SECTION 688
PAINTING STEEL STRUCTURES

688.1-DESCRIPTION:

Painting of metal shall include, unless otherwise specified in the Contract, the preparation of the metal surfaces, the procurement of all materials to meet the necessary specifications and the application of coating. This section shall apply to shop painting of new structures, field painting of new and existing structures.

688.2-SHOP PAINTING:

688.2.1-Description: The fabricator shall submit through the Prime Contractor to the Division their quality control plan for painting. The plan must be accepted prior to painting. The minimum requirements for the plan are set forth in MP 688.02.20.

688.2.2-Materials: The primer shall meet the requirements of 711.6 or 711.20.2.

688.2.3-Weather Conditions: Painting shall not be done when the ambient temperature is below 40° F (5° C)or the relative humidity above 90 percent, except as follows. If it is established that no detrimental effect to the paint film takes place, ambient temperature requirements may be lowered and relative humidity requirements may be raised at the option of the Engineer, however, the temperature of the steel must be at least 5° F (3° C)above the dew point. Painting shall not be performed when the surface to be coated is sufficiently hot to cause blistering of the film or too rapid solvent release.

688.2.4-Surface Preparation: All structural steel surfaces shall receive a very thorough blast SSPC-SP-10 (near white) cleaning prior to painting. Structural steel which has rusted to rust grade D of SSPC-Vis 1 shall not be used. The appearance of the steel surface after blast cleaning shall correspond with the following pictorial standards: A SP-10, B SP-10, or C SP-10 of SSPC Vis 1. In the event the coating manufacturer recommends a white metal finish, the appearance of the steel surface shall correspond to one of the following pictorial standards: A SP-5, B SP-5, or C SP-5, of SSPC-Vis 1.

688.2.4.1-Abrasives: The abrasives used shall meet the guidelines set forth in SSPC - Surface Preparation Commentary. Any additive mixed with the abrasive shall be approved prior to use.

688.2.4.2-Surface Profile: The abrasives used shall produce a height of profile between 1.0 and 3.0 mils (25 mm and 75 mm).

688.2.4.3-Cleaning Sequence: The cleaning sequence shall be as follows:

I. Deposits of oil or grease shall be removed by the methods outlined in SSPC-SP-1, "Solvent Cleaning".

II. Excessive rust-scale may be removed as outlined in SSPC-SP-2, "Hand Tool Cleaning," SSPC-SP-3, "Power Tool Cleaning", or by special blast cleaning equipment prior to normal blasting operations.

III. The surface of the metal shall be blast cleaned to the specified finish by any of the following methods:

   a. Dry sandblasting, using compressed air blast nozzles and dry sand.
   b. Grit blasting, using compressed air blast nozzles or centrifugal wheels, and crushed grit made of cast iron, malleable iron, steel or synthetic grit.
   c. Shot blasting using compressed air blast nozzles or centrifugal wheels, and cast iron, malleable iron, steel or synthetic shot.
   d. Closed, recirculating nozzle blasting, using compressed air and vacuum, and any of the preceding abrasives.

IV. The surface, if dry blasted, shall be brushed with a clean brush made of hair, bristle, or fibers, or shall be blown off with compressed air (from which detrimental oil and water have been removed), or shall be cleaned by vacuum for the purpose of removing any traces of blast products from the surface and also for the removal of abrasives from pockets and corners.

V. The blast cleaned surface shall be examined for any traces of oil, grease or smudges. If present, they shall be removed as outlined in SSPC-SP-1, "Solvent Cleaning".

688.2.4.4-General: The compressed air used for nozzle blasting shall be free of detrimental amounts of water or oil. Blast cleaning operations shall be done in such a manner that no damage is done to partially or entirely complete portions of the work. After blast cleaning, any areas which are repaired by welding shall be blast cleaned. Areas repaired by grinding or other means may have the anchor pattern restored by blast cleaning, or as directed by the Engineer.

688.2.5-Paint Application Requirements: The shop primer shall be applied in accordance with SSPC Paint Application 1 (PA 1). The blast cleaned surface shall be painted within 24 hours. In the event rust bloom or flash rusting occurs the effected members shall be recleaned by blasting. The paint shall be applied by spray methods except those areas inaccessible to spray

application may be brushed. Small touch-up areas may be brushed, if approved by the Engineer.

