

SECTION 512 PAINTING

512.01. DESCRIPTION.

- (a) **General.** This work consists of the painting of surfaces specified in the contract documents to be painted. The work shall be taken to include, but is not limited to, the preparation of surfaces to be painted, application and curing of paint, protection of the work, protection of existing facilities, vehicles, the public and the environment from damage due to this work, and furnishing of all labor, equipment, and materials needed to perform the work. Note that some testing limits are given in metric units.
- (b) **References, Definitions and Abbreviations.**
- *CERCLA.* Comprehensive Environmental Response, Compensation, and Liability Act. (Commonly called "SUPERFUND.")
 - *CFR.* Code of Federal Regulations. To obtain a copy, contact:
 Superintendent of Documents
 General Printing Office
 Washington, D.C. 20402
 Telephone (202) 783-3238.

List of CFR Titles Specified

CFR Number	Title
29 CFR 1926.62	Lead
40 CFR 50, App. J	Reference Method for Determination of Particulate Matter as PM in the Atmosphere
40 CFR 50.6	National Primary and Secondary Ambient Air Quality Standards for Particulate Matter
40 CFR 50.12	National Primary and Secondary Ambient Air Quality Standards for Lead
40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 263	Standards Applicable to Transporters of Hazardous Waste
40 CFR 268.7	Waste Analysis and Recordkeeping
40 CFR 300	National Oil and Hazardous Substances Pollution
40 CFR 302	Designation, Reportable Quantities, and Notification

Note: Absence of a CFR title does not relieve the Contractor of responsibility to comply with federal regulations.

- *Chain of Custody Form.* A form used for maintaining identification of waste samples, by signature and date, from the time the sample is taken, through transportation, receipt at the laboratory, and testing.
- *Deleading.* Deleading is the removal and elimination lead-based paint or lead-based paint contaminated materials.
- *DEQ.* Oklahoma Department of Environmental Quality.

- *EPA*. Environmental Protection Agency.
- *Hazardous Material*. Material is considered as hazardous if, when TCLP tested, any of the elements listed in the following table are extracted in concentrations equaling or exceeding those listed. Note that other materials, such as chemical strippers, can cause a material to be hazardous as defined in 40 CFR 261 and must be taken into consideration.

Hazardous Materials	
Hazardous Elements	Concentration (ppm)
Arsenic	5
Barium*	100
Cadmium*	1
Chromium*	5
Lead*	5
Mercury	0.2
Selenium	1
Silver	5

*Typical Elements found in ODOT paints.

- *HEPA Filters*. A HEPA (High Efficiency Particulate Air) filter removes at least 99.97% of particles that are 0.3 microns in diameter or larger.
- *Manifest*. The shipping document U.S. EPA Form 870022 and, if necessary, U.S. EPA Form 8700-22A.
- *Manifest Document Number*. The U.S. EPA twelve digit identification number assigned to the generator plus a unique five digit document number assigned to the manifest by the generator for recording and reporting purposes.
- *MSDS*. Material Safety Data Sheet.
- *OSHA*. Occupational Safety and Health Administration.
- *PEL*. Permissible Exposure Limit. The 29 CFR 1926.62 standard requires that the Contractor assure that no one on the project is exposed to lead at concentrations greater than 50 $\mu\text{g}/\text{m}^3$ averaged over an eight hour period.
- *PM 10*. Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 μm . PM 10 is determined from samples collected using high-volume air monitors. The analysis conducted according to 40 CFR 50, Appendix J.
- *RCRA*. Resource Conservation and Recovery Act.
- *Reportable Release of Lead*. A discharge of 10 pounds or more of lead into the atmosphere, water, or soil within a 24-hour period is considered a reportable release under 40 CFR 300 and 40 CFR 302 or CERCLA.
- *Representative Sample*. A sample that can be expected to exhibit the average properties of the collected debris.
- *SSPC*. Society for Protective Coatings, formerly Steel Structures Painting Council.

