per production facility or per continuous volumetric mixer, e.g., two continuous volumetric mixers equal a minimum of two LOTS. Testing shall be performed in accordance with ASTM C579 Standard Test Methods for Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing's, and Polymer Concretes and the manufacturer's recommendations. The compressive strength shall be a minimum of 1000 psi at 24 hours and 3000 psi at 7 days.

(2) A minimum of three pull-off tests at locations selected by the Engineer shall be performed for each LOT. Testing shall be performed in accordance with ASTM C1583 Standard Test Method for Tensile Strength of Concrete Surfaces and Bond Strength or Tensile Strength of Concrete Repair and Overlay Materials by Direct Tension (Pull-off Method) and the manufacturer's recommendations. A passing test is the failure of the concrete substrate or bond strength above 250 psi at 24 hours. A passing substrate failure is when more than 50% of the substrate covers the specimen being tested. Fill cored holes with HPC approved by the Engineer.

The pull off tests shall also be used as a means to verify thickness. A minimum of ¾" thickness for the HPC overlay is required.

(P) Quality Control (QC):

(1) HPC Sampling and Testing. Perform QC HPC sampling and testing in accordance with the QC plan and following requirements:

(a) QC tests shall include temperature and preparing compressive strength cubes for testing at later dates. Perform HPC tests on the initial delivery for each mix each day. Ensure that QC technicians are certified, and the materials testing laboratory are accredited in the test method being used and in accordance with the HDOT's Quality Assurance Manual for Materials dated October 2001. Ensure all technicians that are performing the sampling and performing the testing are certified in the test placement operation at each placement site and the testing is done in an accredited material testing laboratory. Cast a set of cubes representing the LOT from the same sample of HPC.

(b) Maintain a logbook with records of relevant details of all tests. Provide a copy of new entries at the end of each work day. Make available for inspection by the Engineer during the normal working hours of construction. At the end of the project, deliver the original logbook to the Engineer. The original logbook will become property of the Engineer.

(Q) Acceptance and Corrective Action. The completed HPC overlay surface with topping aggregate must be uniform in texture and appearance. HPC shall meet the compressive strength and bond strength requirements. The Contractor shall repair or replace all HPC that does not meet the approval of the Engineer at no additional cost to the State. Repair methods shall be submitted to the Engineer for approval.

Correct all defects in material and work, as directed, at no additional cost to the Engineer, according to the following:

(1) Remove and replace HPC overlay that the Engineer determines has any raveling, delamination, streaking, compressive strength test failure, or bond test failure.

(2) Replace with acceptable HPC overlay at the Contractor's expense. Ensure the minimum replacement is the full lane width and the length of the defect plus five lane feet on the up-station and down-station side of the edge of the defect area and as accepted by the Engineer. Replaced areas will be retested and evaluated for acceptance or further corrective action.

(3) Any roadway features disturbed by the work or the Contractor's operations shall be restored with the same materials and design as directed by the Engineer at no additional cost to the State.

The Engineer shall have the right to reject all work which is not in compliance with the requirements of the drawings and specifications. Rejected work shall be removed per Subsection 105.12 – Removal of Non-Conforming and Unauthorized work.

(R) Verification and Independent Assurance. HDOT may perform verification sampling and testing for its own use for internal assurance and acceptance testing. Furnish sufficient quantity of each mix for verification and independent assurance sampling and testing as required by the Engineer. When the Engineer performs verification, the Contractor may perform the same tests on the HPC at the same time. HDOT's Independent Assurance Program will be conducted to evaluate all sampling and testing used in the acceptance material.

678.04 Measurement. The Engineer will measure HPC overlay per square

foot in accordance with the contract documents.

678.05 Payment. The Engineer will pay for accepted HPC overlay on a square foot basis. Payment for JITT shall be considered as incidental for this section. Payment will be full compensation for the work prescribed in this section and the contract documents.

Payment will be full compensation for furnishing and placing all materials, and for furnishing all equipment, labor, and incidentals necessary to complete the work as specified.

No separate or additional payment will be made for preparing road surface, placing materials in final position, sweeping or for the minimum testing of materials and placement as defined in this specification.

No separate or additional payment will be made for reinstallation and retesting of HPC where the initial installation was determined to be defective.