Use of an agitated pot shall be mandatory in all spray or brush application of the paint. The agitator or stirring rod shall reach to within 1 in. (25 mm) of the bottom of the pot and shall be in motion at all times during paint application.

Brushes, when used, shall have sufficient body and length of bristle to spread a uniform coat.

The dry film thickness of the shop coat shall be minimum of three mils (75 µm), except field and shop bolted contact surfaces which shall be as follows:

Minimum thickness shall be two mils (50 µm).
Maximum thickness shall be five mils (125 µm).

All edges, corners, crevices, and welds shall be stripe painted in accordance with SSPC-PA-1.

Under certain conditions, it may be necessary to thin or adjust the solvent balance of the paint. The type and amount of solvent to be used shall be that recommended by the coating manufacturer. Regardless of the thinning done, the dry film thickness requirement shall be met.

If in the opinion of the Engineer the coat has flaws other than deficiency in the prescribed dry film thickness, the material shall be repaired or shall be removed and replaced. If less than the prescribed dry film thickness has been applied, further application shall be made until the proper dry thickness is obtained.

Machine finished surfaces shall be coated as soon as practicable with a coating approved by the Engineer.

Top flanges that will be encased in concrete shall be coated to a minimum dry film thickness of two mils (50 µm). Shear studs may be applied in the shop or in the field. If applied in the shop, the studs shall be installed prior to painting. Painting of studs is not required. If installed in the field, the shop applied paint on the top of the top flange shall be removed at the stud locations to bare metal prior to installation of the studs.

All areas which will be inaccessible after assembly, shall be painted with the total paint system in the fabrication shop. Exposed steel surfaces of expansion dams shall be painted as specified for structural steel. Erection weight and match marks shall be stenciled or painted on structural steel after the prime coat is applied. Surfaces of steel within 2 inches (50 mm) of edges to be field welded shall not be painted in the shop.

688.2.6-Inspection of Applied Paint: No unsightly runs or sags shall be visible. All "mud-cracking" and/or "dryoverspray" in the paint film shall be removed. When examined under 8X magnification, excessive bubbles orpin holes shall not be visible in the coat. Calibration of the thickness gage and dry film thickness measurements shall be in accordance with MP 708.40.00.

688.2.7-Handling Coated Steel: Extreme care shall be exercised in handling the steel in the shop, during shipping, erection, and subsequent construction of the bridge. Painted steel shall not be moved or handled until sufficient cure time has elapsed to insure no damage is done to the fresh coating. The steel shall be insulated from the binding chains by softeners. Hooks and slings used to hoist steel shall be padded. To prevent damage to the coating, diaphragms and similar pieces shall be spaced in such a way that no rubbing will occur during shipment. All shipping and job site storage and handling details shall be submitted to the Engineer and must be approved prior to shipping any steel.

688.2.8-Shop and Field Repair: All shop and field repairs to the coating shall be made in strict accordance with the coating manufacturer's recommendation except where the requirements listed in this specification are more stringent. All procedures for shop and field repairs shall be submitted for approval by the Engineer prior to repair. Surfaces which will be inaccessible for coating after erection shall be repaired and/or recoated prior to erection.

The requirements specified herein for provisions for inspection, mixing, thinning, temperature and humidity, and application shall govern the coating of the repaired areas. In order to avoid abrupt changes in paint thickness, the area adjacent to repair areas shall transition from zero paint thickness to full system thickness within not less than 3 inches (75 mm) of the repair area by means of sanding the transition area. The requirements for the dry film thickness of the repair coats are the same as for the shop coats.

When the field painting is not included in the erection contract the heads of bolts and nuts shall be blast cleaned and painted in accordance with 688.2.4 and 688.2.5.

Blast cleaning and application of shop primer shall not be required for mechanically galvanized or zinc rich painted bolts, nuts and washers. All welds and surfaces from which the shop coat of paint has been damaged or is otherwise defective shall be blast cleaned and painted in accordance with 688.2.4 and 688.2.5.

