

**STATE OF OHIO
DEPARTMENT OF TRANSPORTATION
SUPPLEMENTAL SPECIFICATION 845
SHOP AND FIELD METALLIZING OF STRUCTURAL STEEL
April 20, 2018**

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845.01 Description. This work consists of furnishing all necessary labor, materials and equipment to clean, metallize and seal all structural steel surfaces in the fabrication shop, metallizing facility or in the field according to SSPC-CS23.00/AWS C2.3M/NACE No. 12 except as modified in this Supplemental Specification.

Qualifications of the Metallizer:

The Fabricator with metallizing equipment, Metallizing Facility, or the Field Metallizing Contractor, performing the work shall document previous experience in providing surface preparation for metallizing and metallizing application in the shop and or the field. Submit experience and qualification records of all personnel performing the metallizing work.

845.02 Materials. Supply metallizing wire conforming to ASTM B833 having the 99.99% Zinc – UNS (Z13005) composition. Supply, to the Engineer, certified test data and copies of mill shipping notices or invoices showing the diameter and quantity of wire being accepted.

For new steel, the Fabricator or Contractor has the option to galvanize, according to 711.02, bearings, cross frames, or diaphragms. The galvanized coating system may be applied by a galvanizer not pre-qualified as a fabrication shop under Supplement 1078,

but the pre-qualified fabricator of the structural steel shall be responsible for the quality of the applied galvanized coating system and any repairs, re-fabrication and additional assemblies required to assure the fabricated steel meets the plan requirements.

If the metallized surfaces are not specified to be painted, supply sealer that is UV resistant, VOC compliant for use in Ohio, clear aliphatic urethane material.

If the metallized surfaces are specified to be painted, per 514, provide Intermediate and Finish Coats conforming to 708.02.

845.03 Quality Control. Quality control consists of designating quality control specialists to control the quality of work in each phase established by Quality Control Points (QCPs). Control quality by inspection, tests, and cooperation with inspection and testing performed by the Engineer and inspector.

A. Quality Control Specialist. Identify the individuals dedicated to performing duties as the painting quality control specialists before starting work in the shop and in the field. Comply with the 514.04 Quality control specialist requirements with the following revisions:

1. Completion of the Bridge Painting prequalification course offered by the Department is not required.
2. An additional quality control failure is defined as two separate occurrences when the adhesion values have been approved by the quality control specialist of any one member type, such as the cross frames, webs, flanges, stiffeners, or other parts of the structure and it is later found that the surfaces of those members did not achieve the specified adhesion values. Occurrences are determined per structure.
3. In addition to the quality control specialist duties defined in 514, each quality control specialist shall witness and document the establishment of the **Job Site Standards** according to 845.11.

B. Quality Control Points (QCP). QCPs are points in time when one phase of the work is complete and approved by the quality control specialist and ready for inspection by the Engineer or the inspector before commencing the next phase of the work. At a QCP, the quality control specialist shall provide quality control tests bearing his signature to the Engineer or inspector. The Metallizer shall provide the Engineer and inspectors access to inspect all affected surfaces. If inspection identifies a deficiency, correct the deficiency according to the Contract Documents before starting the next phase of work. Discovery of defective work or material after a Quality Control Point is past or failure of the final product before final acceptance, shall not, in any way, prevent the Department from rejecting the final product or obligate the Department to final acceptance.

	Quality Control Points	Purpose
1	Job Site Standards	Establish visual and reference standards
2	Solvent Cleaning	Remove visible contamination.
3	Grinding Edges	Remove sharp corners and thermally hardened edges
4	Abrasive Blasting	Blast surfaces to receive metallizing
5	Remove Fins, Tears & Slivers	Remove surface defects, slivers and re-profile
6	Containment/Waste Disposal	Contain, collect, & dispose of abrasive blasting debris
7	Metallizing Coat Application	Check surface cleanliness, surface profile, apply metallized coating and check coating thickness
8	Adhesion Tests	Check adhesion of metallized coating
9	Sealer or Paint Application	Check surface cleanliness, dryness, apply coat of sealer or paint, check paint thickness

Provide signed documentation of inspection, testing, conditions and material information to the Engineer on the following ODOT forms, or forms with the equivalent information.

