

**Section 715. CLEANING AND COATING EXISTING STRUCTURAL
STEEL**

715.01. Description. This work consists of cleaning and coating metal surfaces of existing steel structures, and containing, storing, and disposing of spent material. Spent material includes paint chips, abrasive particles, dust, and debris, resulting from cleaning operations. Metal surfaces of existing steel structures include downspouts, sign supports, and brackets; but do not include railings, chain link fencing, utility conduits, and associated brackets and hangers.

715.02. Materials. Provide materials in accordance with the following:

Epoxy Grout.....	<u>914</u>
Bridge Coating System.....	<u>915</u>

Use a Department-approved low dusting abrasive, steel grit or shot, or a combination of these, for blast cleaning. Select low dusting abrasive from the Qualified Products List.

Use a tie coat recommended by the coating manufacturer for galvanized surfaces.

715.03. Construction. Do not field coat from October 1 to May 1 in Superior and North Regions, or from October 15 to April 15 in the remaining regions unless otherwise approved by the Engineer. Comply with temperature restrictions specified in section 915.

Refer to SSPC *Steel Structures Painting Manual*, Volume 1 and Volume 2 for definitions of cleaning criteria and other coating terms.

Provide and erect scaffolding to allow inspection of steel before and after coating. Erect scaffolding to prevent damage to the structure and comply with MIOSHA rules.

Obtain the Engineer's approval for rubber rollers, or other protective devices used on scaffold fasteners. Do not use metal rollers, clamps, or other fasteners that may mar or damage the steel or coating.

A. Protection of Work and Environment During Cleaning Operations.

1. **Training Program.** Provide a documented training program covering the handling and storage of hazardous waste. Provide a copy of this program to the Engineer before beginning cleaning operations and keep a copy at the project.
2. **Worker Training.** Train every employee involved in cleaning the bridge (i.e., generating waste); or cleanup, handling, and storage of

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spent material. Provide training in the management of hazardous waste, as required by the Resource Conservation and Recovery Act 42 USC 6901 et. seq. and 40 CFR 265.16. Keep training records available at the project.

3. **Hazardous Waste Contingency Plan.** Develop a contingency plan for generating, handling, and storing hazardous waste in accordance with 40 CFR Part 265, Subpart C and Subpart D. Address containment and cleanup of accidental spills or releases to the environment. List an emergency coordinator and a telephone number to reach this person 24 hours a day, 7 days a week.

Submit a copy of the contingency plan to the Engineer and keep a copy at the project.

4. **Labeling of Spent Material Containers.** Provide and place the required labeling for hazardous waste storage containers. Label containers before using for hazardous waste storage, and list the date waste is first placed into each container. Make the labels visible without moving containers. The Engineer will provide the EPA generator number required by 1994 PA 451, Part 111, Hazardous Waste Management, and Rule R299.9306, (1), (b) and (c).
5. **Weekly Inspection Log.** If temporarily storing hazardous waste on the project, maintain an inspection log of the storage area and containers. Keep the log on-site and update weekly to document inspection and security of the storage area and containers in accordance with 40 CFR 265.174.
6. **On-Site Records.** Keep the following records on-site and available until blast cleaning is completed and spent material is removed from the job:
 - a. Hazardous waste training program,
 - b. Worker training records,
 - c. Hazardous waste contingency plan,
 - d. Weekly inspection log,
 - e. Waste characterization reports, and
 - f. Waste disposal manifests.

Keep the records near the hazardous waste storage area in a conspicuous location and make available for inspection and review.

The Contractor may place on-site records in a clearly marked, closed barrel, next to the stored hazardous waste.

7. **Storage in Gondolas, Roll-off Boxes, or Barrels.** Store spent material, hazardous or nonhazardous, at the bridge site, secured and protected from weather, accidental spills, or vandalism. Locate the storage containers on a gradually sloped, free draining area, not immediately next to a traffic lane, water course, or direct drainage ditch or structure. Do not place storage containers in standing water. The Engineer will review proposed storage areas before cleaning operations begin.

Keep waste containers closed and covered, except during addition or removal of spent material. Label each container as hazardous or nonhazardous material storage and include the accumulation start date, as required.