688.2.9-No Top Coat Paint System: Structures which will not be topcoated in the field shall meet all the requirements of Section 688.1 except the dry film thickness shall be a minimum of 4 mils (100 µm). In addition, the Contractor shall provide the inspection access and surface protection required in Section 688.3.2.6. All edges, corners, crevices, and welds shall be stripe painted in accordance with SSPC-PA-1. The repair procedures of Section 688.2.8 shall apply.

In order to keep uniformity in the color of the structure, all paint applications will require the use of the same product formulation. The color shall be green.

688.3-FIELD PAINTING:

688.3.1-General Conditions: Field painting of new structures shall include, unless otherwise specified in the contract, the preparation of the primed surface for painting, the procurement of all materials to meet the necessary specifications and the application of the coatings. In addition, the Contractor shall protect pedestrian, vehicular, and other traffic on or underneath the structure from splattering, splashing, or dripping paint. Railings, curbs and all other superstructure and substructure shall be protected against spatters, splashes, and the like. Painting of existing structures shall consists of either removal of existing coatings and complete repainting or spot cleaning and painting as called for on the Plans.

The minimum requirements for the containment/disposal plan are set forth in MP 688.03.20. When lead based paint, as defined below, is to be removed the following apply:

A. The installation, cleaning, maintaining, and removal of pollution control devices.
B. The collection and transporting of "spent material" resulting from the cleaning operation to an approved storage area.
C. The transporting of "spent material" to a disposal site as outlined in these specifications. "Spent Material" shall be defined as rust particles, paint particles, dust and/or debris resulting from the cleaning of steel bridges that have been coated with lead based paint.
   Lead based paint is defined in 29 CFR 1303 as a paint or other similar surface coating material containing lead or lead compounds and in which the lead content is in excess of 0.06% lead by weight of the dried film.

688.3.2-New Structures:

688.3.2.1 – Materials: The field coats of paint shall meet the requirements of 711.20.3 and 711.20.4 or 711.22.3 and 711.22.4. The total thickness of the field coats shall be a minimum of 3 mils (75 µm) dry for the 711.20 system and 4 mils (100 µm) dry for the 711.22 system.

688.3.2.2-Environmental Protection: Surface cleaning materials, removed paint, rust, other wastes, and painting application overspray, drips, and the like shall be contained. The containment class, assessment method and level of assessment as defined in the SSPC X6X shall be as stated on the project plans.

688.3.2.3-Weather Conditions: Shall meet the requirements of Section 688.2.3.

688.3.2.4-Surface Preparation: : Prior to topcoating, surface contamination such as rust, dirt, mud, oil, concrete, loose zinc salts, or other foreign matter shall be removed. The entire structure shall be pressure washed at 2000 – 3000 psi (13800 – 20700 kpa). All areas including black bolts, nuts, and washers, not primed shall be cleaned and painted in accordance with Section 688.2.4 and 688.2.5. All damaged areas of the primer shall be

repainted in accordance with the manufacturer's recommendation. The damage repair primer shall be from the same manufacturer as the shop primer.

688.3.2.5-Paint Application Requirements: At this time, all adjoining concrete work shall be finished and the primer repaired to the satisfaction of the Engineer. Use of an agitated pot shall be mandatory in all spray or brush application of the paint. The agitator or stirring rod shall reach to within 1 in. (25 mm) of the bottom of the pot and shall be in motion at all times during paint application.

The field coats of paint shall be applied in accordance with SSPC-PA 1.

688.3.2.6-Inspection: The Contractor shall furnish suitable access and shall provide a time mutually agreed to for inspecting the structural steel prior to and after coating. The inspector shall approve all repairs. When providing suitable access, rubber rollers or other protective devices shall be used. Metal rollers or clamps and other types of fastenings which will mar or damage freshly coated surfaces shall not be used. Any temporary attachments or supports for access or forms shall not damage the coating system. (In particular, on the fascias where bracing is used sufficient size support pads must be provided). Any damage that occurs from such devices shall be repaired. The inspection shall be in accordance with Section 688.2.6. In addition, the field intercoat adhesion shall be at least 3A when tested in accordance with MP 711.00.20.