Dry Film Thickness Readings for QCP #7 Metallizing.....CA-S-2

QCS Inspection Documentation Sign Off for QCPs.....CA-S-7

QCS & Visual Standards Information for QCP#1 Job Site Standards.....CA-S-11

QCP#2 Solvent Cleaning & QCP #3 Grinding Flange Edges.....CA-S-12

QCP #4 Abrasive Blasting.....CA-S-13

QCP #5 Grinding Fins, Tears and SliversCA-S-16

QCP #6 Disposal of Hazardous/Non-Hazardous Waste.....CA-S-14

QCP #7 Metallizing Coat Application.....CA-S-15

QCP #8 Adhesion Tests.....CA-S-18

QCP #9 Sealer or Paint Coat Application.....CA-S-17

845.04 Testing Equipment. Comply with 514 for the Test Equipment requirements with the following additions:

Have present, with the work, the following equipment for the project duration

1. One (1), Type IV Self-Alignment Adhesion Tester per ASTM D4541.

2. ½” (12mm) diameter, at the minimum, adhesion dollies for the Type IV Adhesion Tester.
3. Two-component epoxy adhesive. The adhesive shall be capable of adhering ½” (12mm) diameter dollies at a minimum tensile strength of 500 psi [3.4 MPa] within 1 hour.

845.05 Work Limitations. Meet the substrate surface temperature and moisture conditions specified below.

A. Temperature. Metallize when the steel surface temperature is greater than or equal to 40°F (4°C).

Monitor the temperatures listed above using the recording thermometer.

The Metallizer may use a heated enclosure. Uniformly and continuously heat the enclosure to maintain the required minimum steel surface temperature during all blasting and metallizing operations.

If combustion type heating units are used, vent the units away from the enclosure and do not allow exhaust fumes to enter the enclosure. Do not use open combustion in the enclosure.

B. Moisture. Do not abrasively blast or metallize:

1. If the steel surface temperature is less than 5 °F (3 °C) above the dew point.
2. If the steel surface is wet, damp, frosted, or ice-coated.
3. If the relative humidity is 85% or greater.
4. During periods of rain, fog, or mist unless the above moisture criteria is met.

If steel was abrasive blasted when the temperature of the steel was less than 5 °F (3 °C) above the dew point, re-blast the steel when the steel temperature is at least 5 °F (3 °C) above the dew point.

C. Industrial Dehumidification. The Metallizer may use industrial dehumidification equipment within an enclosure.

845.06 Protection of Persons and Property. Comply with 514 for the Protection of Persons and Property requirements

845.07 Pollution Control. Comply with 514 for the Pollution Control requirements.

845.08 Safety Requirements and Precautions. Comply with 514 for the Safety Requirements and Precautions requirements with the additional warning.

The metallizing process exposes workers to the following potential health and safety hazards: electric shock; fine particulates dusts and fumes; exposure to high-intensity noise, ultraviolet, infrared and intense visible light radiation.

845.09 Inspection Access. Comply with 514 for the Inspection Access requirements.

845.10 Quality Control Point Photographic Verification and Documentation. Take sufficient number of photographs to document the condition of the work at Quality Control Points 1, 4, 6, 8 and 9.

845.11 Job Site Standards (QCP #1). The quality control specialist shall witness and document the establishment of **Job Site Standards** as specified in this section. Produce **Job Site Standards** in the presence of the Engineer or inspector. After the Engineer or inspector approves the specified **Job Site Standards** and the **Job Site Standards** are documented by replica tape, adhesion values and photographs, the Metallizer may start production work. The quality control specialists and Engineer or Inspector will use the **Job Site Standards** and the contract to inspect the work. In all cases of dispute, testing specified in 845.12, 845.13 and 845.14 shall govern. Perform the abrasive blast, adhesion, cut and bend tests as part of the **Job Site Standards** at the beginning of each shift of metallizing. If the Metallizer, Engineer or inspector believes the initial test section does not establish the proper **Job Site Standard** for a different structure another test section on the different structure may be performed.

