

of A 709, Grade 50W structural steel, the structural steel for the sign support shall conform to A 709, Grade 50W, except that the vertical supports shall be made of steel conforming to A 709, Grade 36 or 50. The fasteners shall conform to 909.07 and shall be Type 3 when used with A 709, Grade 50W structural steel.

Vertical supports to which the sign panels are attached shall be galvanized in conformance with A 123. All bolts, nuts, and similar fasteners in contact with the galvanized material shall be mechanically or hot dipped galvanized. The coating shall conform to the thickness, adherence, and quality requirements of A 153.

433.03 CONSTRUCTION. Construction shall conform to Section 430. Painting shall conform to Section 435, except as otherwise specified herein.

The Contractor shall set the anchor bolts by epoxy grouting or casting in place when applicable.

On new structures the nongalvanized portions of the sign support shall be cleaned and painted in conformance with the system specified for the structure on which it is to be mounted. Portions of the sign support mounted on structures constructed with Grade 50W steel, and attached to areas that are to be painted, shall also be cleaned and painted.

On existing structures not constructed with Grade 50W structural steel, the Contractor may elect to galvanize the entire sign support or paint those areas not designated to be galvanized. The nongalvanized portions of the sign support shall be cleaned and painted as specified in Section 435. They shall be blast cleaned to conform to the surface condition of Near White Sa 2-1/2 prior to painting.

Portions of the sign support mounted on existing structures constructed with Grade 50W steel, and attached to areas that are painted shall also be cleaned and painted.

433.04 MEASUREMENT AND PAYMENT. Bridge Mounted Sign Supports will not be measured but will be paid for at the Contract lump sum price. The payment will be full compensation for all material, labor, equipment, tools, and incidentals necessary to complete the work.

SECTION 434 — RESERVED

SECTION 435 — CLEANING AND PAINTING STRUCTURAL STEEL

435.01 DESCRIPTION. This work shall consist of cleaning and painting new and existing structural steel. The work shall conform to SSPC Standards. Any structural defects including cracks, missing bolts or rivets, deterioration, etc., detected during cleaning and painting shall be brought to the attention of the Engineer. The Contractor shall protect utility pipes, conductors, or conduits from these operations; they shall not be cleaned and painted unless specified in the Contract Documents.

This work shall also include cleaning and painting of all miscellaneous new replacement steel and all surface areas of the coating on the existing steel that are damaged due to structural repairs.

The Contractor shall provide all maintenance of traffic for lane and shoulder closures required to complete the work including inspection of the work. The Contractor shall provide the Engineer with safe and convenient access for the inspection and measurement of the work throughout the course of the project, for final inspection, and final warranty inspections. The Administration will provide all maintenance of traffic and access for the Engineer and Contractor for all intermediate annual inspections. All maintenance of traffic and access required for corrective action resulting from these inspections, and inspections following corrective action, shall be at no additional cost to the Administration. When a railroad is included in the project, all railroad fees shall be as specified in the Contract Documents except that any additional impact on the railroad due to corrective actions or additional inspections shall be at no additional cost to the Administration.

The Contractor shall conform to the requirements of OSHA for lead, arsenic, cadmium, etc., exposure in construction standards; and the applicable Federal and State laws. Existing paint systems may include toxic metals such as lead, arsenic, cadmium, chromium, etc., which may be considered hazardous waste when removed and tested as specified in the Toxicity Characteristic Leaching Procedure (TCLP), EPA Method 1311.

Prior to bidding the Contractor should be familiar with the current environmental regulations and safety procedures. The Administration is considered the "Generator" of all waste associated with the work, however, the Contractor shall be responsible for preventing waste from entering into the environment by containing, collecting, storing, testing, and disposing of all waste in conformance with Federal, State and local regulations.

Failure to Comply. When the Engineer determines that the Contractor has failed to comply with environmental regulations and safety procedures, that portion of the work will be shut down until the Engineer is assured that the Contractor's modified procedures will result in compliance. These procedures include timely submittals from the industrial hygienist; containment, ventilation, and recovery systems working to the required level of efficiency, and other requirements of the Contract Documents. The shut down and corrective action shall be performed at no additional cost to the Administration.

Field Painting Minimum Requirements. All paint contractors/subcontractors shall be certified as specified in (a) below. When field cleaning to a condition of SSPC-SP 6 or SP 10 is required on rehabilitation or cleaning and painting existing bridge projects, they shall also be certified as specified in (b) below. All certificates shall be effective prior to Award of Contract and shall remain in effect for the duration of the Contract.

Cleaning and painting operations on projects that are primarily for cleaning and painting existing bridges shall be performed by the Contractor. The use of subcontractors for the cleaning and painting operations on these projects is prohibited. This requirement applies regardless of the percentage of the cost of the cleaning and painting items when compared to the total work in the Contract. Subcontractors may be used for traffic control and other work not pertaining to cleaning and painting.

- (a) **SSPC-QP1.** Standard Procedure for Evaluating Qualifications of Painting Contractors: Field Application to Complex Structures.
- (b) **SSPC-QP2, Category A.** Standard Procedure for Evaluating Qualifications of Painting Contractors to Remove Hazardous Paint.

435.02 MATERIALS.

New Steel (Includes New Structures, Repairs or Widening)	912.05, Paint System B
Existing Steel (Includes Existing Structures with or without Widening)	912.05, Paint System C
Existing Coatings Damaged During Structural Repairs	435.02.01

All paint within the paint system shall be from the same manufacturer.

435.02.01 Existing Coatings Damaged During Structural Repairs.

Existing coatings damaged during structural repairs shall conform to 435.03.15 and 912.05, Paint System E, Coat I and II except that on fascia beams and trusses Coats I, II, and III shall be applied. The color of the final coat shall match the existing finish coat. The requirement for each coat to be tinted to differentiate between coats will be waived for Coats II and III.

