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<table>
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7-30-2024
License Expires: 12/31/2024
For Special Provision B</td>
<td>MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 W. CAPITOL AVE.
JEFFERSON CITY, MO 65102
Phone (888) 275-6636

Michael Baker International
200 West Adams St., Suite 1800,
Chicago, IL 60606

Certificate of Authority # 000099
Consultant Phone # 312-575-3952

If a seal is present on this sheet, JSP's has been electronically sealed and dated.</td>
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For Special Provisions C, D & E</td>
<td>Wiss, Janney, Elstner Associates, Inc.
330 Pfingsten Road, Northbrook, IL
60062

Certificate of Authority # 001448
Consultant Phone # 847-272-7400

JOB NO. JST0071
St. Louis City, St. Louis, St. Charles &
Pemiscot Counties, MO
Date Prepared: 9/26/2024

Addendums only, blank otherwise
Addendum No. #</td>
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<td colspan="2">Only the following items of the Job Special Provisions are authenticated by these seals: B through E.</td>
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A. Construction Requirements

1.0 Description. This provision contains general construction requirements for this project.

2.0 Construction Requirements. The plans and the asbestos and lead inspection report for the existing structure(s) are included in the contract in the bridge electronic deliverables zip file for informational purposes only.

2.1 In order to assure the least traffic interference, the work shall be scheduled so that a lane closure is for the absolute minimum amount of time required to complete the work. A lane shall not be closed until material is available for continuous construction and the contractor is prepared to diligently pursue the work until the closed lane is opened to traffic.

2.2 Bridge work by contractor forces, including erection, rehabilitation or demolition, shall not be allowed over traffic unless a bridge platform protection system is installed below the work area except for work performed above a deck that is intact. The protection system shall be capable of catching all falling objects such as tools, overhang brackets or materials. Lifting of objects that are heavier than the capacity of the bridge protection system shall not be permitted.

2.3 Qualified special mortar shall be a qualified rapid set concrete patching material in accordance with Sec 704. A qualified rapid set concrete patching material will not be permitted for half-sole repair, deck repair with void tube replacement, full depth repair, modified deck repair and substructure repair (formed) unless a note on the bridge plans specifies that a qualified special mortar may be used.

2.4 The existing slab for the bridge(s) to be redecked was constructed as composite or non-composite as shown in the table below.

Bridge No.	Type of deck
A17006	Non-composite

2.5 Provisions shall be made to prevent any debris and material from falling into the waterway. If determined necessary by the engineer, any debris and material that falls below the bridge outside the previously specified limits shall be removed as approved by the engineer at the contractor's expense.

2.6 Any damage sustained to the remaining structure as a result of the contractor's operations shall be repaired or the material replaced as approved by the engineer at the contractor's expense.

2.7 Provisions shall be made to prevent damage to any existing utilities. Any damage sustained to the utilities as a result of the contractor's operations shall be the responsibility of the contractor. All costs of repair and disruption of service shall be as determined by the utility owners and as approved by the engineer.

2.8 A washer shall be required under head and nut when any reaming is performed for bolt installation.

2.9 SSPC-SP2 and SSPC-SP3 surface preparation shall be in accordance with the environmental regulations in Sec 1081 and collection of residue shall be in accordance with Sec 1081 for collection of blast residue. SSPC-SP6, SSPC-SP10 and SSPC-SP11 surface preparation shall be in accordance with the approved blast media and environmental regulations in Sec 1081 and collection of blast residue shall be in accordance with Sec 1081.

3.0 Coating Information.

3.1 Environmental Contact. Environmental Section may be contacted at the below address or phone number. The Missouri Department of Health may be contacted at (573) 751-6102.

MoDOT - Design Division - Environmental Section
P.O. Box 270
105 W. Capitol Ave., Jefferson City, MO 65102
Telephone: (573) 526-4778

3.2 Approved Smelter and Hazardous Waste Treatment, Storage and Disposal Facility. The following is the approved smelter and hazardous waste treatment, storage and disposal facility:

Doe Run Company - Resource Recycling Division - Buick Facility
Highway KK
Boss, MO 65440
Telephone: (573) 626-4813

3.3 Impermeable Surface Limits. For the duration of cleaning and recoating or overcoating the truss spans, the truss span superstructure in any span shall not be draped with an impermeable surface subject to wind loads for a length any longer than 1/4 the span length at any one time regardless of height of coverage. Simultaneous work in adjacent spans is permissible using the specified limits in each span.

4.0 Navigation Requirements.

4.1 All work shall be performed so that the free flow of navigation is not unreasonably interfered with, the navigable depths are not impaired and navigation lighting is visible at all times. Any floating equipment or vessels working in the channel shall display lights and signals as required by the current “Inland Navigation Rules”. If scaffolding or nets are suspended below low steel in the navigation span, the U.S. Coast Guard district office shall be advised so that the temporary reductions in clearance for river traffic can be checked for reasonableness and appropriate notices can be published. Positive precautions shall be taken to prevent the accidental dropping of spark producing, flame producing, lighted or damaging objects onto barges or vessels passing beneath the bridge. All flame cutting, welding or other similar spark producing operations shall be ceased over the channel when vessels are passing beneath the bridge.

4.2 The contractor shall be responsible for submitting a work plan to the engineer for review. When the engineer is in concurrence with the work plan, the engineer will forward the material to the U.S. Coast Guard district office for approval. The U.S. Coast Guard will require at least 30 days to review the work plan prior to any work beginning. The work plan shall be submitted to the District Commander, Western Rivers Operation, Eighth Coast Guard District, Bridge Branch.

5.0 Method of Measurement. No measurement will be made.

6.0 Basis of Payment. Payment for the above described work will be considered completely covered by the contract unit price for other items included in the contract.

B. Structural Steel – Bolted Splice Repair Location No. 1
Structural Steel – Bolted Splice Repair Location No. 2

1.0 Description. This work involves installing bolted splice retrofits over existing T-1 steel butt welds previously determined to have rejectable defects by ultrasonic testing. The work will be performed in accordance with Sec. 1080 unless modified herein and will include installation of bolted splice plates on the interior and exterior or top and bottom sides of the element shown in the plans. As required, the work will also include removal and reinstallation of an interior truss member diaphragm, trimming of vertical stiffeners, and exposing the girder top flange by removing and replacing a portion of the concrete bridge deck above.