The Engineer will pay for the accepted pay items when included in the proposal schedule:

Pay Item	**Pay Unit**
Hybrid Polymer Concrete (HPC) Overlay _____	Square Foot”

END OF SECTION 678

PRE-BID MEETING MINUTES

Hawaii Belt Road,
Rehabilitation of Nanue Stream Bridge
Island of Hawaii
FEDERAL-AID PROJECT NO. BR-019-2(077)

Date, Time & Place: Wednesday, November 13, 2024; 1:00 P.M. HST, Pre-bid meeting was held virtually via Microsoft TEAMS.

Attendees:

Name	Company/Office	Email
Sunahara, Amy	HDOT	amy.my.sunahara@hawaii.gov
Jeremy Lee	HDCC	jtlee@hdcc.com
Shane Pasion	HDCC	spasion@hdcc.com
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Taylor Byington	W.W. Clyde & Co.	tbyington@wwclyde.net

Items of Discussion:

Project Manager Amy Sunahara opened the meeting at 1:01 P.M. The following reminders were announced:

- This meeting is being recorded. The recording will not be part of the addendum.
- Please identify yourself, the company you are representing, and your e-mail address in the chat or this information can be emailed to Amy.my.sunahara@hawaii.gov.
- Anything said at this meeting is for clarification only. The bid documents shall govern over anything said today and discrepancies shall be clarified by addendum.
- The scope of work for this project consists of replacing steel truss members, bearings, gusset plates, etc.…that have corrosion and section loss, fixing spalls and delamination in the concrete deck, abutments, bridge railing and column pedestals, cleaning and painting the steel members following the repairs, addressing scour deficiencies for the bridge formations, removal and disposal of bridge sections and parts, painting and paving with asphalt and hybrid polymer concrete, management of contaminated materials, installation of pavement markings, installation of bmp measures for erosion control and hazardous materials, and traffic control.

Office of Civil Rights, Jesus Navarro & Dan Williams, presented the Hawaii DOT DBE bidding process to ensure equal opportunity and nondiscrimination in the award and administration of United States DOT assisted contracts.

- Contractors shall take all necessary steps in accordance with the regulations FAR part 26 to ensure that DBEs are having an opportunity to compete for and perform on the contract.
- The DBE goal for this project is 2.4%.
- Document all discussions, phone calls, faxes, memos related to your efforts, and meetings with the DBE.
- DBEs must be certified by the bid opening date.
- DBE forms are due to the Project Manager (Amy Sunahara) by 4:30 PM. HST, five (5) calendar days after bid opening.
- A bidder registration form needs to be completed or updated by each company.

Amy Sunahara announced the following:

- All questions need to be uploaded to HIePro by November 20, 2024 by 4:30 P.M.
- Bid opening is currently scheduled for December 12, 2024 at 2:00 P.M.

Contractor questions:

- Is there a construction manager for this project?
    - Amy Sunahara responded with “HWY-H will be in charge on the HDOT side.”

Meeting was adjourned when prospective bidders had no further questions at 2:17 P.M.

Questions for solicitation: B25000902 BR-019-2(077) Rehabilitation of Nanue Stream Bridge
11/20/2024

1. **Will laser rust ablation / removal by Hawaiian Protective Solutions be an acceptable alternate to shot blasting the existing steel structure that is to remain.**

Laser Ablation will not be an acceptable alternate to abrasive blasting of the existing steel structure. While there are many reasons why this is not acceptable, the main reason being that the laser ablation will not produce the anchor tooth profile that is needed for coating adhesion.

2. **While Sect 666.02, (A), (2) states that the same manufacturer shall furnish the primer, intermediate, stripe and topcoat, the coatings specified in Sect. 666.02, (B) are not furnished by the same manufacturer. Will the Engineer delete the requirement of the former, or will the Engineer revise the latter and call for materials from the same manufacturer?**

See revised Special Provision Sections 666 and 667 for clarification. The Bidder shall follow the paint system as specified in the Special Provisions.

3. **Sect 666.02, (B) calls for the use of materials from two (2) different manufacturer's (ie. primer vs, intermediate, stripe and finish). Shall the Bidders assume that the Engineer accepts responsibility for warranting that the materials are compatible?**

The bidder may assume that the contract imposes no requirements on the bidder to assume responsibility for the compatibility of coatings produced by different manufacturers.