435.03 CONSTRUCTION. The definition of the word “Bridge” as defined in TC-1.02 shall not apply to this Specification. Any references to “Bridges” in this Specification, shall mean any structures carrying traffic over water, roadway, railway, etc., regardless of its length.

Paint Inspector Notification. The Contractor shall notify the Bridge Inspection and Remedial Engineering Division a minimum of 72 hours prior to beginning field cleaning and painting of new and existing steel. The Bridge Inspection and Remedial Engineering Division will provide a paint inspector to assist the Engineer during inspection of the cleaning and painting portion of the work. Failure to comply with this notification shall be cause for rejecting the work performed. Paint applied to steel surfaces without this inspection may be required to be removed and reapplied at no additional cost to the Administration.

435.03.01 The Contractor shall provide, for the exclusive use of the Engineer, the following equipment for the inspection of the Contractor's cleaning and painting operations. All equipment shall be maintained by the Contractor in a condition that is satisfactory to the Engineer and shall remain the property of the Contractor at the conclusion of the Contract.

- (a) SSPC Vis 1-89 and SSPC-Vis 3 Standards (Latest Edition) or other approved visual standards.
- (b) SSPC Painting Manuals (Latest Edition).
- (c) SSPC Guides 6 and 7 (Latest Edition).
- (d) Spring Micrometer with Surface Profile Replica Tape.
- (e) Sling Psychrometer, F.
- (f) U.S. Weather Bureau Psychrometric Tables.
- (g) Surface Thermometer, 0 to 150 F.
- (h) Probe Thermometer for Paint Temperature.
- (i) High/Low Thermometer for Paint Storage Area.

- (j) Wet Film Thickness Gauge.
- (k) Digital Magnetic Dry Film Coating Thickness Gauge (SSPC-PA2).
- (l) Plastic Calibration Shims for Digital Magnetic Dry Film Thickness Gauge.
- (m) Inspector's Mirror.
- (n) Wind Meter.
- (o) Clean, White, Lint-Free, Absorbent Rags.

Field Quality Control. The Contractor shall provide daily job quality control in conformance with SSPC-QP1. Copies of the Contractor's daily job quality control records shall be maintained on site and made available for the Engineer at any time. The Contractor shall also give evidence of qualified personnel and proper inspection and recording procedures for job quality control.

- (a) **Personnel Qualifications.** Documentation that personnel performing quality control related functions are qualified, including records of training and experience of qualified supervisors and inspectors, and a description of qualification requirements for inspectors.

Competent Person. A competent person as defined in SSPC-QP2 shall perform all quality control related functions. The Contractor shall provide documentation including records of training, experience, etc., of the competent person's qualifications. The competent person shall have a minimum of 2 years industrial field painting experience with a minimum of 90 days of field supervisory or management experience in paint removal projects; and shall hold a SSPC Competent Person Certificate, and a certificate of completion of 29 CFR 1926.62(l) Lead in Construction Training.

- (b) **Inspection Procedures and Recording Systems.** The Contractor shall submit a Quality Assurance Plan within 14 days after receiving Award of Contract. The Quality Assurance Plan shall include the following:
 - (1) Records of standards and specifications for coating inspection work and their utilization.
 - (2) System for filing inspections reports.

- (3) Demonstration that inspection equipment and calibration standards and procedures are available.
- (4) Procedures to stop nonconforming work.
- (5) Procedures for verifying proper coating application
- (6) Procedures to ensure that each major operation (surface preparation, primer, intermediate, and topcoat application) is inspected.
- (7) Procedures for calibration of inspection equipment.

435.03.02 Floodlighting. The Contractor shall provide floodlighting, including power source, to supply adequate illumination to the underside and inside of the structure's containment system for all field cleaning and painting operations and inspections. The floodlighting shall be in good working condition and of a design approved by the Engineer. The floodlighting shall be adjusted to avoid glare that may blind marine and vehicular traffic.

435.03.03 Surface Preparation. Surfaces shall be prepared as specified in the pertinent SSPC Specifications and the Contract Documents. Surface conditions shall conform to the pertinent SSPC-Vis Standards.

Should an area of steel that had previously been cleaned become soiled, contaminated, or rusted, the Contractor shall reclean that area to the satisfaction of the Engineer prior to painting at no additional cost to the Administration.

Regardless of the method of cleaning, all surface imperfections such as sharp fins and edges, weld spatter and slag, deep pits, slivers, runs and sags in existing paint, concrete spatter, bird and animal waste, and any other matter which will prohibit a smooth unobstructed surface for the application of paint, shall be removed. Deep pits shall be filled in conformance with the manufacturer's written recommendations and as approved by the Engineer.

Abrasive media used in blast cleaning operations shall result in blasted surfaces having a surface profile height of 1 to 3 mils as determined by a spring micrometer with surface profile replica tape. If the surface profile is greater than 3 mils, the Contractor shall apply additional coating equivalent to the excessive profile height at no additional cost to the Administration.