SSPC
 40 24th Street
 Pittsburgh, PA 15222-4643
 Telephone (412) 281-2331

- *SSPC Guide 6*. “Guide for Containing Debris Generated During Paint Removal Operations.” This guide describes methods of paint removal, containment systems and procedures for minimizing or preventing emissions from escaping the work area, and procedures for assessing the adequacy of the control over emissions. The following class definitions are from SSPC Guide 6 and are used in this specification:

SSPC Guide 6 Classes

<u>Class</u>	<u>Definition</u>
2A	For abrasive blast cleaning, Class 2A requires air impenetrable walls with rigid or flexible framing, fully sealed joints, partially sealed entryways, forced air flow (verified visually), and exhaust air filtration.
2W	For wet methods of preparation, Class 2W requires water impermeable walls and floors, rigid or flexible framing, fully sealed joints, overlapping entryways, and natural air flow.
2C	For chemical stripping, Class 2C requires water impermeable and chemical resistant walls and floors with rigid or flexible framing, fully sealed joints, overlapping entryways, and natural air flow.
3W	For wet methods of preparation, Class 3W requires water impermeable walls and floors, minimal framing, partially sealed joints, open seam entryways, and natural air flow.
3C	For chemical stripping, Class 3C requires water impermeable and chemical resistant walls and floors with minimal framing, partially sealed joints, open seam entryways, and natural air flow.
3P	For hand or power tool cleaning, Class 3P requires air penetrable walls with minimal framing, partially sealed joints, overlapping or open seam entryways, and natural air flow.
4A	For abrasive blast cleaning, Class 4A requires air penetrable walls with flexible framing, open seams and entryways, and natural air flow.

- *Subtitle C Landfill*. A landfill permitted according to Subtitle C of the Resource Conservation and Recovery Act for the disposal of hazardous waste.
- *Subtitle D Landfill*. A landfill permitted according to Subtitle D of the Resource Conservation and Recovery Act for the disposal of nonhazardous waste.
- *TCLP Test*. Toxicity Characteristic Leaching Procedure Test (EPA Method 1311 in SW 846, Test Methods for Evaluating Solid Wastes).
- *Treatment*. A process designed to change the physical, chemical, or biological characteristics or composition of any hazardous waste to neutralize or to render such waste nonhazardous.
- *WAP*. Waste Analysis Plan.

- *Waste Generator.* The Contractor and the Department are considered waste generators or co-generators when existing paint, which is classified as hazardous waste, is removed from the surfaces it covered. Under co-generator status, both parties remain permanently responsible for the waste and RCRA compliance.
- *Water Booms.* Water booms are long, narrow tubes (less than one foot in diameter) linked together to create a floating containment wall on water.

512.02. MATERIALS. Paint shall conform to the Section 730.

512.04. CONSTRUCTION METHODS.

(a) **General Requirements.**

1. *Contractor Qualifications.* When the contract documents specify SSPC-QP 2 certification, submit a current SSPC-QP 2 certificate showing qualifications to remove hazardous paints in accordance with SSPC-QP 2, “*Standard Procedure for Evaluating Qualifications of Contractors to Remove Hazardous Paint from Industrial Structures,*” for the applicable category. Submit SSPC certificates at the time of submission of the Proposal. Perform the work with personnel qualified under the applicable SSPC procedures. Perform the work according to these SSPC procedures, unless otherwise specified.

SSPC certifications will not be required for projects having only Category R paint applications (see Subsection 512.04(b)2 for paint category definitions).

2. *Protection of Public, Property, and Workers.*

- 2.1 *Work Plan.* At least 14 calendar days before beginning surface preparation, submit a written plan for approval that details the measures to be used for the protection of the environment, public, adjacent property, and the workers while doing the work. Make the plan available to state and federal agencies on request. Include the following in the work plan as applicable:
 - *MSDS.* Provide the material safety data sheets for the cleaning and painting products.
 - *Paint Removal Plan.* Describe the proposed methods and procedures for the removal of the existing paint and for the containment and the disposal of removed materials, cleaning products, and paint debris.
 - *Waste Management Plan.* Describe the types of waste generated by the cleaning and painting processes. Describe waste sampling and testing; collecting, handling, treating, and storing of wastes; transporting and disposing of wastes generated; documentation; and clearance testing after a project has been completed.
 - *Worker Protection Plan.* The proposed safety measures to be used to protect workers from site hazards, including protection from falls, fumes, fire, explosion, or other dangers. Use safety practices according to the SSPC-PA Guide No. 3, “*A Guide to Safety in Paint Application,*” and according to OSHA. Describe hygiene facilities; employee training; design, operation, and maintenance of

engineering controls; demarcation of hazardous material work areas; medical surveillance; and planned measures to reduce the hazardous material danger.