4. **Sect 666.02, (B) calls for the use of materials from two (2) different manufacturer's (ie. primer vs, intermediate, stripe and finish). Shall the Bidders assume that the Engineer accepts responsibility for warranting the performance of this custom system?**

The bidder may assume that the contract imposes no requirements on the bidder to assume responsibility for the performance of the system as specified, but rather that the bidder provides written warranties for the individual products to perform as intended by the standards of the manufacturer and to cover replacement of the product in the event of a discovered defective condition.

5. **Sect. 666.02, (B) calls for Zingametall Zinga to be applied as a primer, followed directly by Tnemec Epoxoline II as the stripe coat and the intermediate coat. While reviewing the Zinga TDS, we noticed that the manufacturer says that "To avoid any problems with application of topcoats, we advise the use of a sealer. Zingametall offers two compatible sealers which have been tested according ISO 12944: Zingalufer (PU sealer) and Zingaceram HS (EP sealer)". Shall**

the Bidders assume that a sealer shall be applied, in accordance with manufacturer's directions, or that no sealer shall be applied, in accordance with Sect. 666.02, (B)?

See revised Special Provisions Sections 666 and 667 for clarification. A mist coat of the Epoxoline II Series V69 has been added to the specified system to act as the sealer.

6. **Specification Section 501 – Steel Structures: Contract documents reference Advanced (ABR) Bridge Fabricator Certification for the fabrication of the trestle structure. However, after reviewing the scope of work, it seems that a higher level of certification might not be appropriate for the complexity and scope of this bridge rehabilitation project. Would it be acceptable to allow Intermediate (IBR) Bridge Fabricator Certification? This would allow a larger pool of contractors to bid and provide a more competitive bidding process.**

With consideration, an Intermediate (IBR) Bridge Fabricator Certification is acceptable so long as the fabricator has a documented procedure for welding that includes a distortion control program.

7. **Referencing Plan Sheet EC-3, Water Pollution and Erosion Control Note 2: Please provide the status of these permits.**

E.2.a. NPDES Permit for Construction Activities – See Note. E.1. on Plan Sheet EC-3.

E.2.b. Water Quality Certification – will be issued with the Section 404 Army Corps Permit.

E.2.c. Section 404 Army Corps of Engineer Permit – Pending U.S. Army Corps of Engineers issuance.

8. **Referencing Plan Sheet S0.4, General Notes 3E, F: Please provide As-Build drawings to all bidders.**

The Contractor may obtain the as-built drawings from the HDOT Highways Division at the location noted on Structural General Notes, 3. General: E. or at the following website location: http://162.221.244.142:8080/As-Built/plan/all/page/1?sortField=id&sortDir=asc

9. **Referencing Plan Sheet S0.7, Construction Note 10B: Please provide the bridge load rating and inspection reports to all bidders.**

The latest Bridge Inspection Reports and Load Rating Report will be provided.

10. **Due to the complexity of this project, we would like to request a 4-week extension to the bid date.**

Extension provided in Addendum 1. Bid date extended to January 9, 2025.

11. **Is there a list of prospective bidders available for this contract?**

No

12. **Note 10. Construction Note A. " Contractor shall be entirely responsible for the stability of the bridge…". Please make available for all bidders the Bridge Inspection Report.**

The latest Bridge Inspection Reports will be provided.

13. **Note 10. Construction Note B. "Contractor's Engineer shall determine the structural adequacy of the bridge throughout all phases of construction…". With the different options and approvals needed for temporary bracing, please create a Force account item to not only track the design but installation and procurement of the temporary bracing. This will allow for more aligned and comparable bids.**

Force account item for design and installation of temporary bracing will not be created.

14. **Note 10. Construction Note C. "Contractor shall field verify all existing site conditions, dimensions and member sizes prior to fabrication of any bridge elements". For estimating purposes, confirm that the bidders are to scale the drawings to assume the member lengths. Which drawings should the bidders use for estimating length of the bracing members.**

It is unclear if the bidder is inquiring about the member lengths of the existing steel or new steel. For existing steel, the bidder should refer to the as-built drawings. For new steel members, all dimensions needed for estimating takeoffs are shown on the plans. By "bracing members" it is assumed that the bidder is inquiring about the substructure trestle bracing members and not any of the members for the superstructure. The Contractor should reference plan sheets SA2.1, SA2.3, SA2.4, and SA4.1 through SA4.10 for information in helping to determine bracing member lengths.

15. **Due to the complexity, magnitude and the amount of temporary engineering and structural checks needed for this bid, Contractors request bid to be pushed out 2 months.**

HDOT believes that the 4-week extension provided in addendum 1 is acceptable enough to put together a bid. No further extensions will be considered at this time.