Follow the hazardous waste contingency plan and immediately clean up spent material that spills onto the ground while depositing into storage containers.

- a. **Gondolas or Roll-off Boxes.** Cover each gondola or roll-off box with a cover integral to the gondola or box and a continuous, water repellent tarpaulin. Use support ribs, or other means to prevent water from ponding on the tarpaulin.
 - b. **Barrels.** Seal barrels storing hazardous waste with bolt-locking rims. Elevate barrels on pallets and arrange in single or double rows, allowing access for inspection and viewing of the labels. Bind the rows of barrels together with rope, cable, or binding straps to prevent tipping over. Cover rows of barrels with waterproof tarpaulins, held in place in accordance with 40 CFR 264.175 (c) and 40 CFR 265, Subpart I; 1994 PA 451, Part 111, Hazardous Waste Management; and Rule R299.9306, (1), (e) and (f).
8. **Disposal of Spent Material.** Notify the Engineer of the intent to sample. Ensure that sampling is conducted by a SSPC Competent Person and is witnessed by the Engineer. Take separate samples of spent material collected and stored in waste containers, dust collected from bag house filters, and shower water. Prepare a chain of custody form for each sample. Ship samples, with their chain of custody forms, in a tamper proof container or bag sealed and witnessed by the Engineer, to a laboratory as approved by the Engineer for testing according to the Environmental Protection Agency, Toxicity Characteristic Leaching Procedure (TCLP).

Use test results to characterize the spent material, bag house dust, and shower water for disposal.

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Return the chain of custody form with the test results to the Engineer. The Engineer may sample and test spent material, bag house dust, and shower water during the project.

Dispose of spent material and bag house dust characterized as hazardous waste at a licensed hazardous waste disposal facility. Dispose of spent material and bag house dust characterized as nonhazardous waste at an approved Type II landfill in accordance with 1994 PA 451, Part 115, Solid Waste Management.

Dispose of shower water characterized as a hazardous waste at a licensed hazardous waste disposal facility. Dispose of shower water characterized as nonhazardous as a liquid industrial waste at an approved licensed liquid industrial waste disposal facility in accordance with 1994 PA 451, Part 121, Liquid Industrial Wastes.

Provide copies of waste manifests and disposal receipts to the Engineer.

Dispose of spent material within 90 days from the date spent material is first placed in the container.

The Department may remove and dispose of hazardous and nonhazardous waste and back-charge the Contractor for the work if the Contractor is untimely in removing waste in accordance with 40 CFR 262; 1994 PA 451, Part 111, Hazardous Waste Management, and Rule R299.9306.

B. Containment Requirements.

1. **General Requirements.** Clean bridges using total enclosure. Protect pedestrians, vehicular and other traffic on or under the structure, and workers in accordance with subsection 104.07.B. Include a barrier system that protects against the following:

- a. Direct, or indirect blasting of vehicles, water vessels, and pedestrians;
- b. Abrasive material and debris falling on the traveled portions of the pavement or into waterways; and
- c. Abrasive material and debris spreading into areas where it may create a traffic hazard.

The Contractor is responsible for damage to vehicles, persons, property, or the environment in accordance with subsection 107.07.

Provide total containment of portions of the bridge during cleaning and vacuuming. Contain spent material resulting from cleaning

operations. Use tarpaulins or other Department-approved material to enclose portions of the structure undergoing cleaning. Use tarpaulins made of an airtight material, and secure tightly and continuously at the seams. Do not use burlap or open web materials. Extend the enclosure from the bottom of the deck to ground level or to the level of a solid work platform, and fasten to prevent lifting or opening by the wind. Clamp seams and laps on tarpaulins or sheeting together along the length of the seams or laps to prevent material or dust from escaping the enclosed area.

Use metal halide lighting in the enclosure to illuminate active work surfaces to at least 50 foot-candles.

Design the required enclosure and provide air flow and dust filtering equipment for the design. The Engineer will evaluate the performance of the design on its ability to prevent the visible release of spent material and to provide ventilation to ensure worker safety.