Methods of Cleaning. Methods shall be in the order shown in the following table:

912.05 PAINT SYSTEM	METHODS OF CLEANING
A,B	(a),(h) Shop, (c)
C, D, G	(a),(c),(f)
E, F, H	(a),[(i) or (j)],(d) and (b)

Method (d) - 40 grit sanding disk recommended

Method (b) - 60 grit sanding paper recommended

- (a) **Solvent Cleaning.** Solvents, emulsions, cleaning compounds, steam cleaning, or similar materials and methods approved by the Engineer shall be used in conformance with SSPC-SP 1. Soap steam cleaning shall be used in cleaning steel open grid decks and walkways and machinery areas of drawbridges. Contaminated solvent shall be removed before it evaporates by wiping or rinsing with clean solvents to prevent a film of contaminants from remaining on the surface. Solvent wiping may be required between coats. All solvent shall be approved in writing by the paint manufacturer.
- (b) **Hand Tool Cleaning.** Hand tool cleaning shall conform to SSPC-SP 2.
- (c) **Power Washing.** The pressure washer shall be capable of 2000 psi pressure at the nozzle using potable water unless otherwise specified by the Engineer. This method shall be used within 48 hours prior to blast cleaning. This method shall also be used to remove concrete spatter, dirt, debris, salt contaminants, etc., from new structures prior to application of field coats. The nozzle shall be operated at close range of approximately 6 in. using a pattern of overlapping drops followed by cross hatching with the same overlap. Although usually operated with potable water, a detergent wash approved by the paint manufacturer and the Engineer may be required to remove oil, grease residue, and hydrocarbons.
- (d) **Power Tool Cleaning.** Power tool cleaning shall conform to SSPC-SP 3.
- (e) **Brush Off Blast Cleaning.** Steel grit propelled through nozzles or centrifugal wheels conforming to SSPC-SP 7 shall be utilized unless otherwise approved by the Bridge Inspection and Remedial Engineering Division. Abrasives shall be dry and free of oils, grease, and other harmful materials such as lead dust, etc. at the time of use.

- (f) **Abrasive Blast Cleaning.** Steel grit propelled through nozzles or centrifugal wheels conforming to SSPC-SP 10 shall be utilized unless otherwise approved by the Bridge Inspection and Remedial Engineering Division. The end surface condition shall conform to Near White. Abrasives shall be dry and free of oils, grease, and other harmful materials such as lead dust, etc. at the time of use. Cleanliness of the steel grit shall be verified prior to start of work in conformance with SSPC AB-3 and at least one 8 hour shift every month thereafter in conformance with SSPC AB-2.
- (g) **Power Tool Cleaning to Bare Metal.** Power tool cleaning to bare metal shall conform to SSPC-SP 11.
- (h) **Shotblast Cleaning.** Sufficient amounts of steel grit mixed with cast iron, malleable iron, steel, or synthetic shot propelled through nozzles or centrifugal wheels conforming to SSPC-SP 10. The end surface condition shall produce an etched surface texture as opposed to the peened surface texture typical of shotblasting, and shall conform to Near White. Shotblast cleaning is prohibited in the field.
- (i) **Power Washing (High Pressure).** The pressure washer shall be rated at an optimum of 4000 psi as measured on the flow side of the washer pump. This method shall be used prior to hand tool or power tool cleaning. The pressure washer shall be equipped with easily accessible gauges and pressure regulator to ascertain and regulate the water pressure.

The pressure washer shall operate at 3000 to 6000 psi at the nozzle using a turbo dirt rotary tip as approved by the Engineer. The nozzle shall be operated at close range of approximately 6 in. using a pattern of overlapping drops followed by cross hatching with the same overlap. Although usually operated with potable water, a detergent wash approved by the paint manufacturer and the Engineer may be required to remove oil, grease residue, and hydrocarbons.

- (j) **Power Washing (Ultra High Pressure).** The pressure washer shall be rated at an optimum of 10 000 psi as measured on the flow side of the washer pump. Refer to (i) for all other requirements. The pressure washer shall operate at 8000 to 15 000 psi.

435.03.04 Shop Cleaning. All new structural steel shall be cleaned in the shop. All oil, grease, and other substances shall be removed from steel surfaces as specified in 435.03.03(a) prior to blast cleaning. Blast

cleaning of the following areas shall conform to 435.03.03(h) after all shop fabrication is complete:

- (a) Nonweathering Steel - All surfaces
- (b) Weathering Steel
 - (1) The outside surfaces of the fascia stringers for bridges. For dual bridges this includes median fascia.
 - (2) At abutments, the end 10 ft of all stringers and all other structural steel within the 10 ft area, e.g., stiffeners, cross bracing, bearings, etc.
 - (3) At piers, 10 ft in each direction from the center line of the pier giving a total length at each pier of 20 ft and all other structural steel within the area, e.g., stiffeners, cross bracing, bearings, etc.
 - (4) At bolted field splices, 12 in. beyond the longest splice plate for each particular splice and all splice material.

435.03.05 Field Cleaning Existing Structures. Vegetation overhanging or fouling the structure shall be removed.

When the structure to be painted has planking (timber or plywood) between the stringers, it shall be carefully removed in the areas of work operations. The Contractor shall be responsible for storing and maintaining the planking in good condition and disposing of all debris on the planking. Unless otherwise directed by the Engineer, the planking will not have to be reinstalled until cleaning and painting operations are complete. The Engineer may direct the Contractor to reinstall the planking prior to opening any restricted lane to traffic during the same working day. The Engineer may also direct the Contractor to reinstall planking during periods of work stoppage.

When abrasive blast cleaning is specified, the Contractor shall furnish two 12 x 12 x 1/4 in. steel test plates, which shall be cleaned by the Contractor in conformance with SSPC Vis Standards and the Contract Documents, and used as a job sample standard for cleaning operations. These standard test plates shall be given a clear protective coating.

Cleaning and painting shall proceed by sections, bays, or other readily identifiable part of the work as may be approved by the Engineer. The work shall start at the top and proceed toward the bottom. Regardless of the method used for cleaning, the Contractor shall feather the edges of old

paint permitted to remain so that the repainted surface can have a reasonably smooth appearance.