2.0 Materials. The materials for this work include the following:

2.1 Structural Steel. All structural steel shall be in accordance with Sec 712, Sec 1080, and General Notes.

2.2 Structural Bolts. All structural bolts shall be in accordance with Sec 712, Sec. 1080, and General Notes.

2.3 Epoxy Coated Reinforcing Steel. All reinforcing steel shall be in accordance with Sec 710, Sec 1036 and General Notes.

2.4 Concrete. All concrete repair shall be in accordance with Sec 704, Sec 501, Sec 623, Sec 1005, Sec 1019, Sec 1070, and General Notes.

2.5 Paint. Coating of existing and new structural steel shall be in accordance with Sec 1080, Sec 1045, Sec 1081, and General Notes.

3.0 Construction Requirements The following provides requirements for installation of bolted splice retrofits:

3.1 Eddy Current Testing (ET) shall be performed at each weld identified on the plans to fully document the location and near surface extents of the butt weld. All inspection equipment will have valid certificates of calibration and conform the ET equipment requirements of the T1 Steel Weld Inspection and Repair JSP.

3.2 All existing coating is to be removed to the limits shown on the plans. Cleaning shall occur on both sides of the plate. Cleaning of existing steel shall be in accordance with Sec 1081.10.4.

3.3 The existing paint system contains lead. The contractor shall have all necessary licenses and certifications for lead abatement and removal prior to the commencement of cleaning operations as required by the Missouri Department of Health in accordance with Sec 1081.

3.4 Contractor will provide safe and stable access for all welds to be retrofitted. The engineer will be provided access as requested.

3.5 The contractor will field verify all dimensions before ordering material and developing shop drawings. Any deviation of the dimensions shown on the plans shall be called to the engineer's attention. The contractor shall be responsible for developing all required dimensional adjustments and coordinating the implementation of the dimensional adjustments with all involved fabricators and subcontractors.

3.6 All new holes in existing plates to be match drilled using a template or the actual splice plate unless approved by the engineer. No flame-cutting or plasma-arc cutting of holes is permitted. Minor reaming is permitted.

3.7 Prior to erection of the new structural steel, the steel that is to remain shall be carefully inspected for irregularities. If such irregularities are found, the irregularities shall be brought to the attention of the engineer.

3.8 Crack isolation slots to be installed using a magnetic-base drill equipped with carbide hole cutters and die grinders equipped with carbide cutting tools. Flame cutting and plasma arc cutting are not permitted. All cut and ground surfaces to be ground smooth to achieve a surface roughness average (r_a= 500 µ-inch). Slot opening dimensions are not to deviate by +- 1/8”. Width of crack isolation slot to fully cross existing weld width at top and bottom of the side plate or through the girder web plate as determined by the ET testing.

3.9 The surfaces of existing steel that will become faying surfaces for non-slip critical new connections, typically secondary members, shall be cleaned according to the manufacturer's recommendation and with a minimum of SSPC-SP-3 surface preparation and coated as per the General Notes. The surfaces of existing steel that will become faying surfaces for slip critical new connections, typically primary members, shall be in accordance with contact surfaces in Sec 1081 and the General Notes. The faying surfaces for new bolted connections and bolted connections between proposed and existing steel shall have a slip coefficient and creep resistance for Class B coatings for specified notes and testing methods in accordance with Sec 1081. Primary member connections include splice plates in bolted splice retrofit.

3.10 Exposed girder/floorbeam areas that are not faying surfaces or not covered by concrete that are scratched, damaged by the contractor or by field welding operations shall be recoated in accordance with the General Notes. The areas shall receive the coating system as shown on the plans.

3.11 The primer coat is to be applied to all existing surfaces after all holes are drilled and isolation slots installed. Surfaces are to be cleaned and prepared for recoating.

3.12 Perform modifications to the existing truss member diaphragm including removing existing bolts, modifying diaphragm width, and reinstalling in accordance with the plans.

3.13 Trim existing vertical stiffeners as identified on the plans for the approach span girder retrofit location.

3.14 To trim existing structural steel, use either saw cutting, abrasive cutting, or plasma arc cutting using a guide to achieve a square cut. All trimmed surfaces to be ground smooth to achieve a surface roughness average (r_a= 500 µ-inch).

3.15 At the approach span girder retrofit location, mark out bridge deck opening. Demolition work to include saw cutting deck, chipping existing concrete to expose the reinforcing steel, and cutting the existing reinforcing steel as detailed in the plans. Once the bolted splice plate retrofit has been installed, the repair work will include installing new reinforcing steel (epoxy coated) using mechanical bar splices and installing new Class B-2 Concrete, including installation of an epoxy bonding agent, to restore the bridge deck riding surface.

3.16 Contractor shall exercise care when removing existing concrete to not cause damage to the existing structure to remain. Contractor shall repair any damage to the structure or existing structural elements to remain caused by the concrete removal, including but not limited to demolition activities due to drilling, saw cutting, and hammering.

3.17 Contractor shall leave adequate projection of existing bars to allow for proposed mechanical bar splice connection.

3.18 Contractor will be responsible for designing and installing a falsework system to support the bridge deck surrounding the opening and formwork for the bridge deck repair. Design loads should at a minimum consider deck weight, construction loads, and any contributions from live load. Traffic will be moved to the left travel lane inboard of the second stringer from the median. All falsework drawings and calculations to be sealed by a licensed professional engineer in Missouri.

3.19 Coordinate retrofit work with Motor Carrier Services by using message boards for 80,000-pound weight limit on trucks during all demolition and construction activities of the bridge superstructure.

4.0 Submittals. Submittals required to perform the bolted splice retrofit work include, but not limited to the following:

- Steel plate and miscellaneous steel shop drawings and certified mill test reports
- Structural bolt, nut, and washer certified mill test reports and rotational capacity test lot results
- Sealed falsework and forming design drawings and calculations
- Reinforcing bar certified mill test reports
- Concrete mix design, placement, and curing plan
- Coating system product data sheets

5.0 Method of Measurement.

5.1 Measurement for Structural Steel – Bolted Splice Repair Location No. 1 and Structural Steel Bolted Splice Repair Location No. 2 will be measured and paid for as each.