A. Abrasive Blast Plate Standard. Supply an 18 x 18 x 1/4 inch [450 x 450 x 6 mm] steel plate and one 2 x 8 x 0.050 inch [50 x 200 x 1.6 mm] steel plate per each shift of metallizing of the same specification and grade as the steel being metallized.. Have the Metallizer grind the plate edges and abrasively blast both sides of the 18 x 18 x 1/4 inch [450 x 450 x 6 mm] plate and one side of the 2x 8 x 0.050 inch [50 x 200 x 1.6 mm] steel plate according to 845.12. Record profile depth per ASTM D4417, method B or C.

B. Metallized Plate Standards

- 1. Adhesion and Cut Tests:** Metallize one side of the 18 x 18 x 1/4 inch [450 x 450 x 6 mm] plate per 845.13. The other side is to remain in the blast cleaned condition. Supply a uniform surface texture that is free of lumps, dust, debris, inclusions and blisters. Record the coating thickness. Record the application temperature. Perform three adhesion tests on the coated side according to ASTM D-4541 and record the adhesion value. All three adhesion tests shall exceed a minimum value of 500 psi [3.4 MPa]. Perform a cut test on the coated side by placing the plate on a solid surface and hitting the test plate with a sharp 1.5 inch [38mm] wide mason's chisel impacted with a 3 pound [1.4 kg] drilling hammer. Cut the metallizing with the mason's chisel oriented at 60 degrees from the horizontal plane of the plate; strike the chisel with sufficient force to cut completely through the metallizing but minimize the damage to the base steel. Cut the metallizing in three locations 1/2 to 1 inch [13 to 25 mm] apart. The coating must adhere to the face of the test plate after cutting. No

delamination of the coating is permitted. No cracking of the coating is permitted. The cut test fails if any coating can be picked off with a knife blade. After the Engineer or Inspector and the Metallizer agree the plate was prepared to the requirements of the Contract Documents, The metallized side of the plate becomes the **Job Site Plate Standard**. A picture of the unmetallized side of the plate becomes the **Job Site Visual Standard**.

2. **Bend Tests:** Metallize the 2 x 8 x 0.050 inch [50 x 200 x 1.6 mm] steel plate according to 845.13. Record the application temperature. Record the coating thickness. Cold bend the coupon 180 degrees around a ½ inch [13 mm] diameter mandrel. The metallizing must be on the outside radius of the bent coupon. No delamination of the coating is permitted. Delamination is defined as a coating that can be picked off with a knife blade. Cracking of the coating is permitted, provided the coating adheres to the face of the coupon.

Proper spray equipment set up, calibration, and operating procedures shall be verified by passing a bend test on one 2 x 8 x 0.050 inch [50 x 200 x 1.6 mm] steel plate at the beginning of each work shift that metallizing is to be applied. Perform this bend test in accordance with this section.

845.12 Surface Preparation (QCP # 2, 3, 4, 5, and 6).

A. Solvent Cleaning (QCP #2). Solvent clean by methods described in SSPC-SP1 areas containing oils, greases, asphalt cement, diesel fuel deposits and other petroleum products that interfere with coating adhesion or reduce coating life.

B. Grinding Edges (QCP #3). Round all corners of thermally cut or sheared edges as necessary to achieve a 1/16 inch radius [1.6 mm] or equivalent flat surface at a 45 degree angle. Grind the sides of thermally cut material 1 ½ inch (40 mm) or thicker to remove the heat affected zone, as necessary, to achieve the specified surface cleaning. Perform this work as necessary to produce a metallized coating on edges and thermally cut surfaces capable of meeting the **Job Site Plate Standard** cut test according to 845.11. Perform the **Job Site Plate Standard** cut test on these surfaces if requested by the Engineer.

Remove slag, flux, deposits, weld splatter. Grind any resulting burrs smooth, including burrs around holes.

C. Abrasive Blasting (QCP #4). Abrasive blast all steel to be metallized according to SSPC-SP 10, near white metal finish, as shown on the pictorial surface preparation standards for painting steel surfaces SSPC-VIS 1. Maintain the steel to a SSPC-SP 10 blast cleaned condition until it is metallized.

Produce a sharp angular shaped profile with a minimum profile depth of 3 mils [75 µm] to 5 mils [125 µm] as determined according to ASTM D 4417, Method B or C. Provide a profile with a sharp angular shape that is visually comparable to the **Job Site Visual Standard**.