16. **Please provide the Bridge Load Rating Report with calculations.**

The latest Load Rating Report will be provided.

17. **Please provide As-Built Drawings and calculations**

The Contractor may obtain the as-built drawings from the HDOT Highways Division at the location noted on Structural General Notes, 3. General: E. or at the following website location: http://162.221.244.142:8080/As-Built/plan/all/page/1?sortField=id&sortDir=asc

18. **Due to the complexity of the project, suggest making the Steel Bid Items Unit Price by the lbs.**

Pay Item for Steel work will remain Lump Sum. The Contractor shall perform their own takeoffs for estimation.

19. **Please confirm that any defects etc. to the existing bridge that is not part of the Bridge Load Rating and Inspection report will be a Change**

Any defects to the existing bridge substructure that are not part of the Bridge Inspection Report may be considered a change condition so long as the defects are of a significant enough nature that affect the Contractor's methods of construction. To qualify, defects would need to be measurably worse than the other documented defects and the effect on the methods of construction would need to be quantified by the Contractor's Engineer.

20. **Due to the unknown factors of the As-Built drawings and Bridge Loading Report, it is difficult to estimate the effort needed to design the temporary supports. IE existing damage of the structure in other locations separate from the failure need to to be analyzed.. Recommend that, like other projects, this be a force account price item.**

Force account item for designing the temporary supports will not be created.

21. **With amount of temp engineering needed to bid this project, please issue a stipend to account for bidders costs that we being expended to analyze and confirm that a viable plan works and can be constructed.**

No stipend will be provided. See sheets SB1.1 to SB3.9 for an example of a viable plan that can be constructed.

22. **Please confirm that Builders Risk to include the full Contract value only for the perils of Named Windstorm and Earthquake**

No, Builders Risk shall comply with Specification Section 107.01(B)(4) in its entirety.

23. **Per Section 7.2 of the C-EHMP: Soil that is disturbed will remain on-site per the recommendations of RAA. It will be reused and managed in place. All soil on site is considered to be lead-impacted soil in excess of the HDOH Tier 1 EALs for unrestricted land use and at or in excess of construction/trench worker EALs for lead. Off-site disposal is not planned for soil on-site. Additional sampling is not anticipated as all soil will remain on-site and handled as lead impacted. However, specification section 627, page 2a, states: The Contractor shall separate soil into two soil piles. Pile 1 will consist of soil excavated from the depth found to be contaminated (surface to 36" bags). Pile 2 will consist of soil excavated from 36" bags and deeper. The intent of separating the soil is to utilize potentially unimpacted soil as backfill**

and/or to remove and dispose of impacted soils from the site. Soil from Piles 1 and 2 will be tested for RCRA metals and chlorinated pesticides. If soil concentrations are below the Department of Health (DOH) Environmental Action Levels (EAL), then the soil may be used with no restrictions as long as it meets other specification requirements. The Contractor shall also test any residual soils not used as backfill for Toxicity Characteristic Leaching Procedure (TCLP) for metals and chlorinated pesticides. Soils with concentrations above the regulatory limit shall be disposed of in accordance with regulatory requirements. Questions: Will excavated lead-impacted soil be allowed to be reused onsite, without additional sampling/testing? Also, please confirm that offsite disposal of contaminated soil is not required.

On-site management and reuse of soil on-site will be the approach. Removed soil shall be temporarily stored on-site before being re-used or spread out at the site following subsurface soil excavation activities. Sampling/testing of soil is not required. Soil shall not be disposed of off-site.

24. **Is there an agreement between HELCO and HDOT for relocating the existing overhead utility lines?**

There is no agreement between HELCO and HDOT. The Contractor shall coordinate with HELCO for temporary relocation(s) required and pay for all costs associated with the relocation(s).

25. **When is the anticipated construction start date?**

The anticipated construction start date is in March/April 2025.

26. **Referencing Spec Section 627.03 (L) and the C-EHMP Report page 23, 7.1.3 Excavation: Please clarify how to handle excess soil. Specs Section says to dispose at the landfill while the Report says to keep all soils on-site.**

On-site management of all excavated soil shall be the approach. Excess soil will be cleaned off of steel structural material before being removed from the site. No loose soil will be moved off the site with the steel members being disposed of. The steel members will be hauled away in lined roll-off's.