- *Environmental Compliance Plan.* Describe establishment of a regulated area; ensuring ambient air quality; ensuring soil quality; ensuring water/sediment quality; and reporting a release of hazardous materials into the environment.
- *Certification.* Provide a written certification stating that proposed methods of containment and disposal conform to all applicable federal, state, and local regulations, and the contract documents. Provide copies of all permits and approvals.

Do work according to the approved plan. When the measures fail to perform as intended, immediately stop work and take corrective actions.

2.2 *Protection Requirements for Cleaning Existing Steel Bridges.* Comply with the following requirements for projects involving cleaning of existing steel bridges.

- *Soil Testing.* Before cleaning structures having existing paint, test the soil at a minimum of four sites for the presence of lead. For bridges exceeding 1000 feet (300m) in length, add a test site for each 250 feet (76m) in excess of 1000 feet (300m). Locate two sites under the bridge and two sites from 10 feet (3m) to 100 feet (30m) away from the bridge. The Engineer will designate the location of additional test sites. At each test site, align a 12 inch (300mm) x 12 inch (300mm) template parallel to the structure. Within the template, take five 3/4-inch (20mm) diameter by 1/2-inch (12mm) deep soil samples, one at the center of the square and one at each corner. Combine the five soil plugs in a single bag to represent the sample at the given location. Split the sample into three equal parts. Supply the testing laboratory and the Engineer with two of the three parts. Retain one part of the split sample until the end of the project. At the completion of cleaning operations, return to the same locations and repeat the sampling and testing.

Test the samples for total lead content using EPA Method 3050, "Acid Digestion of Sediments, Sludges, and Soils". Provide the DEQ, Waste Management Division and the Engineer a copy of the soil test results. Notify the Engineer and the testing laboratory before sampling to allow inspection of the sampling process. Provide a chain of custody form for all soil test samples. Use a testing lab accredited by the DEQ. Provide cleanup of the soils if the geometric mean of the post-job soil test results is more than 100 ppm or two standard deviations (whichever is greater) higher than the geometric mean of the pre-job soil test results. The geometric mean is the n th root of the product n number of test results. Calculate standard deviation using pre-job test results. Cleanup is accordance with DEQ guidelines.

- *Airborne Emissions Monitoring.* During the paint removal process, provide air monitoring complying with SSPC Guide 6 methods specified in the following table.

Airborne Emissions Monitoring

Project Situation	Method(s) Required
Project located within 300 feet (100m) or two times the height of the bridge, whichever is greater, of inhabited buildings	Method A: Visible Emissions, Level 1 and Method B: Ambient Air Monitoring for PM-10
Projects involving hazardous materials.	Method A: Visible Emissions, Level 2
Projects involving nonhazardous materials.	Method A: Visible Emissions, Level 3

For Method A monitoring, the boundary of the emissions will be defined as the edge the containment system. Discontinue operations if emissions exceed the specified cumulative duration limits over an 8-hour period until the problem is corrected. For Method B monitoring, discontinue operations if emissions exceed $150 \mu\text{g}/\text{m}^3$ of PM 10 over a 24-hour period until the problem is corrected.

Provide, in the work plan, a detailed description of the monitoring methods, including testing frequency and data recording methods. Use a cleaning method or containment system that minimizes dust according to 40 CFR 50.6 and 40 CFR 50.12.

- *Containment Requirements.* During cleaning operations, contain all waste, hazardous and nonhazardous, solid or liquid, within the work area to prevent pollution of the environment. Prevent waste from reaching the ground or, if the project is over a lake or waterway, the water.

Design and implement a containment system for the work area complying with SSPC class 2A, 2W, 2C, or 3P for hazardous waste materials and SSPC class 4A, 3W, 3C, or 3P for nonhazardous waste materials. UNLESS OTHERWISE STATED IN THE CONTRACT DOCUMENTS, CONSIDER THE WASTE FROM CLEANING EXISTING PAINT TO BE HAZARDOUS. If the project is situated so that PM 10 air monitoring is required, use SSPC class 2 containment or better. For vacuum blasting and cleaning with power tools equipped with HEPA filters, comply with SSPC class 3P containment for hazardous waste.