The quality control specialist shall control the abrasive blasting work as necessary to develop a metallized coating meeting: the adhesion test requirements of 845.14; the plate edges and areas that are not accessible to adhesion tests meeting the cut test requirements of 845.11.

The quality control specialist shall compare the production abrasive blasting cleanliness to the **Job Site Visual Standard**.

The quality control specialist shall take a profile reading at least every 200 square feet (9 m²) of blasted surface. Provide readings at random locations on flanges, webs, cross bracing stiffeners etc.

The quality control specialist shall check abrasives for oil content and water-soluble contamination according to 514.13.C. Check abrasives used at the job site at the beginning of each shift and at 4-hour intervals. Also check each load of abrasive delivered to the job site for contamination before use.

The quality control specialist shall check the compressor for oil contamination by blowing air from the nozzle for 30 seconds onto a white cloth or blotter held in a rigid frame. If the cloth or blotter retains oil or other contaminants, suspend abrasive blasting until retests verify the problem was corrected. Perform this test at the start of each shift and at 4-hour intervals

Use recyclable steel grit or a recyclable natural mineral, low dusting abrasive meeting the requirements of 514.13.C. Clean the abrasive of paint, chips, rust, mill scale, and other foreign material after each use and before each reuse. Use equipment specifically designed for cleaning the abrasive.

Do not abrasive blast areas that contain asphalt cement, oil, grease, or diesel fuel deposits. Before abrasive blasting, completely remove all dirt, sand, bird nests, bird droppings, and other debris from the scuppers, bulb angles, and pier and abutment seats.

Cover and protect surfaces not intended to be metallized, from damage caused by blasting operations. Repair adjacent coatings damaged during the blasting operation. Backwalls and bottoms of decks not sealed nor specified to be sealed do not need to be covered and protected.

The Metallizer may simultaneously abrasive blast and metallize the same bridge provided the abrasive blasting debris and dust does not contaminate surfaces to be metallized.

Remove abrasives and residue from all surfaces to be metallized. Keep all surfaces to be metallized dust free.

Metallize steel that was blast cleaned within the time specified by 845.13. If the steel is not metallized within the specified time, re-blast the steel before metallizing. Remove all dust or abrasives from adjacent work and from the metallized surfaces.

Provide the Engineer and Inspector with field wash facilities and adequate supply of running potable water, soap, and towels for washing face and hands during the surface preparation operation. Properly contain, test, and dispose of the wastewater. Locate a wash facility at each bridgesite or facility and in an area that will not be contaminated by the blasting debris.

D. Removing Fins, Tears, or Slivers (QCP #5). Remove all fins, tears, slivers and burred or sharp edges that appear after the blasting operation per ASTM A6 then re-blast to meet the requirements of QCP #4. Notify the Engineer should welding be required per ASTM A6. Perform weld repairs per 513 as directed by the Engineer.

E. Containment/Waste Disposal (QCP #6). Comply with 514.13.D for the Containment/Waste Disposal requirements.

845.13 Metallized Coat Application and Thickness (QCP #7).

A. General. Metallize all exposed structural steel surfaces of; scuppers; expansion joints except for the traveled surface; steel railing; exposed steel piling; drain troughs; and other areas to the contract limits.

B. Surface Cleanliness. Remove all abrasives and residue from all surfaces to be metallized.

Apply metallizing to surfaces meeting the cleanliness of the **Job Site Visual Standard** and the profile of the **unmetallized side of the Job Site Plate Standard**.

If the surface is degraded or contaminated, restore the surface to the specified surface cleanliness and profile before metallizing.

Apply metallizing to steel surfaces within 6 hours of the beginning of abrasive blasting. If the Metallizer elects to supply a heated and dehumidified enclosure according to 845.05(B), apply metallizing within 24 hours of the beginning of abrasive blasting.

C. Equipment and Techniques. Metallize using electric arc equipment operated in accordance with the manufacturer's latest written instructions and as demonstrated in 845.11 **Job Site Standards**. Flame spray equipment may be used on repair or limited access areas, if operated in accordance with the manufacturer's latest written instructions and demonstrated in 845.11 **Job Site Standards**. Preheating the starting area is required for flame spraying.