Heavy rust and pack rust shall be removed by a combination of cleaning procedures such as hand chipping (using chipping hammers or scaling hammers), blast cleaning, power tool cleaning, etc. without scarring good steel. All dust, puddles, grease, and debris on surfaces adjacent to those being painted shall be removed. Oil and grease shall be removed by solvent cleaning. Portions of paint on previously painted surfaces which are chalky, powdered, cracked, or otherwise unacceptable, including runs and sags, shall be removed.

Included in the cleaning operations shall be the permanent removal of all existing street signs attached to the webs of fascia stringers. These signs shall be removed before cleaning operations begin. Areas exposed as a result of the sign removal including bolt holes, etc. shall be cleaned and painted. The Contractor shall notify the Engineer who will notify the Office of Traffic and Safety's Chief, Traffic Operations Division whenever the sign is removed. Street signs may be reinstalled elsewhere on the structure by the Office of Traffic and Safety utilizing the Contractor's maintenance of traffic. The Office of Traffic and Safety will coordinate this work with the Contractor.

All cleaning operations shall begin with solvent cleaning as specified in 435.03.03(a) followed with washing as specified in 435.03.03(c),(i), or (j). The appropriate cleaning methods will be specified in the Contract Documents. The water shall be potable prior to beginning work operations. Water and debris removed during washing operations shall be contained and collected in conformance with 435.03.06 through 435.03.08. Water shall be contained regardless of the levels of contaminants found therein. If the water is to be recycled, it shall be tested for heavy metals e.g. lead, arsenic, cadmium, etc., before reuse. Water exceeding the threshold value for any heavy metal (e.g. 5 mg/l for lead) shall not be reused.

Field cleaning areas defined as bearings and beam ends shall include all structural steel for a distance of 3.0 ft from the ends of the stringers at the abutments, and 3.0 ft in each direction from the center line of the piers for a total distance of 6.0 ft.

Field cleaning areas defined as fascia beams shall include the underside of the top flange, face of web, the top, bottom and edges of the bottom flange, and the attached bearings.

Residual dust, dirt, and grease shall be removed as the final procedure prior to painting. The Engineer will determine if all methods are required.

Solvent cleaning shall be used as described in SSPC-SP 1. Solvent cleaning may be required between coatings if exhaust from trucks or other foreign matter is present. In the solvent cleaning operations, the contaminated solvent shall be removed before it evaporates by wiping or rinsing with clean solvent to prevent leaving a film of contaminants spread over the surface.

Subsequent to the cleaning operation, the Contractor shall remove and properly dispose of all resultant debris.

435.03.06 Field Cleaning Waste Containment. The Contractor should contact the Department of Environment prior to bidding to determine the latest regulations affecting the project. The Contractor shall also comply with SSPC Guide 6.

Within 14 days after receiving Award of Contract and prior to the Pre-Construction Conference, the Contractor shall submit the following to the Office of Bridge Development, Working Drawing Review Section:

- (a) A written Compliance Program for worker protection conforming to OSHA and the MOSH - Lead in Construction Standards, and other applicable toxic metal standards. The industrial hygienist shall conform to the requirements specified below. The Contractor shall retain on site and make available to the Engineer records of biological monitoring, training, etc. The written Compliance Program shall be signed and sealed by the industrial hygienist and address the following:
 - (1) Activities emitting lead.
 - (2) Work procedures to achieve compliance.
 - (3) Personal air monitoring.
 - (4) Work Practice Program.
 - (5) Job site inspections by the Contractor.
 - (6) Regulated areas.
 - (7) Ambient air quality.
 - (8) Soil quality.
 - (9) Water/sediment quality.
 - (10) Ventilation system performance.

- (11) Emission release.
 - (12) Medical surveillance.
 - (13) Respiratory Protection Program.
- (b) The industrial hygienist's Plan of Action indicating procedures for monitoring air, soil, and water. The Plan of Action shall include a location plan showing the type and location of monitors and soil test samples for each bridge site. The locations of the soil samples shall be permanently marked for the life of the Contract. The Contractor shall retain on site and make available to the Engineer monitoring and sampling results. The site specific Plan of Action shall be signed and sealed by the industrial hygienist and address the following:
- (1) Visual emissions observation.
 - (2) Ambient air monitoring (TSP Monitoring).
 - (3) Soil sampling.
 - (4) Personal monitoring.
 - (5) Waste sampling.
 - (6) Waste water sampling.
 - (7) Water/sediment sampling (if applicable).
- (c) Working drawings of the proposed containment and ventilation system.
- (d) The design of the systems to be employed, including an analysis of the load which will be added to the existing structure by the containment system, blast waste, etc. The load analysis shall be performed and signed and sealed by a licensed professional engineer registered in the State of Maryland and having a minimum of five years experience in bridges. The analysis shall ensure that the system will not induce a load on the bridge which will create an overstress condition or otherwise effect the structural integrity of the bridge. The containment system or equipment shall not encroach upon the minimum bridge clearances shown on the Contract Documents, unless otherwise approved by the Engineer.

- (e) Details for the recovery system for recycling steel grit used for blast cleaning. The recovery system shall be capable of keeping the grit dry, and free of oils, grease, and other harmful materials.

Industrial Hygienist. The industrial hygienist shall be certified by the American Board of Industrial Hygiene with field sampling experience in this type of work. The industrial hygienist shall have \$1 000 000 errors and omissions insurance coverage for this type of work. All sampling and testing shall be performed by the industrial hygienist or an employee of that firm under the direct supervision of the industrial hygienist. Sampling and testing shall be witnessed by a representative of the Administration. The Contractor shall notify the Bridge Inspection Remedial Engineering Division a minimum of 24 hours prior to sampling and testing.