688.3.3-Existing Structures:

688.3.3.1-Material: The field coats of paint shall meet the requirements of Section 711. The applicable sections of 711, the dry film thickness and the color shall be as specified in the contract documents.

688.3.3.2-Weather Conditions: Shall meet the requirements of Section 688.2.3.

688.3.3.3-Surface Preparation: The surface shall be prepared as specified in the contract documents. Specific instructions will be given on the amount of surface required to be blast cleaned. The remainder may be removed bynon blast cleaning. It is intended that sound, adherent old paint not be removed unless it is excessively thick or inflexible. In preparing a previously painted surface, all corrosion and all paint which shows evidence of corrosion, peeling, excessive thickness, brittleness, blistering, checking, scaling, or general disintegration shall be removed. It is essential that the removal of the old paint be carried back around the edges of the spot or area until an area of completely intact and adhering paint film, with no rust or blisters underneath, is attained. Edges of tightly adherent paint remaining around the area to be recoated shall be feathered so that the repainted surface can have a smooth appearance. The remaining old paint shall have sufficient adhesion so that it cannot be lifted as a layer by inserting a blade of a putty knife under it or be removed by wire

brushing or light scraping. The rate of cleaning may vary from one area to the next in order to achieve the desired end condition.

688.3.3.3.1-Near White (SSPC-SP-10): Shall meet the requirements of Section 688.2.4, except rust grade D steel may be cleaned. If rust grade D steel is present, the blast cleaned surface shall correspond to pictorial standard D SP 10 of SSPC V1S 1.

688.3.3.3.2-Commercial (SSPC-SP-6): Shall meet the requirements of Section 688.3.3.3.1 except the blast cleaned surface shall correspond to pictorial standards, B SP 6, C SP 6, or D SP 6 of SSPC V1S 1.

688.3.3.3.3-Non Blast Cleaning: When blast cleaning is not specified in the contract documents, any one or a combination of the following methods may be used. The surface after cleaning shall meet the requirements of the method.

Hand Clean	SSPC-SP-2
Power Tool	SSPC-SP-3
Brush off Blast	SSPC-SP-7
Power Tool to Bare Metal	SSPC-SP-11

The profile after nonblast cleaning shall be as described in the method. The amount and type of material removed shall be as defined in the method.

688.3.3.4-Abrasives: The abrasives shall meet the requirements of 688.2.4.1. In addition, the container or bag or abrasive shall include the name of the abrasive, the name of the manufacturer, and the size of the abrasive. If any additive has been included with the abrasive, the name and the percentage of the additive shall be on the container or bag.

688.3.3.5-Coating Application: The field paint shall be applied in accordance with SSPC-PA-1. In addition, the use of an agitated pot shall be mandatory in all brush and spray applications of the paint. The agitator or stirring rod shall reach to within 1 in. (25 mm) of the bottom of the pot and shall be in motion at all times during the paint application.

All edges, corners, crevices, and welds shall be stripe painted in accordance with SSPC-PA-1.

Any caulking shall be applied after the full prime coat has thoroughly dried and before application of the intermediate coat. The caulking material shall be compatible with the paint system being applied and shall be as recommended by the paint manufacturer. Caulking operations shall be preformed only when weather conditions are within the parameters as specified in Subsection 688.2.3.

688.3.3.6-Environmental Protection Environmental protection shall be used when cleaning, painting, welding or cutting an existing bridge that has

a coating containing lead base paint. The Containment Class, Assessment method, and level of assessment as defined in SSPC X6X shall be as stated on the project plans. Prior to beginning work. The Contractor shall provide a containment/disposal control plan in accordance with M.P. 688.03.20. The specific pollution control system which is proposed for the complete capture, containment, collection, and disposal of the "spent material" generated by the work shall be included in the plan. This work shall be performed in compliance with West Virginia Division of Environmental Protection (DEP), United States Environmental Protection Agency (EPA), Occupational Safety & Health Act (OSHA), United States Coast Guard (USCG), SSPC Guides X6X and X7X, WVDOH Best Management Practice For Containment/Disposal, and other regulatory agencies' rules, regulations, standards, and guidelines in effect at the time the work is in progress. Upon approval, the plan shall be implemented to capture, contain, collect, and dispose of all "spent material".