Apply metallizing in a manner that promotes uniform coverage and prevents discontinuity of the applied coating. Supply a uniform surface texture that is free of lumps, dust, debris, inclusions and blisters. Perform spraying in a block pattern, typically

two to three feet square [0.4 to 1.0 m²]. Overlap fifty percent (50%) on each pass to ensure uniform coverage. Obtain the required coating thickness in multiple layers. Do not exceed 4 mils in thickness in a single layer. Apply each layer at right angles to the previous layer. Control the spraying distance to the work to ensure the zinc is plastic upon impact. Immediately correct any defects. Do not perform startup and adjustment of thermal spray equipment on the surface being metallized.

D. Record Environmental Conditions. The quality control specialist shall record the ambient temperature, the steel temperature and the dew point no more than one (1) hour before application of the metallizing. Monitor environmental conditions every four (4) hours during the metallizing operation.

E. Holding Time. A flash coat of metallizing 2 to 4 mil [50 to 102 µm] thick may be applied within the required six hours to hold the surface condition for an additional four hours. Maximum holding time is four (4) hours provided the metallized coating can be maintained free of contamination. Do not exceed the maximum holding time between each successive 2 to 4 mil [50 to 102 µm] thick metallized coat.

F. Application Approval. The Engineer or Inspector may inspect the work any time. If the Engineer or Inspector discovers defects, production may be stopped. The Engineer may require additional testing as necessary to produce the thickness, adhesion or impact test results developed by the **Job Site Plate Standard**.

G. Record Coating Thickness. Determine the metallizing thickness using Type 2 magnetic gage, calibrated according to SSPC- PA 2, as follows:

The quality control specialist shall randomly select and then measure metallizing thickness at separate, evenly spaced, spot measurement locations over one 100-square feet (9 m²) of area within each 300 square foot (27 m²) unit of surface area of structural steel that is metallized. Locate five spot measurements on each of the following locations: top flanges; bottom flanges; webs; cross bracing; stiffeners; etc. At each spot location, take three gage thickness readings on the metallized surface. Move the probe 1 to 3 inches (25 to 75 mm) for each new gage reading. Discard an unusually high or low gage reading that is not consistently repeated. The spot thickness measurement is the average of the three gage readings.

The average of five spot measurements for each location in the 100-square foot (9 m²) area shall not be less than the specified thickness. No single spot measurement area shall be less than 80 percent of the specified minimum thickness nor greater than 24 mils. Any one of three readings which are averaged to produce each spot measurement may under run or overrun by a greater amount.

The above procedure is the minimum specified level of Metallizer performed quality control. The Metallizer must monitor his application to the extent necessary to assure that any random spot reading meets the thickness requirements specified above.

Metallizing shall have the following thickness:

Location	Min. Spec. Thickness	Min. Spot Thickness	Max Spec. Thickness	Max Spot Thickness
All Steel Surfaces	10.0 mils [254μm]	8.0 mils [203μm]	16.0 mils [406μm]	24.0 mils [610μm]

Test areas of metallizing that exceed the maximum spot thickness by adhesion testing. If the values meet the requirements of 845.14, the coating is acceptable. In an area where the adhesion test cannot be performed, cut test the coating according to 845.11

H. Metallizing System Identification. If the metallized surface is not to be painted, stencil the Completion Date (month and year) and the identification letters on the steel in 4-inch (100 mm) letters with black urethane paint. The identification letters are as follows:

System Comprised of:	Identification Letters
Metallizing	MTL-Zn

Date and identify the coating system at four locations near the end of each outside beam on the outside web visible from the road or as directed by the Engineer.

845.14 Metallized Coat –Adhesion Tests (QCP #8) The quality control specialist shall perform and document the results of adhesion tests in accordance with ASTM D 4541 at locations randomly selected by the Engineer in each 500-square feet (46 m²) area metallized or on companion coupons sprayed at the same time for each 500 ft² coated area, at the Engineer’s discretion. Perform the test in the presence of the Engineer. The minimum acceptable adhesion value is 500 psi [3.4 MPa]. Make repairs as per 845.17.