5.2 Measurement for Partial Removal of Existing Bridge Deck will be measured and paid for per square foot.

5.3 Measurement for Class B-2 Concrete (Superstructure on Steel) will be measured and paid for per cubic yard.

5.4 Measurement for Reinforcing Steel (Epoxy Coated) will be measured and paid per pound.

5.5 Mechanical bar splicers will be measured and paid per each.

6.0 Basis of Payment.

6.1 Payment for Structural Steel – Bolted Splice Repair will be paid for at the contract unit price per each for Structural Steel – Bolted Splice Repair Location No. 1 and Structural Steel – Bolted Splice Repair Location No. 2. Payment for Structural Steel – Bolted Splice Repair Location No. 1 and Structural Steel – Bolted Splice Repair Location No. 2 will be considered full compensation for all labor, equipment, material, and incidentals to complete this work, including mobilization of access and inspection equipment, modifications to the diaphragm and vertical stiffeners, incidental grinding, and formwork and falsework required to restore the bridge deck. Included in this cost is the coating of new steel and the recoating of existing steel faying surfaces to be plated over.

6.2 The cost of surface preparation at existing steel other than faying surfaces shall be included with the contract lump sum price for Surface Preparation for Recoating Structural Steel and will not be measured or paid as part of this pay item.

6.3 The cost of the prime coat at existing steel other than faying surfaces shall be included with the contract lump sum price for Field Application of Organic Zinc Primer and will not be measured or paid as part of this pay item.

6.4 The cost of the finish field coat at existing steel other than faying surfaces shall be included with the contract lump sum price for Finish Field Coat and will not be measured or paid as part of this pay item.

6.5 The cost to remove and dispose of the bridge deck to access the butt weld in the girder top flange will be considered completely covered by the pay item Partial Removal of Existing Bridge Deck.

6.6 The cost to replace the bridge deck will be considered full compensation for all labor, equipment, material, and incidentals to complete the work associated with the respective pay items Reinforcing Steel (Epoxy Coated), Mechanical Bar Splicers, and Class B-2 Concrete (Superstructure on Steel).

Item No.	Unit	Description
712-99.02	Each	Structural Steel – Bolted Splice Repair Location No. 1
712-99.02	Each	Structural Steel – Bolted Splice Repair Location No. 2

C. T-1 Longitudinal Stiffener Retrofit

1.0 Description. This work includes retrofitting the existing girder longitudinal stiffener locations where the stiffener overlaps with the girder web butt weld splices. The retrofit will include coring a hole through the longitudinal stiffener flush with the web plate, trimming the remaining stiffener and grinding the longitudinal weld toes to create a gap at the web as wide as the web plate butt weld. Eddy Current Testing (ET), Magnetic Particle Testing (MT) and Ultrasonic Testing (UT) will confirm the weld location and the presence/removal of any defects after retrofit installation. As necessary, any defects will be removed by grinding or by coring through the web plate.

2.0 Equipment. The equipment for this work shall be as described below:

2.1 Eddy Current Inspection. Eddy current inspection techniques (ET) will be used to locate the near-surface extents of the weld (i.e., fusion lines) and estimate the weld centerline. Any weld repairs or changes in weld width/extents will be documented. ET probe to be Olympus NEC-2236-TF or similar, and ET equipment shall be capable of displaying results in impedance plane and sweep mode such as Olympus Nortec 600 or similar.

2.2 Magnetic Particle Inspection. A certified electromagnetic yoke using a contrasting color, dry iron powder for magnetic particle examination of all accessible welds. Yokes can be AC-powered or a combination of AC/DC powered. Yokes shall be in accordance with ASTM E709 and shall meet the requirements listed in AWS D1.5 Clause 8.7.8.2.

2.3 Ultrasonic Inspection. Conventional or phased array ultrasonic testing (PAUT) flaw detector with display screen and electronic file storage capabilities to be used with piezoelectric transducers of the size, frequency, and orientation needed to adequately interrogate the welds.

2.4 Grinding/Trimming. Hand-held die grinders equipped with carbide cutting burrs of various shapes and diameters as the primary weld removal tool. Hand-held right-angle grinders with abrasive (carborundum) cut-off discs or saws for trimming the stiffeners. Flame-cutting or plasma arc cutting is not permitted.

2.5 Steel Coring. Magnetic base drills equipped with a carbide cutter sized as shown on the plans for the longitudinal stiffener retrofit and as needed to remove any web plate defect identified after installation of the longitudinal stiffener retrofit.

3.0 Weld Inspection Requirements The following provides the requirements for weld inspection of selected welds in the bridge.

3.1 Welds to be inspected are as provided in the plans and as directed by the engineer. The inspection includes fabrication welds used to join plate components of the bridge members. Items described below shall be construed as applicable for inspection of bridge welds as indicated in the plans or as directed by the engineer.

3.2 All existing coating is to be removed to provide direct access for ultrasonic testing through the full thickness of the material. Where the thickness of the material would dictate coating removal to a distance within 12 inches of the weld centerline, 12 inches shall be maintained as the minimum limits for coating removal. Weld cleaning shall occur on both sides of the web plate

containing the weld and aligned vertically 12 inches above and below the longitudinal stiffener. Cleaning of existing steel shall be in accordance with Sec 1081.10.4. Additional cleaning is anticipated after weld inspection and longitudinal retrofit installation to achieve a properly cleaned surface for application of the specified coating system.

3.3 Contractor will provide safe and stable access for all welds to be inspected. The engineer will be provided access as requested.

3.4 The Contractor shall prepare and submit for approval a weld inspection plan, which should address any means of access, surface preparation, weld inspection (ET, visual (VT), MT, and UT) and documentation procedures for the inspection. The non-destructive testing procedure shall be developed and approved by an individual or individuals who have been certified Level III in MT (for MT inspection) and UT (for UT or PAUT inspection) by ASNT or testing in conformance with ASNT SNT-TC-1A, and who are further qualified in examination of T-1 steel butt welds. The weld inspection plan shall include, but is not limited to, the following:

- Qualifications of individual(s) performing the inspection
    - Visual weld inspections shall be performed by an AWS Certified Welding Inspector.
    - The MT inspection shall be performed by an individual(s) certified as Level II in MT or greater in conformance with ASNT SNT-TC-1A or ASNT Central Certification Program (ACCP).
    - The UT inspection shall be performed by an individual(s) certified as Level II in UT or Level II in PAUT or greater in conformance with ASNT SNT-TC-1A or ACCP for UT or PAUT inspection, respectively.
    - Those performing UT/PAUT inspection shall have been qualified to perform testing on T-1 steel welds. Qualification testing is to be administered by the engineer and will take place at a designated testing facility in Northbrook, Illinois. The test will include use of test plates with known flaws with each UT Inspector inspecting three to four test plates for the purpose of accurately identifying and reporting all recordable and rejectable defects, their size, and location to demonstrate their abilities to proficiently perform UT in the field on similar welds. Each inspector will be scored in a process similar to AWS D1.8 Annex F Supplemental Ultrasonic Technician Qualification.
- UT or PAUT scan plan showing the scanning faces, pattern, and coverage of the butt welded region for inspection after installation of the longitudinal stiffener retrofit.
- Criteria (i.e., amplitude and/or size measurements) for UT or PAUT testing
- Discontinuity acceptance/rejection criteria for UT testing
- Type of UT or PAUT equipment (manufacturer, model number, serial number)
- Type of transducer, including frequency, size, shape, number of elements (PAUT only), angle and type of wedge
- Scanning parameters
    - For PAUT, this shall include the following at a minimum:
        - Location and number of active elements
        - Active aperture size
        - Angular range and angular increment
        - Depth and type of focusing, if included
- Scanning surface preparation and couplant requirements
- Type of calibration test block with appropriate reference reflectors

- Method of equipment calibration and calibration interval
- Method for examining for laminations prior to crack scanning
- Reporting of inspection data shall include the following at a minimum:
    - Weld identification
    - Discontinuity location, depth (as applicable), height, length, and amplitude level (for UT or PAUT, as applicable)
    - Screenshot (or UT or PAUT signal trace) including a portion of each suspected crack
- Type of ET equipment and equipment certification
- Type of MT equipment and equipment certification

3.5 Eddy Current Testing (ET) shall be performed at each weld identified on the plans to fully document the location and near surface extents of the butt weld. All inspection equipment will have valid certificates of calibration.

3.6 Magnetic Particle Testing (MT) shall be performed on the newly exposed web surface after installation of the longitudinal stiffener retrofit. All inspection equipment will have valid certificates of calibration. Photographs of cracks highlighted by MT powder shall be provided to the engineer as part of the inspection record.

3.7 Conventional ultrasonic testing (UT) will be performed from the girder web plate on the opposite side of the longitudinal stiffener retrofit designated in the plans. Flaw indications (defects) identified as being recordable or rejectable in accordance with AASHTO/AWS D1.5 UT acceptance criteria for tension welds shall be captured and stored electronically as part of the inspection record. All inspection equipment will have valid certificates of calibration.

3.8 Phased array ultrasonic testing (PAUT) will be performed on welds designated for repair if conventional UT cannot accurately locate or characterize the extent of the indication or if directed by the engineer. PAUT will not be used in the acceptance/rejection of welds. Indications characterized by PAUT shall be captured and stored electronically as part of the inspection record. All inspection equipment will have valid certificates of calibration.

3.9 Verified recordable and rejectable indications (defects) shall be legibly marked with a paint stick on the steel surface opposite the longitudinal stiffener noting positions laterally and within the plate thickness.

3.10 Welds shall be inspected after installation of the longitudinal stiffener retrofit and after any defect removal retrofit.

3.11 The contractor shall notify the engineer at least one week in advance prior to performing UT testing. Contractor shall coordinate with the Department's Quality Assurance UT Inspector to provide access for witness of contractor's UT testing or to independently perform UT.

4.0 Longitudinal Stiffener Retrofit Requirements. The following requirements shall be met during installation of the longitudinal stiffener retrofits.

4.1 The retrofit location shall be identified per the plans and verified using Eddy Current Testing (ET). This applies to both the full retrofit and those retrofits requiring grinding only.

4.2 The core hole shall be a minimum of 4 inches in diameter and sized such that the girder web butt weld width is not wider than 2/3 the diameter of the core barrel.

4.3 The magnetic base drill shall be aligned vertically on the stiffener so as to cut flush with the girder web plate but not into the plate. No coring of the longitudinal stiffener is required at Web Gap Grinding repairs.

4.4 The remaining longitudinal stiffener material shall be trimmed perpendicular to girder web and tangent to the core hole. This step also applies to Web Gap Grinding repairs if needed.

4.5 Using a die grinder, grind the longitudinal stiffener fillet welds and stiffener plate back to expose the full width of the girder web plate butt weld. Grind the fillet weld terminations to create a properly profiled weld termination. This step also applies to Web Gap Grinding repairs.

4.6 Verification of defect removal shall be achieved using MT and UT, as applicable, in accordance with the inspector qualifications and inspection procedures outlined herein. At all material removal locations, care shall be taken to limit effects of the grinding removal to adjacent portions of the plate. Any deficiencies including but not limited to excessive material removal, damage or gouging to adjacent plate, or damage in the final surface due to improper contractor operations or equipment shall be corrected by the contractor, at the contractor's expense.

4.7 Defects identified in the web plate as near-surface shall be removed by grinding up to a depth of 1/8 inch. Defects located deeper than 1/8 inch shall be removed by coring an appropriately sized core hole in the girder web plate. Consult the engineer prior to drilling core holes in the girder web. The core hole shall be sized to completely remove the defect. At the completion of defect removal, welds shall be reinspected with MT and/or UT as appropriate for the type of defect identified.

5.0 Submittals. Submittals required to perform the weld inspection and repair work include, but not limited to the following:

- Weld Inspection Plan including qualifications of personnel, certification of equipment, and procedure for surface preparation and inspection as outlined herein.
- Information of locations where weld defect could not be removed by grinding up to 1/8 inch.
- As-built details of complete defect removal.

6.0 Method of Measurement.

6.1 Measurement for Weld Inspection will be made per each inspected retrofit location. Subsequent inspection of welds after installation of the longitudinal stiffener retrofit (coring or grinding) will not be measured. Additional welds or other areas to be included with the inspection at the direction of the engineer that are not explicitly shown on the plans will be measured as each.

6.2 Measurement for Defect Removal will be measured as each and will only be measured at documented locations with defects in the web plate based on the findings from the Weld Inspection. All core removal work required to remove a defect will not be measured separately.

The quantity of Defect Removal is unknown and may be zero but the contract unit price shall prevail regardless of the variation.