The industrial hygienist shall review all results of sampling and testing performed on the project, and prepare a written report interpreting these results for compliance to the applicable regulations. The industrial hygienist shall state any corrective actions that should be performed by the Contractor when results indicate noncompliance to the regulations. Additional monitoring shall be performed to ensure the corrective actions taken by the Contractor are sufficient and have corrected the problem.

The Contractor shall submit a copy of all reports, analysis, etc. to the Engineer. All copies shall be signed by the industrial hygienist, and be submitted within five working days after sampling unless otherwise approved by the Engineer. The industrial hygienist shall submit written certification within five days after the end of the month that the Contractor has complied with the Plan of Action and addressed any deficiencies found.

Containment System. The Contractor shall provide for total containment of all removed and spent materials, regardless of the presence of lead or method of removal. This containment shall prohibit dust, water, solvent, and other debris from escaping into the environment. The Containment System Plan shall conform to 435.03.07 for the capture, containment, collection, and storage of the waste generated by the work, which includes blasting residue, spent blasting mediums, rust, paint particles, dust, etc. Applicable portions of these requirements apply to shops when existing steel coated with hazardous material is being cleaned in the shop.

The containment system shall be capable of containing residue and water generated by the work.

The containment system for abrasive blast cleaning shall conform to SSPC, Class 2A Containment. The Contractor shall provide dust

collectors and airflow systems capable of satisfying ambient air and worker exposure requirements established by the Maryland Department of the Environment and MOSH.

The containment for power washing shall conform to SSPC, Class 2W Containment.

The containment system for hand tool and power tool cleaning shall conform to SSPC, Class 2P Containment. The Contractor shall satisfy ambient air and worker exposure requirements established by the Maryland Department of the Environment and MOSH.

The containment system shall be properly maintained while work is in progress and shall not deviate from the approved working drawings without approval of the Engineer. Public access to all rigging, scaffolding, containment systems, and work sites shall be denied at all times.

The review and acceptance of the working drawings by the Administration (and Railroad when applicable) shall in no way relieve the Contractor of any responsibility for obtaining the required degree of capture, containment, and collection.

Depositing or dropping spent materials into water, onto unprotected ground or roadways, or outside or below the containment areas is prohibited. Waterways shall be protected against conveyance of any paint drift and overspray. Dust shall be contained.

All waste discharged and collected from the containment system shall be protected in a manner so as to prevent migration of the waste into the environment. For bridges over water, the containment system shall include a skimming boom for emergency backup consisting of a float with a skirt or other approved system to collect floating debris. The skimming boom shall be cleaned at least once a day.

Methods for Assessing Quantity of Emissions.

- (a) **Level 1 Emissions.** Level 1 Emissions is defined as random visible emissions of a cumulative duration of no more than 1 percent of the work day or approximately five minutes in an eight hour day. Level 1 is required for all bridges. The industrial hygienist shall perform a minimum of two 15 minute observations during each work shift during periods of ambient air monitoring. The Contractor's competent person shall be responsible for observations during other work shifts. Records shall be retained on site and made available to the Engineer.

- (b) **Ambient Air Monitoring.** Daily ambient air monitoring at each structure shall begin three days prior to beginning work, during the first 10 days of productive abrasive blast cleaning operations, and at least 24 hours of monitoring during blast cleaning for every month thereafter at each bridge site unless otherwise directed by the Engineer. Daily ambient air monitoring at each structure shall begin one day prior to beginning work, and during the first five days of hand tool, power tool, and power wash cleaning. If the data measured is acceptable as determined by the industrial hygienist, additional monitoring will only be required when problems appear to be occurring as determined by visual assessments of the Contractor's operations. Visible residue on the ground, in the water, or visible dust will not be acceptable and may require additional monitoring of the cleaning operations at no additional cost to the Administration.

Total suspended particulate (TSP) monitors shall be placed downwind adjacent to homes, businesses, parks, or pedestrian walkways that are within 500 ft of the bridge during blast cleaning operations in conformance with Method D at each bridge site. Monitoring shall be conducted a minimum of seven hours per work shift. All TSP monitoring samples shall be analyzed using Method 40 CFR 50 Appendix B and G by a laboratory approved by the American Board of Industrial Hygiene.

The industrial hygienist shall use an Adjusted Daily Allowance (ADA) as described in SSPC Guide 6 (not an average daily allowance) for the TSP monitoring.

- (c) **Worker Exposure Monitoring.** The industrial hygienist shall monitor worker exposure during cleaning operations at each structure for lead and other toxic metals.

Worker exposure monitoring tests shall be performed within the breathing zone. Worker exposure monitoring for each job classification shall be performed for at least the first three days of cleaning and monthly thereafter, and as work operations change. The number of tests required shall be determined by the Contractor's industrial hygienist and approved by the Engineer. Results of this analysis may require adjustments to the containment system.

The Contractor shall provide a clean up area with a shower, soap, hot and cold potable pressurized water, a change area with a locker for clean clothes, etc., and an approved container for collection and disposing of waste at each work site. This facility

shall be available for the Contractor's and the Administration's personnel. Hygiene facilities shall conform to the requirements specified in 29 CFR 1926.51, Sanitation Standard.

- (d) **Soil, Water, and Sediment Sampling.** Soil, water, and sediment samples shall be analyzed using EPA Method 3050 by a laboratory approved by the American Board of Industrial Hygiene. A soil analysis for hazardous elements conforming to Method E shall be performed as directed by the industrial hygienist. A minimum of four soil samples shall be taken and analyzed, one at each corner of each bridge. The location of the soil samples shall be marked and recorded and their location shall be approved by the Engineer. A test analysis shall be performed prior to work, during, and at the completion of all work at each bridge. If the final test results indicate an increase in lead content exceeding 500 ppm for any test, the Contractor shall clean the site to reduce the lead content to preexisting conditions.