The Contractor shall obtain all documents and/or permits that are required for the handling and disposal of the "spent material" collected during the course of the work. All material shall be disposed of at an approved site(s) by the Contractor or his authorized representative. The Contractor shall present the proper documentation and/or permits, as part of the pollution control plan, demonstrating that he has made arrangements to dispose of the materials at an approved disposal site. The Contractor shall not begin cleaning or blasting until he has submitted final documentation that he has an approved disposal site and all documents and/or permits for the handling, storing, and transporting of hazardous water and nonhazardous waste.

The "spent material" shall be collected and stored in containers lined with impervious plastic. The containers shall be locked or secured by a fence and kept covered with waterproof covers. The contents shall not be disposed of until authorized by the Engineer.

The "spent material" collected and stored in the containers shall be sampled and tested in accordance with MP 688.03.21. The "spent material" shall be tested in accordance with MP 688.03.22 to determine if the "spent material" is classified as hazardous. Current DNR methods are defined as those in effect at the time the project is advertised. The Contractor shall, at the Contractor's expense, select a laboratory that will sample and analyze the "spent materials". The laboratory will be approved by the Division as per MP 688.03.23. The Division of Highways will have a person who has been trained in sampling present during the sampling process. The results of the tests shall be provided to the Division within five working days of the sampling.

The Division may take independent samples, split samples with the Contractor's testing laboratory, and/or witness testing at its discretion. If the test results do not classify the "spent material" as hazardous waste, the Contractor shall transport and dispose of it at a landfill that has DEP approval to accept such waste. The Contractor shall be responsible for locating an approved landfill and obtaining all documents and/or permits for transporting disposal.

If the "spent material" is classified as hazardous waste the Division of

Highways shall obtain a provisional EPA generator number in accordance with all applicable Federal and State regulations. The Contractor shall containerize, mark and label all hazardous waste materials in accordance with 40 CFR 260 through 263.

The Contractor shall secure a transporter that meets all State and Federal requirements and a properly permitted disposal facility. The Contractor will be responsible for obtaining the EPA uniform hazardous waste manifest from the state that will be receiving the hazardous waste materials. All EPA uniform hazardous waste manifests will be signed by a Division of Highways official. Hazardous waste shall be removed within 90 days if the total weight exceeds 2,240 pounds (1000 kg). Prior to any shipments all containers and vehicles will be inspected by the Division of Highways person who is trained in the area of hazardous waste transportation.

688.3.3.7-Worker Protection: The Contractor shall provide protection for their Workers as per the requirements of 29 CFR 1926.62. The Contractor shall have a certified industrial hygienist (CIH) review and approve their written compliance plan. The CIH shall be certified by the American Board of Industrial Hygiene. The CIH shall be present during the first week of the work and at least twice a month thereafter. The CIH shall certify in writing during the first week of the work and at the end of the work that the worker protection plan fully complied with all regulations and that the plans were fully implemented.

688.4-METHOD OF MEASUREMENT:

The unit of measurement for "Cleaning and Painting Existing Steel Bridges" or "Cleaning and Painting Existing Steel Bridges Coated with Lead Based Paint" shall be lump sum. The unit of measurement for "Containment and Disposal of Spent Material" shall be lump sum.

688.5-BASIS OF PAYMENT:

Basis of payment for "Cleaning and Painting Existing Steel Bridges" or "Cleaning and Painting Existing Steel Bridges Coated with Lead Based Paint", or "Containment and Disposal of Spent Material" shall be lump sum price bid for the items listed below, which price and payment shall be full compensation for furnishing all the materials and doing all the work herein prescribed in workmanlike and acceptable manner, including all labor, tools, equipment, supplies, and incidentals necessary to complete the work.

688.6-PAY ITEMS:

ITEM	DESCRIPTION	UNIT
688001-*	CLEAN AND PAINT EXISTING STEEL BRIDGE	LUMP SUM
688002-*	CLEAN AND PAINT EXISTING STEEL BRIDGE COATED WITH LEAD BASE PAINT	LUMP SUM
688003-*	CONTAINMENT AND DISPOSAL OF SPENT ATERIAL	LUMP SUM

* Sequence Number