Maintain negative pressure inside the enclosure to prevent spent material from leaving the enclosure during cleaning. Maintain air flow through the enclosure to provide visibility and a safe working environment for blasting operators. Provide limited air intake openings in the enclosure during the operation of air moving equipment. Filter air exhausted from the enclosure through a portable truck mounted filtering system or dust collectors. Clean filters or dust collectors before delivery to the project and before removal from the project. Obtain the required state and local air quality and noise ordinance permits for operating air-filtering equipment at the bridge site. Do not discharge dust from the filter exhaust, dust collectors, or vacuum truck.

Place ground cloths under the enclosed area and extend at least 10 feet beyond the enclosure edges, but not into open traffic lanes. Provide ground cloths with sealed seams or laps. Collect spent material that settles on ground cloths from work platforms and enclosures.

If protective devices do not serve the intended purpose, suspend work until corrected. If the Engineer determines threatening weather conditions may cause a release of spent material into the surrounding environment, the Engineer will shut down cleaning operations and require immediate clean up of spent material in the enclosure.

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Prevent the release of spent material from the tarpaulins and other components of the containment enclosure during relocation or removal. Mechanically clean or vacuum the dust contaminated portions before moving. Protect workers from exposure to lead-bearing dust during moving or removal work.

2. **Bridges Over Waterways.** For cleaning bridges over waterways, provide the following measures in addition to the requirements of subsection 715.03.B.1:
 - a. Provide a stable barge in the water directly under the area enclosed for cleaning. Size and secure the barge to provide freeboard and stability to preclude the possibility of capsizing or sinking. Evenly distribute equipment and material loads on the barge. Extend containment enclosures to the level of the barge and secure to prevent release of spent material into the waterway. Cover the surface of the barge with ground cloths to allow collection of spent material.
 - b. If impractical to use a barge, erect a temporary work platform under containment enclosures to collect spent material. Extend containment enclosures to the level of the temporary platform and secure to prevent release of spent material. Before installation, submit plans for the proposed work platform in writing, to the Engineer for review.
 - c. Stretch a floating boom across the waterway 200 feet from the bridge, on the downstream and down wind side of the bridge. Collect, store, and dispose of spent material that accumulates at the booms as specified for other waste generated by cleaning operations.
3. **Cleanup and Storage of Spent Material.** Clean spent material in the containment enclosure daily and before prolonged work stoppage. Clean ground cloths. Immediately clean spent material released outside the enclosure in accordance with the hazardous waste contingency plan.

Place spent material in storage containers.

C. **Cleaning Structures.** Shield and protect utility pipes and conduits not requiring cleaning and coating. Notify affected utility companies at least 48 hours before beginning blast cleaning operations. Shield or mask freshly coated surfaces, railings, galvanized fencing, appurtenances, and adjacent concrete, not requiring cleaning and coating. Wire brush coated surfaces damaged by blasting or, if visibly rusted, re-clean to a near-white or bare metal condition. Vacuum and re-prime wire brushed or blast cleaned surfaces.

Remove and dispose of loose concrete from the bottom of deck slabs, fascia, concrete diaphragms, and beam perimeters at dependent backwalls. If possible, remove concrete with hand-held, non-power tools.

Before cleaning, scrape surfaces to remove dirt or debris and remove oil or grease deposits in accordance with SSPC-SP 1, Solvent Cleaning. Clean surfaces to SSPC-SP 10, Near White Blast Cleaning or SSPC-SP 11 Power Tool Cleaning to Bare Metal. Grind fins, tears, slivers, and burred or sharp edges on steel members in accordance with SSPC-SP 11 bare metal finish.

The Contractor may use scaling hammers to remove heavy scale on existing structures, but not chipping hammers.

The Engineer will use the visual standard in accordance with SSPC-VIS 1, Guide and Reference Photographs for Steel Surfaces Prepared by Dry Abrasive Blast Cleaning, SSPC-SP 10, or SSPC-VIS 3, Guide and Reference Photographs for Steel Surfaces Prepared by Hand and Power Tool Cleaning, SSPC-SP 11 that corresponds to the initial rust condition, to determine steel cleanliness.