At the selected areas check the plate edges and areas that are not accessible for adhesion testing by performing at least three cut tests. If the cut tests for that area do not meet the requirements of 845.11, additional measurements will be taken to determine the extent of the deficient coatings.

The above procedure is the minimum specified level of Metallizer performed quality control. The Metallizer must monitor his application to the extent necessary to assure that any random spot reading meets the specified metallizing adhesion value.

845.15 Seal or Paint Application (QCP # 9). If the surface is degraded or contaminated, restore the surface to the specified surface cleanliness before applying the sealer or paint.

If moisture is present in the pores, of the metallized surface, heat the surface to 250°F to remove the moisture prior to seal or paint coat application.

Apply the sealer/paint to all previously metallized surfaces as soon as possible after thermal spraying. Do not allow the metallized surface to stand for longer than 8 hours before application of the seal or paint coat, unless the steel is specified to be metallized in the shop and painted in the field. In no cases shall the seal or paint coat be applied over visible oxidation of the metallizing.

If specified in the plans, apply a two coat paint system consisting of Epoxy Intermediate coat and a Urethane Finish coat meeting the requirements of CMS 708.02, paint according to 514.17 except as modified below.

For painting over galvanized surfaces, remove zinc high spots such as metal drip line and others that would detract from the paint appearance by Hand Tool Cleaning per SSPC-SP2 or Power Tool Cleaning per SSPC-SP3. Take care that the base galvanized coating is not removed. Check repaired areas for required coating thickness. Repair galvanized coatings damaged in the shop or field according to 711.02. After removing high spots, solvent clean the galvanized coating according to SSPC SP-1. After cleaning, abrasive blast the pieces according to SSPC-SP7 Brush-off Blast Cleaning. The blasting operation shall roughen the galvanized surface to an angular surface profile of 0.75 to 1.00 mills. Select the Blasting equipment, technique and abrasive material to provide for the specified surface profile without removal of excessive zinc layers. The final galvanized zinc milage shall not be less than 4.0 mils. Remove all abrasive residue with clean compressed air or other methods acceptable to the Department. Apply the epoxy coating within 24 hours of the brush-off blasting.

Apply the sealer/intermediate coat of paint in a two-coat operation, a mist coat and a full coat. Thin the mist coat up to the manufacturer's written maximum amount using the recommended thinner in order to penetrate the metallizing layer. Apply the full finish sealer/paint coat without thinning.

Apply the sealers to all metalized surfaces at the manufacturers recommended dry film thickness (mils).

If conventional spray is used, verify that the compressed air supply is clean and dry as determined by the blotter test. When spraying, use extreme care to avoid contamination of surrounding areas or property by overspray. Brushes or rollers may be used to control overspray, or for localized application such as touch-up, in areas of limited accessibility for spraying, or for stripe coating.

Do not apply the sealer/paint to faying surfaces prior to assembly. Mask faying surfaces of all bolted connections prior to the application of the seal/paint coat. Apply touch-up sealer/paint to the connections after assembly.

Apply sealer/paint in such a manner to assure that they are well-adherent to each other and to the underlying surface. If the application of any coat causes lifting of an underlying coat, or there is poor adhesion between coats or to the substrate, remove the coating in the affected area to adjacent sound, adherent, coating, and reapply the material. If sealer/paint adhesion is suspect, conduct adhesion tests in accordance with ASTM D4541 and 514.17.G as directed by the Engineer and repair all test areas

845.16 Final Acceptance. The Department will base Final Acceptance upon the results of the adhesion tests, cut tests and dry film thickness measurements obtained during the work. Supply a report, including the CA-S forms, that documents and contains the raw field data demonstrating compliance to all aspects of the specification. The Department will review this report, progressive project documentation and progressive field measurements to determine the final acceptability of the metallized coating.

845.17 Repair Procedures. Repair areas of metallizing that do not have acceptable adhesion or cut tests by removal and replacement.

Repair areas of metallizing that have low coating thickness, but have acceptable cut or adhesion tests, by brush blasting according to SSPC-SP 7 to establish the cleanliness of the **Job Site Visual Standard** and the profile of the **unmetallized side of the Job Site Plate Standard**. Then metallize according to 845.13. Control blasting to create the cleanliness and profile standards with minimal removal of acceptable metallizing.

