SECTION 1081

COATING OF STRUCTURAL STEEL

1081.1 Scope. This specification covers coating new and existing bridges and structures made of structural steel and miscellanous metals.

1081.2 Systems of Coatings. The required system and color or choice of systems and color will be specified on the plans. Each coat of the specified system shall be applied to all structural steel, unless the contract specifically delineates otherwise. The system and color of coating to be shop-applied shall be shown on the shop drawings. All coatings shall comply with local VOC (Volatile Organic Compound) regulations where the paint is applied. The system and color shall not vary for any portion of the entire structure, including material for field repairs and shall be compatible products of a single manufacturer. The contractor shall coordinate the various items of work to ensure compliance with the requirements of this section. Approved material specifications and dry film thickness for the coating systems shall be as indicated in the following table:

Paint Systems for Structural Steel		
System G (High Solids, Inorganic Zinc Silicate-Epoxy-Polyurethane)		
Coating	**Section**	**Dry Film Thickness, mils (µm)**
Prime Coat	1045.3	3.0 (75) min.-6 (150) max.
Epoxy Intermediate Coat	1045.4	3.0 (75) min.-5 (125) max.
Polyurethane Finish Coat, Gray or Brown	1045.5	2.0 (50) min.-4 (100) max.
System H (High Solids, Inorganic Zinc Silicate-Waterborne Acrylic Intermediate-Waterborne Acrylic Finish)		
Coating	**Section**	**Dry Film Thickness, mils (µm)**
Prime Coat	1045.3	3.0 (75) min.-6 (150) max.
Waterborne Acrylic, Intermediate Coat	1045.6	2.0 (50) min.-4 (100) max.
Waterborne Acrylic, Finish Coat, Gray or Brown	1045.6	2.0 (50) min.-4 (100) max.
System I (High Solids, Inorganic Zinc Silicate-Polysiloxane)		
Coating	**Section**	**Dry Film Thickness, mils (µm)**
Prime Coat	**1045.3**	**3.0 (75) min. -6 (150) max**
Polysiloxane Finish Coat	**1045.7**	
Calcium Sulfonate System		
Coating	**Section**	**Dry Film Thickness, mils (µm)**
Calcium Sulfonate Rust Penetrating Sealer	1045.10.2	1.0 (25) min.
Calcium Sulfonate Primer	1045.10.3	4.0 (100) min.
Calcium Sulfonate Topcoat	1045.10.4	5.0 (125) min.
Aluminum & Gray Epoxy-Mastic Primer		
Coating	**Section**	**Dry Film Thickness mils (µm)**
Aluminum Epoxy-Mastic Primer	1045.8	5.0 (125) min.
Gray Epoxy-Mastic Primer	1045.9	5.0 (125) min

1081.3 Protective Coating of Structural Steel.

1081.3.1 Scope. This specification covers the preparation of previously uncoated structural steel surfaces, furnishing and applying specified coatings, protection and drying of coatings, furnishing protection from coating spatter and disfigurement, and final cleanup.

1081.3.2 Surface Preparation.

1081.3.2.1 Cleaning. Oil, grease and other contaminants shall be removed in accordance with procedures from Steel Structures Painting Council specification SSPC-SP1 prior to blast cleaning. Where high strength bolts are installed prior to blast cleaning or finish coat, the lubricant on high strength bolt assemblies shall also be removed in accordance with SSPC-SP1. Surfaces to be prime coated shall be blast cleaned with abrasives in accordance with SSPC-SP10, producing a height of profile 1.5 mils (38 µm) minimum and 3.0 mils (76 µm) maximum for all systems. The appearance of the final blast cleaned surface shall be in accordance with SSPC-Vis1, Photograph A SP-10, B SP-10, C SP-10, or D SP-10. Conformance with the corresponding SP-5 photographs will also be acceptable. The blast profile shall be assessed with replica tape per ASTM D 4417, Method C. The contractor shall make available to the engineer access to all SSPC specifications referenced for cleaning and coating operations.

1081.3.2.2 Preparation for Coating. After blast cleaning, all surfaces shall be cleaned to remove any trace of blast products, dust or dirt from the surface and from all pockets and corners. The blast-cleaned surfaces shall be given the specified prime coat as soon as practical, but within 24 hours after blast cleaning. If blast cleaned surfaces rust before coating is accomplished, the surface shall be reblasted by the contractor at the contractor's expense. All rusted, damaged or uncoated areas, including ungalvanized nuts, bolts and washers to be prime coated in the field, shall be blast cleaned to the same degree as specified above for the applicable coating system. Care shall be exercised to ensure the blasted steel remains free of grease and oil during handling.