27. **Referencing C-EHMP Report page 23, 7.2 Soil Reuse: Please clarify if green waste can be left on-site.**

Green waste that is free of soil shall be removed off-site. Payment for removal of green waste off-site shall be considered incidental to the various contract items. Green waste with soil shall be managed on-site.

28. **Note 3 on SA9.23 (pg. 182) states "Only one cross frame may be removed per span during each phase." Since these members also have to be field fit prior to welding and galvanizing, is it acceptable to reinstall the original members or install temporary members so that Multiple cross frames can be sent for galvanizing and painting at the same time?**

There are many different possibilities for how the Contractor can "field fit" the cross frames. The purpose of the field fitting is to ensure that the cross frames can be bolted up to the stiffener and still maintain all the required clearances and dimensions shown on the contract drawings. Bolt holes do not need to be drilled at this time as they will be drilled after initial abrasive blasting. Field fitting could be performed on an identical adjacent pair of stiffeners that are not occupied by a cross frame. The proposal by the Contractor to reinstall the original members to the stiffeners would be acceptable but would need to be installed with pretensioned HS bolts. If temporary cross frames are installed, they would need to have equivalent strength and stiffness to existing cross frame.

It is not the intention of the Engineer to require the Contractor to remove one cross frame, fabricate the new cross frame, install new cross frame, and then continue the sequence. It is the intention of the Engineer that the Contractor will prefabricate all cross frames (see suggested steps discussed above for how "field fitting" may be accomplished) and then proceed with removal and replacement one at a time.

29. **In spec section 666 on page 2a line 89 it states, "Do not mix manufacturers. The same manufacturer shall furnish the primer, intermediate, stripe, and topcoat." The products called out on page 4a of the spec lines 161 - 168 have Zingametall for the primer and Tnemec for the stripe, intermediate and topcoat. Tnemec does not manufacture the Zingametall prime. Is it the designer's intent to mix manufacturers and is there an issue if Tnemec only warranties the intermediate and finish coats but not the primer or how the primer interacts with the intermediate and Finish coat?**

The specified paint system does utilize products from different manufacturers. See revised Special Provisions Section 666 and 667. It is not intended for the paint manufacturer to warrant any product other than the ones they produce. Therefore, Tnemec is not required to provide a warranty for Zinga or their products interaction with Zinga.

30. **In spec section 667 on page 2a line 63 they call out SSPC-QP-3, "Standard Procedure for. Evaluating the Qualifications of Industrial / Marine Painting Contractors" Is this meant to be SSPC QP-3 Shop Painting Contractor Certification Program?**

Yes. See revised Special Provisions Section 667.

31. **Would it be acceptable for the shop coating applicator to have the AISC-Complex Coatings Endorsement (AISC 420-10) in lieu of the AMPP/SSPC QP-3 Shop Painting Certification?**

No. For this project, the AISC Complex Coatings Endorsement is not considered equivalent to the AMPP/SSPC QP 3 Shop Certification/Accreditation.

32. **In spec section 666 on page 4a line 149 it states, "All coating used shall have a mixed VOC at or under 340 g/l (2.8 lbs/gal)". Will the Zingametall coating called out in this specification be approved even though it has a VOC content 3.96 lbs/gal?**

See revised Special Provision Section 666 for clarification.

33. **In spec section 666 on page 3a line 109 it states, "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. The Tnemec Fluoronar Series 1070V manufacturer's product data sheets (PDS) says "Thinning is required for proper application. For brush, roller, and air spray, thin up to 10% per gallon with No. 63 Thinner. Note: In areas that require lower VOC, use No. 65 Thinner. Caution: Do not add thinner if more than thirty (30) minutes have elapsed after mixing." Will the Coating Contractor be allowed to follow the Manufacturers PDS?**

See revised Special Provision Section 666 for clarification. Thinning will be allowed in accordance with the Manufacturer's PDS, however, stripe coating shall be made using unthinned paint.

34. **Can a QP-1 Certified Coating Contractor perform shop coating per the AMPP/SSPC QP-1 standard in lieu of all shop coating by a QP-3 shop? The AMPP/SSPC QP-1 and QP-3 standards are equal in their quality requirements. The only difference is the location at which the work is performed. A QP-1 contractor has established that it can produce the same level of quality required for QP-3, but in much more difficult field applications.**

No. AMPP QP-3 Enclosed Shop accreditation is required for any steel prepared in accordance with Special Provisions Section 667.