For vacuum blasting, maintain continuous contact between the blasting head and the blast surface. If dust is visible from vacuum blasting, discontinue vacuum blasting until the problem is corrected. Equip cleaning power tools with HEPA filters. For vacuum blasting and power tool cleaning, use an equipment manufacturer representative at the start of work to ensure the equipment is being used correctly.

Obtain permission of the Engineer and the DEQ to use chemical stripping. Submit the MSDS for the chemical stripper to both agencies

When the projected wind area of the proposed enclosure exceeds 30% of the projected bridge superstructure area and the enclosure is attached to the bridge, submit structural analysis of the bridge performed by a professional engineer and shop drawings showing the enclosure/bridge attachment details. Determine wind areas on a span-by-span basis.

- *Reportable Release of Hazardous Materials.* When a reportable release of hazardous materials occurs, notify the Engineer and the DEQ. Provide testing and cleanup as directed by the DEQ.
- *Permits from Other Governmental Entities.* Obtain written approval of the DEQ, Waste Management Division, for all solid waste collection/containment, storage, treatment, and disposal methods. Obtain approval from the DEQ, Water Quality Division, for the treatment of all liquid waste. Provide copies of submissions and approvals to the Engineer.

If blast cleaning methods are to be used, obtain all required blast-cleaning permits. Notify the Engineer and state, county, and municipal air and water pollution agencies, including the DEQ, 10 days before commencement of cleaning operations.

- *Worker Safety and Health.* Refer to Subsections 107.07 and 107.12 of the Standard Specifications. Comply with 29 CFR 1926.62. Provide each worker on the project site with a copy of the publication "Working with Lead in the Construction Industry," OSHA 3126. Require each worker to become familiar with the publication contents. Submit to the Engineer blood lead level test results of each worker on the project site. Test blood lead levels before and after the entire deleading process. Additionally, establish a testing schedule to monitor blood lead levels during the project. Use an OSHA Certified Laboratory for all blood testing. Report blood lead levels over 40 µg/dl to the Epidemiology Service of the Oklahoma State Department of Health.

Supply each worker within the enclosure with personal air monitors to verify that worker exposure to lead paint dust within the permissible exposure limit (50 µg/m³).

- *Work Area Signs.* During surface cleaning where hazardous materials are involved, post signs in the work area that read as follows:

<p style="text-align: center;">WARNING Lead Work Area POISON From This Point On No Smoking or Eating Authorized Personnel Only</p>
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- *Waste Storage.* Store waste in closed containers (drums) that do not leak and comply with EPA requirements. Label the drums as shown in the following two examples. For waste from dust collectors, add the label "From Dust Collectors."

HAZARDOUS WASTE		
FEDERAL LAW PROHIBITS IMPROPER DISPOSAL		
IF FOUND, CONTACT THE NEAREST POLICE, OR PUBLIC SAFETY AUTHORITY, OR THE U. S. ENVIRONMENTAL PROTECTION AGENCY		
PROPER D.O.T.		
SHIPPING NAME _____	UM OR NA# _____	
GENERATOR INFORMATION:		
NAME _____		
ADDRESS _____		
CITY _____	STATE _____	ZIP _____
EPA	EPA	
ID NO. _____	WASTE NO. _____	
ACCUMULATION _____	MANIFEST _____	
START DATE _____	DOCUMENT NO. _____	
HANDLE WITH CARE!		
CONTAINS HAZARDOUS OR TOXIC WASTES		

WARNING	
CONTENTS - LEAD PAINT RESIDUE	
TARE WT. _____	_____
DATE COLLECTED _____	_____
LOCATION _____	_____
CONTAINER NO. _____	_____

Store waste drums on the project site, in a storage area secured by a chain link fence with a gate and lock. Lay down impermeable tarpaulin to protect drums from rusting and to facilitate any required cleanup. Place drums on pallets. Store drums no more than two drums deep or two drums high. Place the storage area within the right-of-way as approved by the Engineer and the DEQ, Waste Management Division. Do not place the storage area within a flood plain, drainage area, or where water may pond.