1081.3.2.3 Recleaning. When there is contamination of any blast-cleaned surface to be coated, the material shall be recleaned to the requirements of SSPC-SP10.

1081.3.3 Limits of Coating Application. Unless otherwise indicated on the plans, the application of the intermediate and finish coats, hereinafter referred to as field coats, for Systems G,H and I shall be applied to the structure within the following limits.

1081.3.3.1 Bridges over Roadways. This section will not apply to bridges over railroads.

1081.3.3.1.1 The field intermediate coat for beam and girder spans shall be applied to the surfaces of all structural steel, except that areas of steel to be in contact with concrete shall not receive the intermediate coat. The intermediate coat shall also be applied to the bearings, except where bearings will be encased in concrete. The finish coating for beam and girder spans shall include the facia girder or beams. The limits of the facia girders or beams shall include the bottom of the top exterior flanges, top of the bottom exterior flanges, the exterior web area, the exterior face of the top and bottom flange and the bottom of the bottom flange. Areas of steel to be in contact with concrete shall not receive the finish coat. The finish coat shall also be applied to the exterior bearings, except where bearings will be encased in concrete.

1081.3.3.1.2 The surfaces of all structural steel located under expansion joints of beam and girder spans shall be field coated for a distance of 1 1/2 times the girder depth, but no less than 10 feet (3 m) from the centerline of the joint. Within this limit, the items to be field coated shall include all surfaces of beams, girders, bearings, diaphragms, stiffeners and miscellaneous

structural steel items. Areas of steel to be in contact with concrete shall not receive the field coats. The limits of the field coatings shall be masked to provide crisp, straight lines and to prevent overspray on adjacent areas.

1081.3.3.1.3 For all truss or steel box girder spans, the above limits will not apply and all structural steel for these span types shall be field coated, except the areas of steel to be in contact with concrete.

1081.3.3.2 Bridges Over Streams or Railroads.

1081.3.3.2.1 The field coating for beam and girder spans shall include the facia girders or beams. The limits of the facia girders or beams shall include the bottom of the top exterior flanges, top of bottom exterior flanges, the exterior web area, the exterior face of the top and bottom flange and the bottom of the bottom flange. Areas of steel to be in contact with concrete shall not receive the field coats. The field coatings shall also be applied to the exterior bearings, except where bearings will be encased in concrete. The interior beams or girders shall only have the prime coat applied with no other field coating required.

1081.3.3.2.2 The surfaces of all structural steel located under expansion joints of beam and girder spans shall be field coated for a distance of 1 1/2 times the girder depth, but no less than 10 feet (3 m) from the centerline of the joint. Within this limit, the items to be field coated shall include all surfaces of beams, girders, bearings, diaphragms, stiffeners and miscellaneous structural steel items. Areas of steel to be in contact with concrete shall not receive the field coats. The limits of the field coatings shall be masked to provide crisp, straight lines and to prevent overspray on adjacent areas.

1081.3.3.2.3 For all truss or steel box girder spans, the above limits will not apply and all structural steel for these span types shall be field coated, except the areas of steel to be in contact with concrete.

1081.3.4 Coating Thickness Measurement. The dry film thickness of the coatings will be measured by magnetic-type gauges in accordance with Steel Structures Painting Council, specification SSPC-PA2. At the option of the engineer, the adhesion of the prime coat will be measured in accordance with ASTM D 3359, Test Method A. When the adhesion is tested, each test result shall equal or exceed scale 3A. Locations for adhesion tests shall be randomly selected. Test locations shall be in areas of least visibility in the completed structure and shall be touched up in an approved manner after completion of the test. When satisfactory test results are not obtained, additional adhesion tests shall be taken to determine the area of insufficient adhesion. For these areas, the surface shall be prepared in accordance with Sec 1081.3.2.1 and the area recoated in accordance with these specifications. If additional prime coat is required to provide the specified minimum thickness, the prime coat shall be applied as soon as possible, but within 24 hours of the initial application.

1081.3.5 Coating Material Storage. All coating material shall be stored in accordance with the coating manufacturer’s recommendations. Exposure to storage temperatures outside the range recommended in the manufacturer's specifications will be considered cause for rejection of the coating material.