Provide a uniform blast profile from 1 mil to 2.8 mils, measured using extra coarse replica tape, except on A 588 structures. For A 588 structures, supply a non-blasted piece of A 588 steel at least 1 foot square and ¼ inch thick and clean it on the project, using the proposed cleaning procedures. Obtain the Engineer's approval for the resulting profile before continuing.

Remove abrasive and coating residue from steel surfaces with a commercial grade vacuum cleaner equipped with a brush-type cleaning tool, or by double blowing with partial vacuuming. If using the double blowing method, vacuum the top surfaces of structural steel, including flanges, longitudinal stiffeners, splice plates, and hangers after completing double blowing. Provide an air line for blowing steel clean with an inline water trap and air free of oil and water as it leaves the air line. Maintain the steel dust free and apply prime coat within 8 hours of cleaning.

D. Coating Structural Steel.

1. **Applying the Coating.** After the Engineer approves cleaned surfaces, spray apply the coatings using the manufacturer's recommended nozzles and pressures. Provide a dry film thickness of 4 mils to 10 mils for primer, 3.5 mils to 9 mils for intermediate, and at least 1 mil for the top coat. Vacuum accumulated dirt from primed

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surfaces before applying subsequent coats. If the Engineer determines the surface unfit for further coating, scrub the surface with a commercial detergent, rinse with water, and allow to dry for at least 24 hours before continuing.

Recoat areas with less than the required minimum primer dry film thickness. Use a magnetic film thickness gauge to measure the dry film thickness. Calibrate the gauge with plastic shims, the same thickness as the minimum dry film thickness, placed on a smooth section of newly cleaned steel.

Apply the intermediate and top coat to provide complete coverage with uniform color and appearance. If the dry film thickness exceeds the maximum, sand the areas to below the maximum thickness and clean before applying subsequent coats.

If coating applications result in runs, bubbles, or sags, apply coating using multiple passes of the spray gun, and allow several minutes between each pass.

Brush out runs and sags immediately, or remove and recoat the surface. Repair bubbles, pinholes, craters, and other defects by sanding the area and applying coating.

Protect wet coating against damage from dust and other deleterious material.

Remove all dry spray by sanding.

Correct coating the Engineer determines unsatisfactory and unauthorized.

Clean galvanized components, including nuts, bolts, and washers, to SSPC-SP 1 condition, provide a tie coat, and coat with intermediate and top coats. Apply tie coat to the thickness recommended by the manufacturer.

The Contractor may brush on the tie coat.

2. **Coating Faying Surfaces and Connections.** Faying surfaces consist of surfaces internal to a connection that bears on adjacent surfaces.

Coat new connections, and disassembled connections in existing structures. Apply prime coat the same way and to the same thickness as on the adjacent structural steel. Mask faying surfaces during subsequent coating operations.

Coat slip critical connections in accordance with section 716.

Perform final vacuuming of the connection immediately before reassembly. If vacuuming does not remove accumulated dust and dirt, or the Engineer determines the surface unfit for bolting, clean the surface. Scrub the surface with a mild detergent solution, rinse with water, and allow it to dry before assembling connections. After assembling the connection, blast clean and coat exposed areas of the connection. Clean and coat immediately after erection, or when blast cleaning and coating the remainder of the structure.

3. **Cure Times for Coatings.** Cure coatings for the minimum cure times specified in subsection 915.04.A. Follow the manufacturer's recommended maximum cure time, except do not allow more than 21 calendar days between coat applications. If the maximum time between coats is exceeded, blast clean newly coated surfaces and recoat at no additional cost to the Department.
4. **Protection of Work and Environment During Coating Operations.** Protect portions of the structure, including superstructure, substructure, slope protection, and highway appurtenances from spatter and overspray of coating material. Shield utility pipes and conduits not requiring coating.

Protect pedestrian, vehicular, water vessels, and other traffic in accordance with subsection 104.07.B.

If protective devices do not serve the intended purpose, the Engineer may suspend work until the Contractor makes corrections.

5. **Stenciling Requirement.** When coating is complete, stencil the structure number, completion date (month and year), and coating type onto the structure. On A 588 steel structures, stencil "A 588" just above the completion date. For partial painting projects, stencil the letter P before the coating type.