When the bridge is within 500 ft of a stream or other body of water, the water and sediment shall be tested for heavy metal content before work begins, during work operations, and after work operations are completed.

- (e) **Hazardous Waste Sampling.** The industrial hygienist shall take a minimum of four samples of the accumulated residues collected at each bridge or a sample from every third drum, whichever is greater. All sampling shall be random and representative. The samples shall be analyzed for TCLP as outlined in COMAR 26.13.02.25B, Method 1311; and the EPA Test Procedure Manual, SW-846. Waste shall not accumulate for longer than 30 days before sampling. The representative samples collected shall be analyzed by an approved laboratory and the results returned to the Engineer within five working days. Additional samples may be required if the average test results for lead exceed 3.5 mg/l. For allowable concentrations of other heavy metals, refer to COMAR and EPA procedures. The disposal method employed will be based on the results of these analyses.

Waste water from hygiene facilities shall be tested for heavy metals e.g. lead, arsenic, cadmium, etc. Tests shall be performed after work operations are complete using EPA Method 6010 by a laboratory approved by the American Board of Industrial Hygiene.

435.03.07 Field Cleaning Containment System Plan Guidelines. Connections to the steel work of the bridge shall be made with clamps or

other devices approved by the Engineer. Drilling holes anywhere into the existing structure or welding to the existing steel work is prohibited.

- (a) All drawings shall be made on standard 22 × 34 in. reproductive sheets with proper lettering. General notes shall be placed in the space above the title box.
- (b) Show the containment system in plan and elevation views including details of clips and hangers.
- (c) Indicate maximum permissible waste load permitted on the containment system.
- (d) Indicate if vehicles with abrasive and waste will be stationed on the bridge; if so, indicate allowable load and location. Vehicle and equipment loads shall not be permitted behind abutments if surcharging results.
- (e) Indicate all restrictions on the bridge and if it is posted.
- (f) Indicate which bridges are covered by the plans submitted.
- (g) Attachments or fasteners to the bridge shall not be permanent.
- (h) When the bridge is over water show a skimming boom for emergency backup.
- (i) Identify all containment system components on the plan sheets. Indicate the type and size of scaffolding or rigging to be used and clearly state erection procedures. Indicate sizes of the containment areas, the capacity of the dust collectors, and types of airflow systems to be provided including volume of air from ventilation fans and minimum velocity of air movement. Include number of blasters, capacity of blasting equipment, and hose pressure.
- (j) All curtains, screens, or tarps used for containment shall be secured.
- (k) No load shall be attached to the bridge railings unless details and calculations showing loading have been approved by the Administration.
- (l) Submit six copies of each drawing. Each sheet shall be signed and sealed by a professional engineer. The submittal letter shall be on company letterhead. At least one copy of the submittal shall have an original seal.

- (m) Include a location plan for the soil samples, a written Compliance Program, and the industrial hygienist's Plan of Action. Submit six copies each signed and sealed by an industrial hygienist. All submittals shall be in writing and on company letterhead. At least one copy of the submittal shall have an original seal.

435.03.08 Field Cleaning Waste Disposal.

The Contractor shall comply with SSPC Guide 7.

Each day the Contractor shall collect the clothing and other waste material in approved containers and seal them. When drums are used they shall be sealed 55 gal open head type drums conforming to I.C.C. Specification 17-H. All containers shall be in new condition and approved for use by the Engineer. Containers shall be labeled with the bridge number, Contract number, Contractor's name, contents, and the date.

Hazardous Waste. Maryland law provides that when samples tested using TCLP exceed the threshold value (e.g. 5 mg/l for lead), they shall be considered hazardous waste and shall be removed under manifest by a licensed hazardous waste transporter to a permitted disposal facility. Waste containing less than the threshold value by the TCLP test may be disposed of as an industrial waste at any landfill permitted to accept this material. When tested waste material is determined to be hazardous waste, the Contractor shall request through the Administration an EPA identification number as specified in COMAR 26.13.03.03.

The Contractor shall prepare a manifest for waste to be transported from the approved temporary storage site. The manifests shall be prepared and shall contain the information stipulated in COMAR 26.13.03.04 and as otherwise required by State regulations. The manifests shall be forwarded to the Bridge Inspection and Remedial Engineering Division.

Drums of other wastes, such as solvent contaminated rags, disposable protective clothing, disposed dust collector filters, and other contaminated substances shall be sampled individually and tested appropriately.

COMAR 26.13.03.05 stipulates the "Pre-Transport" requirements. Waste shall be transported by a certified waste hauler to any landfill permitted to accept this material.

The Contractor can obtain a list of certified haulers and other information regarding handling and disposal of blast waste by contacting the Department of Environment, Hazardous Waste Administration.

Nonhazardous Waste. All waste shall be disposed of in conformance with Federal, State, county and local regulations.

Temporary Waste Storage Site. At the end of each working day the Contractor shall haul the waste material away from the bridge site to an approved temporary storage site which has been obtained by the Contractor, located in the county the waste material was generated, and approved by the Engineer. The storage site shall be capable of preventing the migration of the contaminated material into the environment. The storage area shall provide protection from vandalism and unauthorized access by the general public. The waste shall be removed from the temporary storage site within 75 days from the initial date of accumulation or before the completion of work, whichever comes first. When the Contract Documents specify that the Contractor's waste containers shall be stored at a particular facility owned by the Administration, the Contractor shall contact that facility to schedule delivery.