1081.3.6 Weather Conditions.

1081.3.6.1 Temperature Limitations. The prime coat shall be applied in accordance with the manufacturer’s recommendations, except that the minimum air and steel temperature shall be no less than 34 F (1 C). Finish and intermediate coats applied over the prime coat shall be applied in accordance with the manufacturer's recommendations, which shall be furnished to the engineer. The minimums and maximums or additional requirements established by the

coating manufacturer's written specifications for recommended air or metal temperature or relative humidity will apply if those requirements are more restrictive than those specified in the contract documents.

1081.3.6.2 Moisture Limitations. Coatings shall not be applied in rain, snow, fog or mist, or when the steel surface temperature is less than 5 F (3 C) above the dew point. The dew point shall be determined in accordance with MoDOT Test Method TM 38. Coatings shall not be applied to wet, damp, frosted or ice-coated surfaces.

1081.3.6.3 Application in Protected Areas. When coatings are applied in a protected area to eliminate the weather conditions, the coated steel shall remain in the protected area until the coatings are cured.

1081.3.6.4 Damaged Coatings. Any uncured coatings exposed to freezing, excess humidity, rain, snow, condensation or curing temperatures outside the range recommended by the manufacturer will be considered damaged. Damaged coatings shall be permitted to dry, then shall be removed and the surface blast cleaned and recoated at the contractor's expense.

1081.3.7 Thinning. Thinners will be permitted as recommended by the manufacturer's recommendations, provided VOC limits are not exceeded.

1081.3.8 Application. Coatings shall be applied in accordance with the Steel Structures Painting Council specification SSPC-PA1, unless otherwise specified by the product manufacturer. The manufacturer's written specifications for application, upon request, shall be submitted to the engineer for review prior to application.

1081.3.8.1 Application Repairs. If deficiencies in the quality of work or material result in rejection, the contractor shall submit a repair proposal for approval by the engineer.

1081.3.8.2 Curing of Coatings. Curing time for recoating shall be within the limits of the manufacturer's recommendations. Application of the finish coat over the intermediate coat shall be accomplished within the recoat time for proper adhesion established by the manufacturer's recommendations.

1081.3.9 Shop Coating. All surfaces of fabricated structural steel, including areas that will be inaccessible after assembly, contact surfaces of high strength bolted connections and all surfaces to be in contact with concrete in the completed structure shall be coated in the shop with the prime coat. The primer shall be of the type and thickness specified, except as modified by Secs 1081.3.9.1 and 1081.3.9.2. Structural steel sway bracing for the substructure may be prepared and coated in the field.

1081.3.9.1 Contact Surfaces. Contact surfaces of high strength bolted field splice and diaphragm connections shall be prime coated to produce a dry film thickness no less than 1.5 mils (40 µm) or more than 2.5 mils (65 µm). The limits of the coating thickness for these surfaces shall be shown on the shop drawings. The maximum limit of 2.5 mils (65 µm) may be increased provided acceptable test results in accordance with the Testing Method to Determine the Slip Coefficient for Coatings Used in Bolted Joints (AISC *Specification for Structural Joints Using ASTM A 325 or A 490 Bolts*, Appendix A) are submitted and approved by the engineer. Revised shop drawings will not be required upon acceptance of the test results. The tests shall meet the requirements for the slip coefficient and creep resistance for Class B coatings and shall be performed by a nationally recognized independent testing laboratory. Any change in the formulation of the coating will require retesting, except when thinned within the limits of manufacturer's recommendations. At the contractor's option, the contact surfaces of connections for all non-slab bearing diaphragms on non-curved girders

may be prime coated with a dry film thickness of no less than 3.0 mils (75 µm) or more than 6.0 mils (150 µm), unless noted otherwise on the plans.

1081.3.9.2 Inaccessible Surfaces. Surfaces that will not be in contact, but that will be inaccessible after assembly, shall be prime coated to produce a dry film thickness of no less than 3.0 mils (75 µm) and no more than 6.0 mils (150 µm). Dry film thickness on surfaces that will be in contact with concrete may be reduced to 2.0 mils (50 µm) provided thorough and complete coverage is obtained. Although shear connectors need not be coated, protection of the connectors from overspray when coating other parts of the beam or girder will not be necessary. Coating thickness measurements will not be made on shear connections.

1081.3.9.3 Touch-up of Galvanized Bolts. The galvanized coating of nuts, bolts and washers damaged during shop installation shall be shop repaired in accordance with Secs 1081.3.10.1 and 1081.3.10.1.1.