6.3 Measurement for Longitudinal Stiffener Retrofit will be made per each. Surface preparation and recoating will be paid under the lump sum price for Surface Preparation for Recoating Structural Steel, Field Application of Organic Zinc Primer, and Finish Field Coa t – A150119 and A150120, respectively.

6.4 Measurement for Web Gap Grinding – Web Gap Grinding will be measured as each at the locations where coring is not required per the plans. No measurement will be made for additional or repeat grinding of unacceptable retrofits placed by the contractor. Surface preparation and recoating will be paid under the lump sum price for Surface Preparation for Recoating Structural Steel, Field Application of Organic Zinc Primer, and Finish Field Coat – A150119 and A150120, respectively.

7.0 Basis of Payment.

7.1 Payment for Weld Inspection will be paid for at the contract unit price per each of inspected location. Payment for Weld Inspection will be considered full compensation for all labor, equipment, material, and incidentals to complete this work, including mobilization of access and inspection equipment, qualification of personnel and inspection personnel labor, incidental grinding as part of the inspection, documentation of findings, and post-longitudinal stiffener retrofit inspection. Surface preparation including removal of the coating system to facilitate the inspection shall be included with Surface Preparation for Recoating Structural Steel and will not be measured or paid as part of the Weld Inspection. Any additional cleaning and surface preparation necessary for the inspection shall be considered incidental to the cost of the Weld Inspection.

7.2 Payment for Defect Removal will be made at the contract unit price per each location where a defect was identified and removed with a core hole after installation of the longitudinal stiffener retrofit. Payment for Defect Removal will be considered full compensation for all labor, equipment, material, consumables, and incidentals to complete this work, including mobilization of access and repair equipment, and labor to perform defect removal using coring methods.

7.3 Payment for Longitudinal Stiffener Retrofit will be made at the contract unit price per each of completed and accepted retrofit. Payment for Longitudinal Stiffener Retrofit will be considered full compensation for all labor, equipment, material, consumables, and incidentals to complete this work. Grinding of up to 1/8 inch to remove a defect detected after installation of the longitudinal retrofit is considered completely covered by this pay item.

7.4 Payment for Web Gap Grinding will be made at the contract unit price per each of completed and accepted retrofit. Payment for Web Gap Grinding will be considered full compensation for all labor, equipment, material, consumables, and incidentals to complete this work.

Item No.	Unit	Description
712-99.02	Each	Weld Inspection for Bridge No. A1501
712-99.02	Each	Defect Removal for Bridge No. A1501
712-99.02	Each	Web Gap Grinding
712-99.02	Each	Longitudinal Stiffener Retrofit

712-99.01	Lump Sum	Finish Field Coat for Bridge No. A1501

D. T-1 Steel Weld Inspection and Repair

1.0 Description. This work involves a multi-step process to locate and remove/repair recordable and rejectable indications in T-1 steel butt welds. Specific welds in the truss bottom chord detailed in the plans have been identified as having rejectable indications with some welds also containing recordable indications in accordance with the AASHTO/AWS D1.5:2020 – Bridge Welding Code. For this work, these welds will be reinspected using non-destructive evaluation techniques by a qualified inspector after removal of the coating. Both recordable and rejectable weld indications (defects) will be marked on the steel, and a repair plan to include, among other details, a scale drawing locating the indications will be provided to the engineer for approval. Following approval of the plan, the contractor will grind the welds as required to remove the indications. Indication removal will be verified by non-destructive test methods. New weld metal will be placed to restore the original weld profile when grinding depth from the original weld profile exceeds 1/8-inch. All welding will conform to the approved weld repair plan procedures consistent with Sec 1080 unless modified herein. Verification of weld indication removal will use non-destructive test methods throughout the welding process, daily after weld completion, and one week after reaching ambient temperature following completion of the weld bake-out.

2.0 Equipment. The equipment for this work shall be as described below:

2.1 Eddy Current Inspection. Eddy current inspection techniques (ET) will be used to locate the near-surface extents of the weld (i.e., fusion lines) and estimate the weld centerline. Any weld repairs or changes in weld width/extents will be documented. ET probe to be Olympus NEC-2236-TF or similar, and ET equipment shall be capable of displaying results in impedance plane and sweep mode such as Olympus Nortec 600 or similar.

2.2 Magnetic Particle Inspection. A certified electromagnetic yoke using a contrasting color, dry iron powder for magnetic particle examination of all accessible welds. Yokes can be AC-powered or a combination of AC/DC powered. Yokes shall be in accordance with ASTM E709 and shall meet the requirements listed in AWS D1.5 Clause 8.7.8.2.

2.3 Ultrasonic Inspection. Conventional or phased array ultrasonic flaw detector with display screen and electronic file storage capabilities to be used with piezoelectric transducers of the size, frequency, and orientation needed to adequately interrogate the welds.

2.4 Grinding. Hand-held die grinders equipped with carbide cutting burrs of various shapes and diameters as the primary weld removal tool. Hand-held right-angle grinders with abrasive (carborundum) grinding discs for removal of weld and base material at depths greater than ½ inch.

2.5 Pre- and Post-weld heating. Multiple-port portable heating system utilizing insulated ceramic heater pads controlled by electronic temperature controllers with thermocouples to monitor and regulate heat input and cool-down profiles and to produce a record of all weld repair temperature profiles. Small, welded studs may be used to attach the ceramic heater pads to the bridge, but the welded studs shall be completely removed by grinding and the affected area shall

be visually inspected for cracks or other damage. Any observed damage shall be repaired at the contractor's expense.

2.6 Welding. Certified, shielded metal arc welding equipment sized and powered to produce replacement welds in accordance with a Welding Procedure Specification (WPS). Includes appropriate storage and warming ovens to maintain welding consumable integrity.

3.0 Weld Inspection Requirements The following provides the requirements for weld inspection of selected welds in the bridge.

3.1 Welds to be inspected are as provided in the plans and as directed by the engineer. The inspection includes fabrication welds used to join plate components of the bridge members. Items described below shall be construed as applicable for inspection of bridge welds as indicated in the plans or as directed by the engineer.

3.2 All existing coating is to be removed to provide direct access for ultrasonic testing through the full thickness of the material. Where the thickness of the material would dictate coating removal to a distance within 12 inches of the weld centerline, 12 inches shall be maintained as the minimum limits for coating removal. Weld cleaning shall occur on both sides of the plate containing the weld. Cleaning of existing steel shall be in accordance with Sec 1081.10.4. Additional cleaning is anticipated after weld inspection and repair to achieve a properly cleaned surface for application of the specified coating system.