- *Waste Sampling and Testing.* Test waste in the same manner described in Subsection 512.04(b)1.6, *Soil Testing*, with the following exceptions. Conduct at least one TCLP test for every 4000 pounds (1800 kg) of collected debris, liquid or solid, and one TCLP test for every 1000 pounds (450kg) of debris taken from dust collectors. Provide a minimum of four tests. Take a representative sample containing portions from the top, middle, and bottom of each drum. Test for all hazardous elements as defined in Subsection 512.01.
- *Waste Treatment.* Submit a WAP and a “Nonhazardous Industrial Waste Form” to the Engineer and DEQ, Waste Management Division according to 40 CFR 268.7. Include with the WAP, the proposed location of the disposal site. Treat waste by either incineration or stabilization, as described below.

Waste Treatment

<u>Method</u>	<u>Treatment Procedure</u>
Incineration.	Incinerate all solid waste, hazardous or nonhazardous, in a lead blast furnace or recycle the nonhazardous blast debris as feedstock for cement kilns. Obtain approval of the treatment process in writing from the DEQ and provide a copy of the approval to the Engineer 10 days before treating.
Stabilization.	Stabilize hazardous waste. Also stabilize nonhazardous waste containing steel shot or grit. Unless another method is approved, combine waste with Portland cement and water to stabilize. Add sufficient amounts of cement and water to lower leachable hazardous element concentrations, as determined by TCLP testing, below the specified limits. Provide a minimum of four TCLP tests to characterize the treated waste as nonhazardous. Prevent dust from escaping and provide worker protection during the stabilization process. For waste containing steel shot or grit, conduct back-to-back TCLP tests and the Multiple Extraction Procedure (MEP), EPA Method 1320, to demonstrate the long-term stability of the stabilized waste, simulating 500 years in a landfill.

- *Transportation.* Transport the hazardous collected debris according to 40 CFR 263. Provide manifests to the Engineer for both hazardous and nonhazardous waste to verify that the handling, disposal, and notifications are done as specified and that the names of approved disposal facility and licensed transporter are included.
- *Disposal.* Dispose of waste at the permitted landfill, Subtitle C or D in 90 days as approved by the DEQ and the Engineer.

2.3 *Traffic Control.* When construction affects highway traffic by encroaching on traffic lanes, shoulders, or reducing sight distances, provide traffic control. Design and construct traffic control under Chapter VI of the Manual of Uniform Traffic Control Devices for Streets and Highways and the Oklahoma Department of Transportation Standards.

3. *Protection of the Work.* Provide protective devices such as tarps, screens, covers, etc. as necessary to prevent damage to the work. Prevent contamination of freshly painted surfaces by dust, oil, grease, or other harmful and deleterious material. Protect all parts of the work against disfigurement by spatters, splashes, and smirches of paint materials. Repair painted surfaces that are marred or damaged, at no additional cost to the Department, with materials and to a condition equal to that of the coating specified herein.

If traffic causes an objectionable amount of dust, sprinkle the adjacent roadbed and shoulders, when directed, with water or dust palliative for a sufficient distance on each side of the location where painting is being done.

Upon completion of all painting operations and of other work that would cause dust, grease, or other foreign materials to be deposited on the painted surfaces, thoroughly clean, without damaging, the painted surface of dust, grease, or other foreign materials.

4. *Color.* Furnish paint so each coat of paint will be a contrasting color to ensure complete coverage and such that the previous coat can be hidden by a single coat of the next application. If requested, provide appropriate color chips. Obtain approval of the color for the top coat before application.
 5. *Quality Control.* Establish quality control (QC) procedures to assure surface preparation and paint application is done according to these specifications, the contract documents and the paint manufacturer's guidelines. Submit the written QC procedures for approval with the work plan.
- (b) **Painting Steel Structures.** Clean all surfaces to be painted. Provide written notice at least one week before beginning field cleaning and painting operations.
1. *Surface Preparation.*
 - 1.1 *New steel or existing steel to be completely stripped of existing paint.*
Clean new steel or existing steel to be completely stripped of existing paint as follows.
Begin cleaning steel, new or existing, by removing gross contaminants by hand, broom, compressed air, or other approved methods.