1081.3.9.4 Inspection Prior to Coating. No coatings shall be applied before shop inspection of fabrication has been completed. Surfaces of steel within 2 inches (50 mm) of edges to be field welded shall not be coated in the shop.

1081.3.9.5 Erection Match Marks. Erection match marks shall not be visible in the completed structure.

1081.3.10 Field Coating. Intermediate and finish coats for the specified coating system shall be applied in the field. The contractor shall be responsible for final cleanup and field touch-up of any shop applied coating, including surface preparation and coating of field connections, welds or bolts, areas masked in the shop and all damaged or defective coating and rusted areas. Surface preparation for field touch-ups shall be performed in accordance with Sec 1081.3.2, unless otherwise approved by the engineer. The touch-up field coat shall consist of the same coating used for the shop-applied coat. Contact surfaces of high strength bolted connections shall be protected from the intermediate and finish coats. Damage to the coating of galvanized bolts, nuts and washers where bare steel is exposed shall be repaired in accordance with these specifications or, the connection may be prepared as specified in Sec 1081.3.2, followed by a touch-up field coat application of the required coating system.

1081.3.10.1 Field Touch-up of Galvanized Bolts. The galvanized coating of nuts, bolts and washers damaged during installation shall be repaired. Lubricants shall be removed in accordance with SSPC-SP1. Rust shall be removed in accordance with SSPC-SP-2 or SSPC-SP-3. Touch-ups shall consist of the application of an approved gray epoxy mastic. The touch-up material shall be compatible with and from the same manufacturer as the coating system to be used for the structure. Prior to field coating operations, the contractor shall submit information on the specific products to be used, including compatibility data and applicable recoating times, to the engineer for review. Subsequent coatings shall be applied within the recoat time recommended by the manufacturer.

1081.3.10.1.1 Touch-up Color. For areas of the structure that will not receive a field coat, the color of the touch-up material for bolts specified in Sec 1081.3.10.1 shall be similar to galvanized metal.

1081.3.10.1.2 Previously Repaired Material. If repairs to the galvanized coating of shop-installed nuts, bolts and washers have previously been performed in accordance with Sec 1081.3.9.3 or if epoxy mastics are otherwise shop-applied to structural steel, the contractor shall be responsible for any special field preparation required for proper adhesion of subsequent field coats to the epoxy coating. Prior to field coating operations, the contractor shall submit the manufacturer's recommendations to the engineer.

1081.3.10.1.3 Masking. Previously coated or adjacent areas shall be masked or otherwise protected from material used to touch-up the galvanized coating of fasteners.

1081.3.10.2 Sequence of Work. Field coatings, except for touch-up and coating of inaccessible surfaces, shall not be applied until the concrete deck has been placed, the forms removed and all concrete spatter, foreign material and contaminants are removed from existing coatings, unless otherwise approved by the engineer. Prior to submittal of alternative application methods, the contractor shall present methods to be used to prevent damage to the intermediate and final field coatings. The sequence of work shall be arranged to provide ample time for each coat to cure before the next coat is applied. The intermediate field coats shall be free of all oil, grease, dust or dirt prior to application of the next coat. Intermediate or prime coats that have been exposed to chlorides used in snow removal operations shall be cleaned by power washing as defined in Sec 1081.5.3.2.2 prior to application of the subsequent intermediate or final coats. In no case shall a coat be applied until the previous coat has been approved by the engineer. Excessive rust streaks or coatings on concrete masonry shall be removed by sandblasting or by other approved methods without damage to the masonry.

1081.3.10.3 Work Under Stage Construction Contracts. If complete field coating is not included in the contract for erection of structural steel, the touch-up coating of newly erected work and the coating of surfaces that will be inaccessible after erection shall be included as part of the work to be performed under the contract for erection. Field coating under any contract that does not include the erection shall include cleaning, preparation of any previously applied coatings, repairs and spot application of coatings required at the time the work is performed. Prior to field coating structural steel that was erected under a previous contract, the contractor shall submit the manufacturer's recommendations to the engineer, outlining requirements for cleaning and preparation of all existing coatings. The manufacturer’s recommendations shall include requirements for preparation of epoxy mastics previously applied for touch-up or other purposes.

1081.3.10.4 Partial Applications. If partial application of the field finish coats to a structure as provided in Sec 1081.3.3 is required or permitted, the contractor shall perform field touch-up coating to areas of the structural steel outside the limits to receive the intermediate and finish coats. Touch-up shall be in accordance with in Sec 1081.3.10 and at the contractor’s expense.