435.03.09 Paint Storage. Paints and thinners shall be stored in well ventilated areas and not subject to excessive heat, open flames, electrical discharge, and direct rays of the sun. The Contractor shall adhere to all manufacturer's recommendations. Materials susceptible to damage by low temperatures shall be stored in heated areas when necessary. All materials shall be used on a rotating stock basis and remain closed until used. Paints which cannot be stirred to attain normal consistency shall not be used. Paint not in actual use shall be stored in tightly covered containers at not less than an ambient temperature of 45 F. Containers used for storage of coating shall be maintained in a clean condition, free of foreign materials and residue.

Thin skins formed in the container shall be cut loose and discarded. Material which has livered, gelled, thick skinned, or become questionable shall not be used unless reapproved by the Engineer. Waste chemical solutions, oil rags, and other waste shall be removed daily. All necessary precautionary measures shall be taken to ensure that workmen and work areas are adequately protected from fire hazards and health hazards resulting from handling, mixing, and application of materials. Materials shall not be used beyond their pot life or shelf life.

435.03.10 Field Painting Prerequisites. The Contractor shall conform to SSPC-PA 1 for painting application.

Paint shall not be applied between December 15 and April 15 unless approved by the Engineer.

The Contractor shall adequately protect the environment by providing containment for the paint application area, and be fully responsible for any damage resulting from wind or the cleaning and painting operations.

The Contractor shall submit in writing to the Engineer the proposed type and method of protection against paint spatters, overspray, drippings, etc. while painting over roadways, waterways, machinery areas, and areas in the vicinity of abutments and private properties. If at any time during the execution of the work the method of protection fails to function at the required level of efficiency, the Contractor shall immediately suspend all operations except those attendant to minimizing adverse impact to the environment. Operations shall not resume until modifications have been made to correct the cause of the failure.

Paint operations shall stop if the wind velocity exceeds 20 mph unless otherwise approved by the Engineer, or whenever the Engineer determines that the wind has an adverse affect on the work being performed.

All surfaces to be painted shall be sound, properly cleaned, and thoroughly dry. Paint shall not be applied in rain, snow, fog, mist, or when the ambient air temperature in the shade is below 40 F, the surface temperature is less than 45 F, the surface temperature is expected to drop to 32 F or below before the paint has dried, either temperature is less than 5 F above the dew point, the relative humidity exceeds 85 percent, or the steel is hot enough to cause the paint to blister, produce a porous film, or otherwise be detrimental to the life of the paint. The surfaces to be painted shall not be wet, damp, or frosted. Exceptions to temperature and humidity requirements may be allowed for paint conforming to 912.05 Paint System F and G if approved in writing by the paint manufacturer. However, paint shall not be applied if the surface temperature is less than 35 F.

If at any time it is suspected that moisture is condensing upon the surface, the sling psychrometer shall be used to check dew point, etc. The Engineer may allow a well defined area of the surface to be lightly moistened with a damp cloth and observed. If the dampness evaporates and decreases in 15 minutes, the surface shall be considered satisfactory for the application of paint. If fresh paint is damaged by the elements, the paint shall be replaced or repaired by the Contractor at no additional cost to the Administration.

The Contractor's operations shall be scheduled so that all cleaned surfaces are painted within 24 hours. If rust bloom appears or the air or steel temperature falls below five degrees above the dew point after cleaning and prior to application of the primer coat, the Contractor shall

re-clean the affected areas to the satisfaction of the Engineer at no additional cost to the Administration.

Prior to the application of paint, the Contractor shall obtain approval from the Engineer that the surfaces to be painted during that day have been cleaned as specified.

All areas adjacent to machinery or mechanical components, etc. shall be painted by brush application unless approved by the Engineer. Areas not approved by the Engineer for spray painting shall be painted by brush application. All dry spray, runs, and mud cracking shall be removed prior to the application of the succeeding coat. The steel shall be kept dust free during painting operations, and care shall be taken to protect newly coated surfaces from cleaning operations. When an area that had previously been cleaned or painted becomes soiled, contaminated, or rusted, the area shall be re-cleaned to the specified condition and completely recoated at no additional cost to the Administration.

All edges, corners, crevices, rivets, bolts, nuts, and washers shall be stripe coated prior to the full coat application as specified in SSPC-PA 1, Striping. All areas to be stripe coated shall be done prior to each coat. Inorganic zinc shall not be stripe coated. Stripe coats shall be applied by brush or dauber.

After the primer coat has been applied, each subsequent coat shall be applied within 30 days after the previous coat unless otherwise approved in writing by the paint manufacturer. If the recoat window is exceeded, the surface shall be re-cleaned as approved by the paint manufacturer and the Engineer.

Paint Representative. The paint representative shall be a technical representative of the paint manufacturer. The paint representative shall be present at the Pre-Construction Conference, and during the initial execution of the work to approve with the Engineer the degree of cleanliness prior to painting, and the method of application of the coating system. The Engineer may stop paint operations for failure to conform to this requirement regardless of reasons. Areas that have been cleaned prior to ceasing paint operations shall be re-cleaned if required. All work shall conform to the manufacturer's recommendations unless otherwise approved by the Engineer. Work stoppage ordered by the Engineer for failure to comply with these requirements shall not be justification for time extensions or any additional cost to the Administration.

435.03.11 Painting New Steel. The primer coat shall be applied in the shop as recommended by the manufacturer in a single application employing multiple spray passes. The specified dry film thickness shall be applied to all surfaces to be painted except a light dust coating shall be

applied within the areas of field welding and to the top and both edges of the top flange where steel stud shear developers are to be attached.

The primer shall be applied from agitated containers. All touch ups shall have the same dry film thickness as the coat being repaired but may be applied by brush. A zinc rich primer or other primer approved by the manufacturer and the Engineer shall be used to touch up the inorganic zinc primer coat.