For new steel, unless otherwise prohibited by the contract documents, use solvents to remove oil, grease, and other soluble contaminants from new steel according to SSPC-SP 1, Solvent Cleaning.

When the steam cleaning method of solvent cleaning is used, clean according to SSPC-SP 1 except:

- Do not steam clean more than 14 calendar days before performing other phases of cleaning.
- Use a biodegradable detergent in the feed water of the steam generator or apply the detergent directly to the surface to be cleaned.
- Use a detergent and steam cleaning apparatus that will remove all dirt, grease, loose chalky paint, or other foreign material from previously painted or galvanized surfaces.
- After cleaning and flushing, wait a minimum of 24 hours to apply paint.

For existing steel, begin cleaning by removing dirt and salt deposits. Wash with either a water spray, pressurized from 800 psi (5.5 MPa) to 1500 psi (10.4 MPa), or an approved chemical solution, applied according to the manufacturer's recommendations. Keep the nozzle within 12 inches (300mm) of the surface during washing. Do not wash if wet abrasive blasting is used or testing proves that chloride content is less than 50 $\mu\text{g}/\text{cm}^2$. Submit, to the DEQ, Water Quality Division, and the Engineer, the MSDS for any chemical solutions to be used as cleaning agents and obtain approval before using. Collect all water, paint chips, and solids used for washing or cleaning including solvents and store as hazardous waste unless the DEQ determines the waste is nonhazardous.

After the initial cleaning of new and existing steel, remove all remaining dirt, mill scale, rust, paint, and other foreign material from exposed surfaces according to SSPC-SP 10, Near-White Blast Cleaning. Obtain a written statement from the paint manufacturer approving the cleaning method, abrasive, and abrasive additives. Include a copy of the statement in the work plan, along with a description of the cleaning method. Blast-clean with clean dry sand, mineral grit, steel shot, or steel grit having a suitable gradation to produce a dense, uniform anchor pattern. Unless otherwise specified, produce an anchor profile height of 1 mil (25 μm) to 2 mils (50 μm), but not less than that recommended by the manufacturer's product data sheet for the paint system specified. Measure anchor profile height using the tape method according to ASTM D 4417. Check the anchor profile at least twice for each 8-hour shift. Increase frequency if needed. Do not apply primer before the anchor profile has been verified and is correct.

Provide compressed air (for abrasive blast-cleaning and roughening) that is free from oil or moisture and does not show black or wet spots when tested according to ASTM D 4285. When blast-cleaning near machinery, seal all bearings, journals, motors, and moving parts against entry of abrasive dust before beginning.

The same day cleaning is performed, remove dirt, dust, and other debris from the surface by brushing, blowing with clean dry air, or vacuuming and apply the first coat of paint to the blast-cleaned surfaces. If the cleaned surfaces rust or become contaminated before painting, repeat blast-cleaning.

- 1.2 *Preparing existing steel surfaces when sound existing paint is to remain.* Clean existing steel surfaces when sound existing paint is to remain as follows.

Prepare surface according to SSPC-SP 2, SP 3, SP 10 and SP 11, as described below to 2 inches (50mm) beyond damaged area. Feather edges of remaining old paint to achieve a reasonably smooth surface.

Use hand or power tool cleaning methods according to SSPC-SP 2 and SP 3 to remove dirt, loose mill scale, loose rust, or paint that is not firmly bonded to the underlying surfaces. In addition, clean small areas that show pinhole corrosion, stone damage from traffic, or minor scratches. Clean small areas of deteriorated topcoat (less than 10% rust) according to SSPC-SP 2 and 3. Also, remove rust and rust bubbles.

Use the SSPC SP 10 blast-cleaning methods described in the preceding subsection to remove all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter in areas showing severe deterioration (greater than 10% rust). Cleaning according to SSPC-SP 11, Power Tool Cleaning to Bare Metal, may also be done in these areas. Use SSPC SP 10 methods for new structural steel to be used in repair applications.