35. **SA 11.1 Defective Concrete Repair Quantities Chart. Please provide locations of each spall and quantity of each location of the spalls or confirm that that are only 4 locations of spalls.**

There are not only 4 locations of spalls, but there are only 4 locations where the spalls may occur. The soffit of concrete deck has multiple spall locations. Due to such a low quantity of spall repairs, a location map was not deemed necessary. Work access to soffit of deck is being provided under Pay Item 209.0300 so location should not affect price.

36. **Sheet SA11.2. Please provide a Repair quantity table (like Sheet SA11.1) for the horizontal defective concrete to show how many locations and quantity at each location.**

The horizontal defective concrete repair locations are unknown as the top of the concrete deck is covered in AC pavement. Only after the AC is removed will any horizontal defective concrete repair areas be made known.

37. **Sheet SA 11.2, 11.2. For estimating purposes, please clarify the average depth of spalls contractors are to assume.**

See as-built plans for depths of reinforcing steel from the surface of the concrete. The defective concrete is to be repaired to a depth of ½" minimum beyond the reinforcing steel as shown on the contract drawings.

38. **Spec 679.03(K). Can maturity meters be utilized in lieu of 3-hour breaks for the VESLMC?**

Maturity meters may not be used in lieu of the 3-hour breaks. Please follow the Contract Requirements in Special Provisions Section 679.

39. **Spec 679.03(K). What is the required strength for a 7 day break for VESLMC? Is this necessary if there is no requirements?**

There is no required compressive strength for the 7-day breaks. The Contract Requirements still require the Contractor to conduct 7-day breaks.

40. **Spec 680.03(F)(e). Please provide a quantity of corroded rebar repairs for defective areas or consider making it a Force Account Item**

See Note 7 on Sheet SA11.3

41. **Sheet SA 14.1. Note 1 states that the construction sequence shall not be changed unless approved by the Engineer. Note 2 states … Engineer sole judge of whether a sequence stage is completed or not. Without the Bridge Inspection Report and Load Rating Report it is difficult to analyze the critical portions of the structure. The current sequence will add significant time and cost to the Bid. Please outline the concerns that the Engineer has and critical members that should be analyzed when Contractors are planning and resequencing the Work.**

The latest Bridge Inspection Reports and Load Rating Report will be provided. It is unclear what in particular about the current sequence is adding significant time and cost.

1. The suggested schematic erection (SB Series) drawings show all columns (A, B, C, and D) within a level being replaced simultaneously at each bent/trestle. This is to avoid complicated sequencing of trestle bracing installation. The Engineer doesn't see any benefit or time savings by changing this sequence.

2. The overall construction sequence is phased so that the replacement of the trestles precedes the cleaning and painting of the adjacent superstructure spans. The Engineer does not want the cleaning and painting of the superstructure spans to precede the trestle replacement. The reason for this is that the replacement of the trestles will require installation of temporary girder supports just outside the bearing locations, installation of temporary bearing stiffeners at support locations, removal and replacement of permanent bearing stiffeners and cross frames, and installation of new bearings. All this work will require bolting/welding to the superstructure and would damage any new coating placed.
3. The overall construction sequence is phased so that the weight of the underdeck work platform (including superimposed dead loads and live loads) installed beneath the superstructure will be supported by new steel trestles and not the existing ones. Changing this would add additional responsibilities onto the Contractor's Engineer.
4. The overall construction sequence is phased so that the soffit of deck crack/defective concrete repairs occur in close proximity with the superstructure repair/cleaning/painting work since it is assumed that the underdeck work platform would be utilized to cover all of this work.
5. The overall construction sequence is phased to show the top of deck work to be performed at the end of all other construction. This work was shown as the last phase due to any potential issues that may arise with the placement of overweight equipment may impose on the bridge that would be needed may be conducted at any time after the abutment bearing replacement has been performed so long as the Contractor's Engineer is responsible for checking that the bridge structure can support the weight of any equipment needed to remove AC and place the HPC overlay.

42. **Sheet SA 14.1 Similar to previous question number 41. Can multiple locations be completed simultaneously and what are the restrictions for working on multiple locations. IE multiple bents/trestles, girder bracing, and foundation concrete work.**

Multiple trestles may be worked on simultaneously if the Contractor has the man power to accommodate. See response to RFI 28 for discussion addressing multiple girder cross frame replacements.