Repair damage areas, including destructive test locations, of less than 1 square foot by using hand or power tools to establish the cleanliness of the **Job Site Visual Standard** and the profile of the **Job Site Plate Standard**. Then metallize according to 845.13.

Repair damage areas greater than 1 square foot by abrasive blasting according to 845.12 to establish the cleanliness of the **Job Site Visual Standard** and the profile of the **Job Site Plate Standard**. Then metallize according to 845.13

Overlap all repairs at least 2 inches (50 mm) into the accepted coating to provide a feathered-area overlay between the accepted metallized areas and the repair area. Metallize the feathered-area and the repair area, so that the repair, overlay and accepted areas are a uniform coating of the thickness specified in 845.13.

Coat areas inaccessible to metallizing such as behind snipes and non-connection holes with high zinc content products according to 711.02.

845.18 Method of Measurement. The Department will measure surface preparation and metallizing by the number of square feet (square meters) of structural steel metallized.

The Department will measure grinding fins, tears, or slivers by the number of man hours expended by the workers actually doing this work and will include the time when the workers are grinding and reprofiling, (i.e., the Department will include all hours of the workers when assigned to this work regardless of actual grinding time).

For rolled beam and girder bridges, the Department will determine the surface area by taking a nominal measurement of the beams, (i.e., two times the beam depth plus three times the flange width). In addition to this nominal measurement, the Department will add a percentage to account for incidentals such as cross frames, bearing assemblies, stiffeners, expansion joints, scuppers, etc. It is not necessary for the Engineer or Inspector to field measure every detail of the bridge to verify quantities. If there is a quantity dispute, exact field measurements of all metallized surfaces and calculations will govern over the above percentage to account for incidentals.

For extremely complex bridges, such as trusses, the Department will pay for surface preparation and metallizing on a lump sum basis.

845.19 Basis of Payment. The Department may consider Metallizing wire as eligible for payment for material on-hand as specified in 109.10, however, only wire that the Metallizer can prove to the Engineer will be used metallizing this structure is eligible for payment. The Metallizer shall provide the Engineer calculations indicating the total square feet (square meter) of steel to be coated. The Metallizer shall also provide calculations showing the total weight of wire (pounds) required.

Surface Preparation, Metallizing, sealing and painting performed in the shop is considered incidental to Item 513 Structural Steel Members Level.

Sealing of Metallized steel in the Field is considered incidental to Item 845 Field Metallizing of Existing Structural Steel.

If the Metallizer causes damage or injury to public or private property, the Department will not pay for restoring the property to its original condition.

The Department will also not pay for the following:

- A. Repairing adjacent coatings damaged during the blasting or metallizing operations.
- B. Repairing areas of coating because of low coating thickness, low adhesion values or failing cut tests.
- C. Additional testing required by any hauler, treatment facility, disposal facility or landfill.
- D. Accessing, inspecting, and repairing areas that are not found to be in conformance with the specifications and pertinent contract documents.

If welding is required for 845.12.D, the Department will pay for this welding repair as extra work according to 109.05.

All other requirements are considered incidental to the work.

The Department will pay for accepted quantities at the Contract prices as follows:

Item	Unit	Description
845	Square Foot (Square Meter), Lump Sum	Surface Preparation of Existing Structural Steel
845	Man Hour	Grinding, Fins, Tears, Slivers on Existing Structural Steel
845	Square Foot (Square Meter), Lump Sum	Field Metallizing of Existing Structural Steel

Designer Notes:

Include all pay items.

845.13 specifies metallizing to all structural steel; scuppers; expansion joints except for the traveled surface; steel railing; exposed steel piling; drain troughs; and other areas to the contract limits. Carefully review these areas that are to be metallized and show the limits of the contract work.

When estimating the quantity for Item 845 Surface Preparation of Existing Structural Steel calculate the area to be metallized according to 845.18

When estimating the quantity for Item 845, Grinding Fins, Tears, Slivers on Existing Structural Steel, provide 1 minute for each linear foot of beam/girder to be coated.

When estimating the quantity for Item 845 Field Metallizing of Existing Structural Steel, calculate the area to be metallized according to 845.18