The same day cleaning is done, remove dirt, dust, and other contaminants from the surface with methods permitted by SSPC-SP 1 and spot paint with the first coat of paint all areas cleaned. If the cleaned surfaces rust before painting, repeat blast cleaning. If the cleaned surfaces are contaminated with foreign material, including any surface treatment, before painting, clean according to SSPC-SP 1.

- 1.3 *Abrasives and Pretreatments.* Use abrasives free of oil, moisture, hazardous substances, and corrosive constituents, such as, chlorides, sulfates, and salts. Use additives or coatings, such as, inhibitors and proprietary cementitious materials, according to the manufacturers instructions. Do not use abrasives with more than 1% "free" silica. In vacuum blasters, use No. 24 aluminum oxide grit or as approved by the Engineer.
2. *Paint Systems.* See Section 730 for paint system requirements. Unless otherwise specified in the contract documents, supply a paint system appropriate for the application. Applications are categorized as follows:

<i>Category</i>	<i>Application</i>	<i>Paint System</i>
N	New structure. Shop-applied primer. Field-applied intermediate and top coats.	IZ-E-U
E	Existing structure with all existing paint removed. All coats field-applied.	IZ-E-U or SC-MC-U
O	Existing structure with existing sound paint (Overcoating). All coats field-applied.	SC-MC-U
R	Repair of existing structure. All coats field-applied. Application area limited to repair area as specified.	SC-MC-U or an approved Performance Class 2 paint system

For Category O and R applications, verify the compatibility of the paint system with the existing system as follows:

- Apply the proposed system to the existing topcoat and to the existing primer. Observe for lifting, bleeding, blistering, wrinkling, cracking, flaking, or other evidence of incompatibility. Verify that no indication of incompatibility exists after at least 48 hours after the application of each product.
- Perform adhesion tests according to ASTM D 3359, Method A or ASTM D 4541. For ASTM D 3359, scale results 5A are acceptable. For ASTM D 4541, adhesion strengths exceeding the larger of 150 psi (1000 kPa) or the paint manufacturer's specified adhesion strength, are acceptable. Notify the Engineer immediately if adhesion testing fails at the interface of the existing system and substrate or between the existing top coat and primer.

Perform compatibility testing at least two weeks before ordering paint. Furnish a written certification and supporting test results verifying compatibility.

3. *Weather Conditions.* Unless otherwise specified by the manufacturer and approved by the Engineer, apply paint when the following conditions are met:

- The surface to be painted is thoroughly dry.
- The ambient air temperature and the surface temperature are between 40°F (5°C) and 100°F (38°C) .
- The surface temperature is 5°F (3°C) or more above the dew point.
- The humidity is 85% or less.
- Rain, fog, or ambient air temperature below 40°F (5°C) is not predicted during the drying period.

Do not paint when metal surfaces are hot enough to cause the paint to blister, to produce a porous film, or to cause the vehicle to separate from the pigment.

Suitable enclosures may be used to provide the conditions required above. Control the atmospheric conditions within the enclosure within limits suitable for painting throughout the painting operation and curing. The cost of providing and maintaining such an enclosure shall be considered as included in the prices bid for contract items involving painting and, therefore, no additional compensation will be allowed.

4. *Film Thickness.* Limit the thickness of each application to that which will result in uniform drying throughout the paint film. Verify the application rate of each coat with an approved wet film paint thickness gage, adjusted for volatile content, immediately after applying paint to the surface.

An example is as follows: If 3 mils (75µm) of dry thickness is needed and the volatile content of the paint is 50%, the wet film paint thickness gage must read at least 6 mils (150µm) immediately after application of the paint to achieve the desired dry coat thickness of 3 mils (75µm) .

Provide the dry film thickness of each coat and total thickness of the finished product according to the contract documents. Measure dry coating thickness after each application of paint according to SSPC-PA2, "*Measurement of Dry Paint Thickness with magnetic Gages.*"

5. *Application of paints.*

- 5.1 *General.* Mixing and application procedures shall conform to the product manufacturer's instruction data sheet. Mix paint with mechanical mixers. Before application, mix paint a sufficient length of time to blend the pigment and vehicle thoroughly. Continue the mixing during application. Do not thin paints formulated ready for application.