Use black urethane spray paint and 4-inch numbers for stenciling.

Stencil the numbers on the outside of each fascia beam at the approaching end of the structure. Place markings at least 10 feet above ground or fill slope elevations and at least 10 feet from abutments.

If not completely coating the fascia beam, stencil the designation on the outside of each fascia beam on the approaching traffic side, in the lower right corner of the newly painted section. Place markings completely within the partial coating limits, at least 3 inches above the bottom flange and with the stenciling ending within 3 inches of the right edge of the newly painted area.

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If these locations are inconsistent with the newly painted areas of the structure, the Engineer will designate the stencil location.

6. **Solvents.**

- a. **Solvent Reuse Determination Procedures.** Prepare a written Solvent Reuse Determination Procedure that complies with 1994 PA 451, Part 111, Hazardous Waste Management, and Rule R299.9202. Provide a copy of this procedure to the Engineer before performing field coating.

Include, in the Solvent Reuse Determination Procedures, at least the methods for determining if the solvent is reusable; applications for use of reusable solvent; and a statement of effectiveness of the reusable solvent in each application cited.

Include in the Solvent Reuse Determination Procedure documentation certification of agreement to:

- i. Maintain records regarding solvent reuse on a "Bridge Painting Solvent Tracking Log;"
 - ii. Handle the solvent in a manner consistent with the product status as either waste or reusable solvent;
 - iii. Reuse solvent within 1 year of the initial use; and
 - iv. Reclaim only solvent after reusing it.
- b. **General.** Determine during performance of the work and before leaving the bridge site, if solvents for cleaning and coating equipment are reusable or considered waste. Make the determination and document in accordance with Solvent Reuse Determination Procedures and the applicable federal, state, and local laws and regulations. Provide a copy of the written determination documentation to the Engineer before removing solvents from the project. Dispose of non-reusable waste solvent associated with the project.

Manage, label, contain, store, and ship solvent determined reusable in accordance with the applicable federal, state, and local laws and regulations. Provide certification (shipping paper) for reusable solvent transported from the bridge site. Manage, label, contain, store, ship, and dispose of solvent characterized as waste in accordance with the following:

- i. 1994 PA 451 Part 111, Hazardous Waste Management;
- ii. Subtitle C of the Federal Resource Conservation and Recovery Act of 1976, as amended (RCRA);
- iii. 1994 PA 451 Part 121, Liquid Industrial Waste; and

- iv. The administrative rules or regulations promulgated pursuant to these acts, and other applicable federal, state, and local laws and regulations.

E. Removal and Replacement of End Diaphragms. Before beginning the removal and replacement of end diaphragms, divert traffic on the bridge from the affected bay until shoring placement is complete. Place shoring to support the concrete deck during diaphragm removal. Disconnect each end diaphragm from connecting plates or angles by removing existing bolts or rivets.

Clean the diaphragm and portions of the structure inaccessible with the diaphragm in place. Apply the prime coat and allow to cure in accordance with the manufacturer's requirements for slip critical connections at 50 °F or higher. Mask faying surfaces and the top of the diaphragm top flange. Apply the intermediate coat.

After the intermediate coat is dry to the touch, coat the top of the diaphragm top flange with epoxy grout. Immediately bolt the diaphragm in place in accordance with subsection 707.03.D.7.

Clean the galvanized bolts to SSPC-SP 1 condition and apply a tie coat. Apply the tie coat in accordance with the manufacturer's recommended coating thickness. Coat bolts and missed areas with an intermediate coat.

Apply the top coat to the area, including behind the reinstalled diaphragms.

F. Cleaning, Coating and Installing New Hanger Assemblies. Select a coating system from the Qualified Products List meeting the required cure time. Use the same coating system for the joint area as for the remainder of the bridge.

If the dry film exceeds the maximum required thickness, sand to below the maximum thickness and clean before applying subsequent coats. If the maximum time between coats is exceeded, blast clean and recoat newly coated surfaces at no additional cost to the Department.

Modify girder end cleaning and coating procedures as follows for areas within 3 feet of each side of the centerline of the pin holes or the nearest stiffener.