3.3 Contractor will provide safe and stable access for all welds to be inspected. The engineer will be provided access as requested.

3.4 The contractor shall prepare and submit for approval a Weld Inspection Plan, which should address any means of access, surface preparation, weld inspection (ET, visual (VT), MT, and UT) and documentation procedures for the inspection. The non-destructive testing procedure shall be developed and approved by an individual or individuals who have been certified Level III in MT (for MT inspection) and UT (for UT or PAUT inspection) by ASNT or testing in conformance with ASNT SNT-TC-1A, and who are further qualified in examination of T-1 steel butt welds. The weld inspection plan shall include, but is not limited to, the following:

- Qualifications of individual(s) performing the inspection
    - Visual weld inspections shall be performed by an AWS Certified Welding Inspector.
    - The MT inspection shall be performed by an individual(s) certified as Level II in MT or greater in conformance with ASNT SNT-TC-1A or ASNT Central Certification Program (ACCP).
    - The UT inspection shall be performed by an individual(s) certified as Level II in UT or Level II in PAUT or greater in conformance with ASNT SNT-TC-1A or ACCP for UT or PAUT inspection, respectively.
    - Those performing UT/PAUT inspection shall have been qualified to perform testing on T-1 steel welds. Qualification testing is to be administered by the engineer and will take place at a designated testing facility in Northbrook, Illinois. The test will include use of test plates with known flaws with each UT Inspector inspecting three to four test plates for the purpose of accurately identifying and reporting all recordable and rejectable defects, their size, and location to demonstrate their

abilities to proficiently perform UT in the field on similar welds. Each inspector will be scored in a process similar to AWS D1.8 Annex F Supplemental Ultrasonic Technician Qualification.

- UT or PAUT scan plan showing the scanning faces, pattern, and coverage of the butt welded region for inspection prior to the weld repair, after grinding removal of defects is complete but prior to preheating is initiated, and one week after the weld repair has cooled to ambient temperatures following post-weld bake-out.
- Discontinuity reporting criteria (i.e., amplitude and/or size measurements) for UT or PAUT testing
- Discontinuity acceptance/rejection criteria for UT testing
- Type of UT or PAUT equipment (manufacturer, model number, serial number)
- Type of transducer, including frequency, size, shape, number of elements (PAUT only), angle and type of wedge
- Scanning parameters
    - For PAUT, this shall include the following at a minimum:
        - Location and number of active elements
        - Active aperture size
        - Angular range and angular increment
        - Depth and type of focusing, if included
- Scanning surface preparation and couplant requirements
- Type of calibration test block with appropriate reference reflectors
- Method of equipment calibration and calibration interval
- Method for examining for laminations prior to crack scanning
- Reporting of inspection data shall include the following at a minimum:
    - Weld identification
    - Discontinuity location, depth (as applicable), height, length, and amplitude level (for UT or PAUT, as applicable)
    - Screenshot (or UT or PAUT signal trace) including a portion of each suspected crack
- Type of ET equipment and equipment certification
- Type of MT equipment and equipment certification

3.5 Eddy Current Testing (ET) shall be performed at each weld identified on the plans to fully document the location and near surface extents of the butt weld. All inspection equipment will have valid certificates of calibration.

3.6 Magnetic Particle Testing (MT) shall be performed on 100% of all cleaned welds shown in the plans. Previous inspection at the bridge has identified that visual inspection is insufficient to detect all of the defects in the welds or base metal. All inspection equipment will have valid certificates of calibration. Photographs of cracks highlighted by MT powder shall be provided to the engineer as part of the inspection record.

3.7 Conventional ultrasonic testing (UT) will be performed on welds designated in the plans as to be inspected and repaired. Flaw indications (defects) identified as being recordable or rejectable in accordance with AASHTO/AWS D1.5 UT acceptance criteria for tension welds shall be captured and stored electronically as part of the inspection record. All inspection equipment will have valid certificates of calibration.

3.8 Phased array ultrasonic testing (PAUT) will be performed on welds designated for repair if conventional UT cannot accurately locate or characterize the extent of the indication or if directed by the engineer. PAUT will not be used in the acceptance/rejection of welds. Indications characterized by PAUT shall be captured and stored electronically as part of the inspection record. All inspection equipment will have valid certificates of calibration.

3.9 Locate the defects using UT from the exterior (A) surface when defect removal is specified to occur from the exterior (A) surface. Locate the defects using UT from both the exterior (A) and interior (B) surfaces of the plate when removal is indicated on the interior side of the plate. From the outside, scan the full weld length. Mark the defects and compare to the drawings. When scanning from the inside, mark the defect indications and their depths on the inside surface. Compare exterior and interior findings. Verified recordable and rejectable indications (defects) shall be legibly marked with a paint stick on the steel in different colors and their lengths and positions laterally and within the plate thickness recorded on representative weld inspection drawings. Weld indication start and stops shall be combined into a single repair length (consolidated) when within 3 inches of each other or when requested by the engineer.

3.10 A Weld Inspection Summary Report shall be submitted to the engineer for approval at least one week prior to scheduling repair work. The report shall detail, for both surfaces inspected, the location (x, y), depth, and length of each rejectable defect to be removed as combined in 3.9 above and considering additional grinding length required to reach ends of defects. The approved report will establish the maximum length and depth of grinding permitted without additional approval by the engineer.

3.11 All defect repairs including those removed by grinding only or requiring rewelding, shall be inspected for conformance with Sec 1080.3.3.4 and as modified by Sec 1080.3.3.5.

3.12 Welds shall be reinspected as follows:

(a) As defect removal grinding progresses to verify defect removal (MT),
(b) After full defect removal but prior to weld repair, when necessary for removal greater than 1/8 inch, to verify complete removal of the defect (MT and UT),
(c) After the root pass of a weld repair (MT),
(d) Periodically during installation of multi-pass welds (MT),
(e) Prior to the resumption of welding when welding inactivity exceeds 2 hours (MT),
(f) After any period where preheat, interpass, or post-weld bake-out temperatures deviated from the specifications by more than 200 deg. F (MT),
(g) At the conclusion of a weld repair prior to post-weld bake-out (MT),
(h) Hands-on visual inspection of both faces of the plate at the location of the weld repair shall be performed daily until final MT and UT are completed (VT).
(i) One week after weld returns to ambient temperatures following post-weld bake-out (MT and UT), and
(j) At the direction of the engineer (MT and UT).