Paint in a neat and workmanlike manner that does not produce excessive paint buildup, runs, sags, skips and holidays, or thin areas in the paint film. Apply paint by brush, spray, roller, or any combination thereof as necessary for the paint being applied, unless otherwise specified.

Use brushes that have sufficient bristle body and length to spread the paint in a uniform film. Use round, oval shaped brushes, or flat brushes no wider than 4¹/₂ inches (115mm). Evenly spread and thoroughly brush out the paint as it is applied.

Use airless or conventional spray equipment with suitable traps, filters, or separators to exclude oil and water from the compressed air. Use rollers only on flat, even surfaces. Do not use rollers that leave a stippled texture in the paint film.

Paint surfaces that are inaccessible for painting by regular means, using sheepskin daubers, bottle brushes, or other acceptable methods. When spot painting, remove old paint that lifts after the first application by scraping. Repaint the area before the next application.

Cure each application of paint, and correct any skips, holidays, thin areas, or other deficiencies before the next application of paint. Tint succeeding applications of paint to contrast with the paint being covered.

Coat structures with the primer before erection. After erection and before applying the field coats, thoroughly clean all areas where coating has been damaged, has deteriorated, or where there are exposed unpainted surfaces, and spot coat with the primer to the specified thickness.

- 5.2 *Application of Zinc-Rich Primers.* Apply zinc-rich primers, which include inorganic and organic zinc primers, by spray methods. On areas inaccessible to spray application, the primer may be applied by brush or daubers.

Mix paint with mechanical mixers. After mixing, strain the primer through a metal 30-60 mesh screen or a double layer of cheesecloth immediately before or during pouring into the spray pot.

Use an agitating spray pot to apply the primer. The agitator or stirring rod shall reach to within 2 inches (50mm) of the bottom of the spray pot and shall be in motion at all times during primer application. Stir sufficiently to keep the primer well mixed.

Use spray equipment that provides the proper pot pressure and atomization pressure to produce a coating the composition of which shall comply in all respects to the specification for zinc paint. The hose from the pot to the nozzle shall not be more than 75 feet (23m) long, nor be used more than 15 feet (4.5m) above or below the pot.

Cured, zinc-rich primer shall be free from dust, dirt, salt, or other deleterious deposits and thoroughly dry before applying the intermediate coat.

Comply with the following additional requirements for *inorganic* zinc primers:

- Apply succeeding coats of inorganic zinc primer within 24 hours of the preceding application, but not earlier than 30 minutes after the preceding application.
 - In areas where mud-cracking occurs in the inorganic zinc primer, blast-clean these areas back to soundly bonded primer, and recoat to the same thickness by the same methods specified for the original coat.
 - Cure inorganic zinc primer for 48 hours at a relative humidity of at least 45 percent before applying intermediate coat. Before applying intermediate coat, wash the cured primer with water to remove any evidence of dust, dirt, salt, or other deleterious deposits if present, and to allow time to dry completely.
6. *Painting Galvanized Surfaces.* Clean and prepare the surface to be painted by washing with a mineral spirit solvent to remove all oil, grease, or other contaminants on the surface according to SSPC-SP 1. Apply the intermediate and final coats of the specified paint system.
 7. *Labeling.* Stencil the paint types (all coats), manufacturer name, contractor name, and date of completion inside the exterior girder on the southwest corner.

512.05. METHOD OF MEASUREMENT.

For new structural steel, include the cost of cleaning, painting and related work described in this section in the price bid for the appropriate structural steel pay items.

For existing steel structures, painting will be measured under the *painting existing structures* pay item by the lump sum unless otherwise specified in the contract documents. The painting pay item shall include the cost of painting and the painting related work. Cleaning, containment, stabilization, incineration, transportation and disposal of waste, sampling and testing of soil, air, and waste materials, permits and related items, other than painting, will be measured under the *collection and handling of waste* pay item as a lump sum unless otherwise specified in the contract documents.

512.06. BASIS OF PAYMENT.

The accepted quantities, measured as provided above, will be paid at the contract price per unit of measurement for the pay items listed below that are shown in the bid schedule. Payment will be full compensation for the work prescribed in this Section.

- (A) PAINTING EXISTING STRUCTURES LUMP SUM
- (B) COLLECTION AND HANDLING OF WASTE LUMP SUM