1. Enclose joint areas in accordance with subsection 715.03.B except negative pressure in the containment is not required. The Contractor may remove containment during coating and curing if the temperature is at least 50 °F.

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2. Blast clean joint areas to a white metal finish, in accordance with SSPC-SP 5 White Metal Blast Cleaning(see SSPC-VIS 1 Visual Standards), with a surface profile of 1 mil to 2.8 mils.
3. Enclose and heat joint areas, as acceptable to the Engineer, to maintain steel and air temperatures at 50 °F or higher. If the ambient air temperature at least 50 °F during coating application and curing, enclosing the joint area is not required. If enclosure is required, apply three coats before removing the enclosure. Apply coating when the relative humidity is below 90 percent.
4. Spray on prime coat and cure at 50 °F or higher for at least 12 hours. Provide a dry film thickness of 4 mils to 6 mils.
5. Mask pin holes before applying the intermediate coat. Spray on the epoxy intermediate coat and allow it to cure at 50 °F or higher for at least 12 hours. Provide a dry film thickness of the intermediate coat between 3.5 mils and 6 mils.
6. After the intermediate coat cures for at least 1 hour and is dry to the touch, install the new pins and link plates. Continue curing the epoxy intermediate coat at 50 °F or higher for at least 12 hours.
7. Spray the urethane top coat over assembled joint areas when the temperature is at 40 °F or higher. Apply the final coat as soon as possible after the epoxy intermediate coat cures, but no later than 21 days. Coat the areas behind assembled link plates with urethane top coat to the extent possible. Provide complete coverage and a uniform appearance with the top coat application.
8. If cleaning and coating the remainder of the girder after the joint area, box in or cover the joint area including the new pins and link plates, before blast cleaning and prime coating girders. Remove the box or covering before top coating the girders.
9. If remainder of the girder is cleaned and coated before the joint area, prevent damage to the girder coating during the blast cleaning and coating of the 6-foot joint area. Protect painted girder as approved by the Engineer.

715.04. Measurement and Payment.

Pay Item	Pay Unit
Steel Structure, Cleaning, Type 4 (Structure No.).....	Lump Sum
Steel Structure, Cleaning, Partial, Type 4 (Structure No.).....	Lump Sum
Steel Structure, Coating Type 4 (Structure No.)	Lump Sum
Steel Structure, Coating, Partial, Type 4 (Structure No.).....	Lump Sum
End Diaphragm, Rem and Replace.....	Each
Protective Shield, Utility Pipe.....	Foot

A. **Steel Structure, Cleaning.** The unit prices for **Steel Structure, Cleaning, Type 4** and **Steel Structure, Cleaning, Partial, Type 4** include the cost of protecting the work and environment during blast cleaning, removing loose concrete, providing barges or temporary platforms, enclosures, handling, storage, testing, transporting, and disposal of spent material, bag house dust, and shower water, regardless of hazardous or nonhazardous. The Department will not make additional compensation for suspension of work by the Engineer.

B. **Protective Shield, Utility Pipe.** If pipes or conduits are clustered in groups of at least two, the Engineer will measure the length of the cluster. The unit price for **Protective Shield, Utility Pipe** includes the cost of shielding the utility pipe or conduit during blast cleaning and painting operations, or if required, cleaning and coating existing utility conduits, including brackets and hangers.

C. **End Diaphragm, Rem and Replace.** The unit price for **End Diaphragm, Rem and Replace** includes the cost of shoring the structure while the slab remains unsupported, providing galvanized high strength bolts, and providing and applying epoxy resin to the diaphragm flange.

The unit prices for **Steel Structure, Cleaning, Type 4** and **Steel Structure, Coating, Type 4**, or **Steel Structure, Cleaning, Partial, Type 4** and **Steel Structure, Coating, Partial, Type 4** include the cost of cleaning and prime coating diaphragms.

D. **Stenciling.** The cost of stenciling is included in the unit price for related structure cleaning and coating pay items.

E. **Steel Structure, Coating.** The unit prices for **Steel Structure, Coating, Type 4** and **Steel Structure, Coating, Partial, Type 4** include the cost of coating faying surfaces.

The unit prices for coating pay items include the cost of management, characterization, and disposal of waste solvent.