3.13 The weld inspector shall append the weld indication drawings shown in the plans to indicate the as-built length of weld in inches and location where grinding removed the defect and the length of weld in inches and location were a weld repair was performed. The inspector shall provide their AWS stamp on all indication drawings when the weld repairs are complete. The inspection

documentation shall include locations (x, y, z coordinates) of both recordable and rejectable weld indications identified and/or repaired.

3.14 The contractor shall notify the engineer at least one week in advance prior to performing UT testing. Contractor shall coordinate with the Department's Quality Assurance UT Inspector to provide access for witnessing contractor's UT testing or to independently perform UT.

4.0 Weld Repair Requirements. The following requirements shall be met during repair of weld indications at the specified locations in the bridge.

4.1 The contractor shall submit a Weld Repair Plan after the inspection is complete to the engineer for approval before commencing repairs. Previous findings of weld-related defects and cracking in the bridge indicate that they formed as hydrogen-induced cracks or volumetric defects, most likely from a combination of welding-related factors during original fabrication. The Weld Repair Plan shall take measures to prevent recurrence of similar fabrication related defects in repair welds. All welding shall be conducted in accordance with the latest edition of AWS D1.5, and as modified or stated herein. The Weld Repair Plan shall include the following, at a minimum:

(a) Locations of weld defects (x, y, and z coordinates) identified from the inspections (approved Weld Inspection Summary Report).
(b) Plate surface on which the repairs will be performed (interior or exterior, or top or bottom).
(c) Order of weld repairs at locations where more than one weld repair will be performed.
(d) Repair welding procedures, including weld joint details. A procedure qualification record (PQR) shall be performed using ASTM A514/A517 material with the specified electrodes in accordance with AWS D1.5. A Welding Procedure Specification (WPS) shall be developed based on the PQR and submitted along with the PQR for approval by the engineer. Defect removal shall be performed by grinding only (i.e., flame cutting or air carbon arc gouging is not allowed). Areas to receive repair welds shall be ground to white metal prior to welding, which will completely remove all moisture, oil, grease, rust, debris, paint, etc. before welding. Each weld repair groove shall be welded out with a series of stringer beads rather than by weaving the electrode from side to side as the deposited layers increase in width. Slag shall be completely removed from each stringer bead prior to depositing the next bead. Weld beads should be started and terminated outside of the repair groove where possible. Any discontinuities identified during weld placement or subsequent MT inspection shall be ground out and rewelded before depositing the next layer.
(e) Electrode selection. Electrodes shall be AWS A5.5 E11018M-H4R for SMAW for welds joining matching ASTM A514/A517. The weld repair on Bridge A1700 which joins Structural Low-Alloy Steel (ASTM A441, A572 Grade 50, or A588) to ASTM A514/A517 in the approach spans shall utilize AWS A5.1 E7018-H4R electrodes for SMAW.
(f) Means for proper electrode maintenance. Electrode handling and storage shall be in accordance with AWS D1.5. Electrodes shall be dried prior to welding in accordance with AWS D1.5 6.5.3, regardless of whether directly removed from a hermetically sealed container.
(g) Means for temperature control (i.e., heating) of the base metal before, during, and after welding. Minimum temperature limits shall extend a minimum for over a distance of ten (10) inches in any transverse direction from the repair groove and shall include the following:

i. preheat the full thickness of the plates to a temperature between 300 and 350° F and maintain this temperature for a minimum of one (1) hour prior to beginning welding
ii. preheat can be applied on the opposite face of the plate where welding is to occur
iii. maintain a temperature of between 300 and 400° F as the interpass temperature range until the entire length of a given repair groove has been fully welded for plate thicknesses up to and including 1 1/2 inches (300 and 450° F for plate thicknesses greater than 1 1/2 inches).
iv. upon completion of each repair groove, maintain the temperature of the preheated area at 300° F for at least three (3) additional hours to maximize the effusion of hydrogen
v. on any given repair groove, if the completion of the welding plus a three-hour post-weld hydrogen bake-out is threatened by inclement weather or other adverse circumstances, welding should be stopped early enough to enable an interim three-hour bake-out prior to the likely work stoppage or precipitation event (which could rapidly cool the base metal). A second and final three-hour bake-out should then be required upon subsequent completion of the repair groove.

(h) Welder certifications for the applicable method and position.

4.2 The contractor shall coordinate with the Department to identify suitable weekend(s) within the project calendar day schedule to complete the weld grinding and weld repair at a given weld during the same weekend. The engineer will be available during those weekends to provide direction should grinding depths or lengths change over what was approved. During the weekend closure(s), the two right lanes of Bridge A3292 will be closed to traffic and loads greater than 80,000 pounds will be prohibited from crossing any bridge where welding repairs are being performed. All defect removal and weld repair at a given weld repair locations must be completed prior to reopening the closed traffic lane and removing the load restrictions. All inspection and painting work can be performed without two lane closures or load restrictions.

4.3 Using the detailed location information submitted as part of the Weld Inspection Summary Report, the contractor shall layout the weld defect locations on the interior of the plate when weld defects are located within one-half the thickness of the plate measured from the interior (B) surface; otherwise, the defect to be removed shall be marked on the exterior (A) surface.

4.4 After review and approval of the Weld Inspection Summary Report, and at the direction of the engineer, the contractor shall proceed with defect removal by grinding. Removal shall be completed by grinding using die grinders with carbide burrs or angle grinders using abrasive disks. Flame cutting or arc gouging will not be permitted. A nominal removal of up to a 1/8-inch depth of affected weld or base metal will not require rewelding. If a defect in the Weld Inspection Summary Report identified to be removed by grinding cannot be removed after grinding to a depth of 1/8 inch, that portion of the affected weld or base metal shall be documented similar to the procedure outlined in 3.9 along with an estimate of remaining removal required to remove the defect and submitted to the engineer prior to performing additional grinding.

4.5 After review and approval of locations requiring further material removal than 1/8 inch by the engineer, proceed with weld or affected base metal removal until the defect is completely removed.