Bolts for field assembly shall not be shop coated. After field welding and prior to applying Coat II (first field coat), these bolts, field weld areas, and rusted or damaged areas, shall be power tool cleaned or brush off blast cleaned as specified in 435.03.03(d) or (e), respectively, or abrasive blast cleaned as specified in 435.03.03(f) if required by the Engineer. The primer coat shall be applied on these areas the same day they are cleaned. Primer paint stained from rusted bolts shall be wiped before Coat II is applied.

Prior to field coating the surfaces of the steel shall be pressure water blasted with potable water in conformance with 435.03.03(c) to remove dirt and contaminants. Scrubbing the surface or scraping off excess concrete, etc. may also be required.

Coats II and III shall be applied in the field after all field welding has been completed. All paint shall be applied in conformance with the manufacturer's recommendations. Unless otherwise specified in the Contract Documents, Coats II and III shall be sprayed after all welded areas and damaged primer coatings are properly cleaned and primed as specified or as directed by the Engineer.

Areas of structural steel to be painted, after blast cleaning is complete, are:

- (a) **Nonweathering Steel.** The primer coat shall be applied in the shop to all structural steel surfaces. The remaining coats shall be applied to all exposed structural steel surfaces in the completed structure.
- (b) **Weathering Steel.** The primer coat shall be applied in the shop to all structural steel surfaces listed below. The remaining coats shall be applied to all exposed structural steel surfaces in the completed structure listed below.
 - (1) The end 10 ft of all stringers at all abutments and the 20 ft section centered over the piers shall be painted and all other structural steel in these areas shall be painted.

- (2) If the structure is over a highway or has curb openings, in addition to those areas cited in (1) above, the entire outside surfaces of the fascia stringers shall be painted (includes underside of the top flange, face of web, and the top, bottom and edges of bottom flange). For dual bridges this includes the median fascia.

435.03.12 Painting Existing Steel. Areas of delamination between plates that are 1/8 in. or greater that cannot be cleaned and coated, and gaps between steel members that cannot be sealed during the application of the primer or stripe coat shall be caulked with a material approved by the paint representative and coated with all coats of the specified paint system at no additional cost to the Administration.

All paint shall be properly mixed and applied as specified by the manufacturer and approved by the Engineer. Spray painting will be permitted provided the location and method of application is approved by the Engineer. The Contractor shall adequately protect the environment and take full responsibility for any damage resulting from wind or the painting operations. All dry spray and runs shall be removed prior to the application of the succeeding coat. Surfaces inaccessible for painting by regular means shall have the paint applied by sheepskin daubers or by other means if necessary to ensure coverage of the proper coating thickness. Thinning of paint is not permitted unless authorized by the paint manufacturer and approved by the Engineer. The Engineer shall be present whenever the paint is thinned.

435.03.13 Restrictions. Except for shop coat touch-ups, steel that will be exposed to view in the completed structure shall not be painted until all concrete has been placed. Care shall be taken by the Contractor to protect concrete from being stained by painting operations. Damaged concrete surfaces shall be restored to originally intended color without damage to the concrete.

435.03.14 Defective Work. The Contractor shall be responsible for the satisfactory application of paint and neither conditions during application nor Laboratory acceptance of paint shall relieve the Contractor of responsibility of obtaining a satisfactory paint system. Painting shall be done in a neat and workmanlike manner. If rusting occurs or a paint coat lifts, blisters, wrinkles, or shows evidence of having been applied under unfavorable conditions, the workmanship is poor, impure or unauthorized paint has been used, or for any other reason the painting is unsatisfactory, the affected paint shall be removed and the steel thoroughly cleaned and repainted at no additional cost to the Administration. These areas shall provide a uniform appearance throughout the structure.

435.03.15 Repair of Damaged Coatings. Coatings which are damaged as a result of the Contractor's operations, regardless as to whether or not cleaning or painting is required in the Contract Documents, shall be repaired at no additional cost to the Administration. The Bridge Inspection and Remedial Engineering Division shall be notified to determine the methods of cleaning and painting to be used. Damaged fascia beams shall be repaired so as to provide a uniform appearance and may require total painting as defined in 435.03.05 when required by the Engineer.

435.03.16 Final Identification. When the final coat of paint is dry, the Contractor shall stencil on the structure a legend indicating the type of paint used in each coat and the month and year in which each application was completed. The letters of the stencil shall be 2 to 2-1/2 in. high and shall be applied with black paint inside a fascia stringer near the abutment at a location selected by the Engineer. If more than one paint system is used, additional stencils shall be applied.

435.04 MEASUREMENT AND PAYMENT. The Contract unit price for the item specified in the Contract Documents will be full compensation for all permits, working drawings, daily quality control records, and professional engineer's services used for containment, industrial hygienist services, air monitoring, sampling and testing materials for lead and heavy metal content, including any revisions, resubmissions of the Containment Plan and Systems that may be required during the execution of the work, and all other incidentals necessary to complete all cleaning and painting operations including providing safe access for inspections, floodlighting, test plates, drums, collection and storage at the temporary storage site, hauling and disposal at an approved industrial waste site or hazardous waste site, removing and replacing planking, removal of debris, and all material, labor, equipment (including test equipment), tools, and incidentals necessary to complete the work.

435.04.01 Cleaning and painting new structural steel will not be measured but the cost will be incidental to the pertinent Fabricated Structural Steel item.

435.04.02 Cleaning and painting existing structural steel will not be measured but will be paid for at the Contract lump sum price for the pertinent Cleaning and Painting item.

SECTION 436 THRU 439 — RESERVED