4.6 Verification of defect removal shall be achieved using MT and UT, as applicable, in accordance with the inspector qualifications and inspection procedures outlined herein. Confirmation of defect removal shall include inspection from both the A and B surfaces. After complete defect removal, document the lengths, positions, and depth(s) of material removal on representative weld inspection drawings for inclusion with the final as-built drawings. At all material removal locations, care shall be taken to limit effects of the grinding removal to adjacent portions of the plate. For material that will not be rewelded, a smooth thickness transition of approximately 2.5:1 should be maintained from maximum depth of removal to original material thickness. Any deficiencies including but not limited to excessive material removal, damage or gouging to adjacent plate, or damage in the final surface due to improper contractor operations or equipment shall be corrected by the contractor, at the contractor's expense.

4.7 After review and approval of weld defect removal documentation, and at the direction of the engineer, proceed with repair welding. Repair welding is required to restore weld or base metal removal in excess of 1/8 inch, or at the direction of the engineer. Repair welding shall be conducted in accordance with the contractor's submitted and approved welding procedure. Unapproved deviations from the contractor's welding procedure shall be grounds for repair rejection, up to and including complete removal of nonconforming welds and re-welding at the contractor's expense. Welds shall be inspected with MT and/or UT in accordance with 3.12.

5.0 Submittals. Submittals required to perform the weld inspection and repair work include, but not limited to the following:

- Weld Inspection Plan including qualifications of personnel, certification of equipment, and procedure for surface preparation and inspection as outlined herein.
- Weld Inspection Summary Report summarizing defect locations and characterization, as outlined herein.
- Information of locations where weld defect could not be removed by grinding up to 1/8 inch.
- As-built details of complete defect removal and repair weld placement.
- Repair Welding Plan and procedures.

6.0 Method of Measurement.

6.1 Measurement for Weld Inspection will be made to the nearest linear inch of inspected welds, based on the length of welds shown in the plans. Lengths of welds to be inspected as depicted in the plans are based on previous field measurements and available bridge shop drawings. Actual weld lengths in the field may vary slightly. No re-measurement of those weld locations is anticipated or required. No additional measurement will be made for minor variations in actual weld lengths for the listed welds compared to what is shown on the plans. Subsequent inspection of welds during defect removal or repair welding and post-weld repair follow-up inspections will not be measured. Additional welds or other areas to be included with the inspection at the direction of the engineer that are not explicitly shown on the plans will be measured to the nearest linear inch.

6.2 Measurement for Defect Removal - Grinding will be made to the nearest linear inch for ground welds or ground plate surfaces for the purposes of removal of weld defects at a depth of 1/8-inch or less. Grinding shall only be measured at documented locations with defects based on the

findings from the Weld Inspection. Measurement will be made along the length of the completed and accepted defect removal by grinding. Only locations approved by the engineer for grinding removal will be measured. The quantity provided in the estimate is based on previous inspection findings of the anticipated defect lengths including weld repair consolidation. The estimated quantities may vary, but the contract unit price shall prevail regardless of the variation. No measurement will be made for grinding of unacceptable welds placed by the contractor.

6.3 Measurement for Weld Repair will be made to the nearest linear inch for length of repair welds placed at locations where defect removal by grinding exceeded 1/8 inch, or at the direction of the engineer. Measurement will be along the completed and approved weld, regardless of weld thickness or number of weld passes. The quantity provided in this estimate is based on previous inspection findings including weld repair consolidation. The estimated quantities may vary, but the contract unit price shall prevail regardless of the variation. No measurement will be made for re-welding of welds rejected by the engineer.

7.0 Basis of Payment.

7.1 Payment for Weld Inspection will be paid for at the contract unit price per linear inch of inspected weld. Payment for Weld Inspection will be considered full compensation for all labor, equipment, material, and incidentals to complete this work, including mobilization of access and inspection equipment, qualification of personnel and inspection personnel labor, incidental grinding as part of the inspection, documentation of findings, and furnishing of a Weld Inspection Summary Report(s). Weld inspections required to complete the defect removal or weld repair will be paid under Weld Inspection. Surface preparation including removal of the coating system to facilitate the inspection shall be included with Surface Preparation for Recoating Structural Steel and will not be measured or paid as part of the Weld Inspection. All post-weld repair inspections will be considered completely covered by the Weld Inspection pay item. Any additional cleaning and surface preparation necessary for the inspection or re-inspection shall be considered incidental to the cost of the Weld Inspection.

7.2 Payment for Defect Removal - Grinding will be made at the contract unit price per linear inch of ground weld. Payment for Defect Removal - Grinding will be considered full compensation for all labor, equipment, material, consumables, and incidentals to complete this work, including mobilization of access and repair equipment, labor to perform defect removal up to a depth of 1/8 inch and documentation of areas where 1/8 inch of plate or weld thickness removal does not remove the defect.

7.3 Payment for Weld Repair will be made at the contract unit price per linear inch of completed and accepted weld repair. Payment for Weld Repair will be considered full compensation for all labor, equipment, material, consumables, and incidentals to complete this work, including removal of defects deeper than 1/8-inch, development of an approved welding procedure, any required welder or weld procedure qualification, furnishing and installation of required heating equipment and temperature monitoring, placement of field welds in accordance with AWS D1.5 and accepted by the engineer, and furnishing as-built drawings that summarize weld repair locations approved by the engineer.

Item No.	Unit	Description
712-99.01	Lump Sum	Finish Field Coat for Bridge No. A1700

712-99.03	Linear Feet	Weld Inspection
712-99.03	Linear Feet	Defect Removal
712-99.03	Linear Feet	Weld Repair

E. Finish Field Coat – A1501
Finish Field Coat – A1700

1.0 Description. This work involves application of the Finish Field Coat per Section 1081 but as modified in the General Notes where Finish Field Coat is presented.

2.0 Materials. The Finish Field Coat shall be the following or an equivalent coating:

Bridge	Product	Dry Film Thickness, mils
A150119 and A150120	Sher-Loxane 800	4.0 to 6.0
A17006	Sherwin Williams Pro Industrial DTM Acrylic B66-Series	4.0 to 5.0

3.0 Construction. The Finish Field Coat shall be applied as presented in the General Notes.

4.0 Method of Measurement. The application of the Finish Field Coat will not be measured.

5.0 Basis of Payment. The application of the Finish Field Coat will be paid as lump sum. The cost of the Finish Field Coat will be considered completely covered by the contract unit price.