1081.3.11 Identification. The contractor shall, at the completion of the coating application, stencil in black paint on the structure the number of the bridge, the word "COATED", the system used and the month and year the coating was completed. The letters shall be capitals approximately 3 inches (75 mm) high. The legend shall be stenciled on the outside face of an outside stringer or girder near each end of the bridge as directed by the engineer.

1081.3.12 Property and Traffic Protection. The contractor shall protect pedestrian, vehicular, railroad and other traffic, persons and property, upon, beneath and in the vicinity of the structure and all portions of the bridge against damage or disfigurement by blast media, blast residue, coatings, coating material, equipment or by any other operations.

1081.4 Recoating of Structural Steel (System G , H or I).

1081.4.1 Scope. This specification covers the field preparation of structural steel surfaces to be recoated, furnishing and applying specified coatings, protection and drying of coatings, furnishing protection from coating spatter and disfigurement, and final cleanup.

1081.4.2 Systems of Protective Coatings. All structural steel shall be recoated by the contractor in the field using one of the complete systems, including prime coats, in accordance

with Sec 1081.2, unless noted otherwise. Recoating of structural steel, including surface preparation, weather conditions, application, touch-up and protection, shall be in accordance with all requirements of Sec 1081.3.

1081.4.3 Surface Preparation. Cleaning and coating of structural steel shall proceed in areas or sections as approved by the engineer, usually consisting of one or more complete spans. The cleaning and application of the coatings for each specified section shall be entirely completed and accepted by the engineer prior to proceeding with additional cleaning or coating. Surface preparation shall be in accordance with Sec 1081.3.2. All existing coatings and paint shall be removed by blast cleaning unless specifically indicated otherwise in the contract.

1081.4.3.1 Approved Blast Media. Approved blast media materials, such as silica sand and steel abrasive, shall be used to remove lead and non-lead paint. This approved blast media can be sent to a lead smelter for recycling and is not considered a solid or hazardous waste in accordance with 40 CFR 261.2(e)(1)(ii). The use of other blast media shall be approved in writing by the receiving lead smelter prior to use to determine if the smelter can recycle the blast media. A copy of the smelter approval letter shall be submitted to the engineer and to the Environmental Section in Design Division. Only blast media approved by the receiving lead smelter will be permitted. Surface preparation areas cleaned with unapproved blast media shall be at the contractor's expense. The collected residue shall consist of media no larger than one inch (25 mm) and removed paint chips.

1081.4.3.2 Environmental Regulations. The paint removal operation shall comply with all local, state and federal regulations, including but not limited to, the EPA, OSHA Standards 29 CFR 1910 and 1926.62, and the Missouri Code of State Regulations, including 10 CSR 10 Air Conservation Commission, 10 CSR 20 Clean Water Commission, 10 CSR 25 Hazardous Waste Commission, and 10 CSR 80 Solid Waste Management. The contractor shall have all necessary licenses and certifications as required by the Missouri Department of Health including necessary licenses and certification for lead abatement/removal workers prior to commencement of the cleaning operation. If hazardous waste will be generated at the site, the contractor shall notify the engineer and Environmental Section in Design Division and comply with all applicable hazardous waste generator requirements.

1081.4.3.3 Collection of Blast Residue. The contractor shall collect the lead contaminated or non-lead blast residue from the cleaning operations for recycling or disposal. Blast residue shall be managed as a recyclable material or hazardous waste. Container management shall be in accordance with Sec 1081.4.3.3.2. Analytical testing required for the disposal of blast residues shall be the responsibility of the contractor.

1081.4.3.3.1 Hazardous Waste Notification. The contractor shall request the Environmental Section in Design Division to obtain an EPA identification number and inform the engineer that the request has been made. The Environmental Section in Design Division will submit a "Notification of Regulated Waste Activity" form to MDNR Hazardous Waste Program to obtain the EPA identification number. Requests shall be submitted as soon as hazardous waste is determined or at least 30 days prior to shipping hazardous waste. The cost of obtaining the EPA identification number will be considered as part of the surface preparation cost and the engineer will subtract the cost from the contract. Hazardous waste will not be permitted to be shipped offsite until the EPA identification number has been received. The Environmental Section in Design Division will file the quarterly and annual hazardous waste reports in accordance with 10 CSR 25-5.262(2)(D)1 and will deactivate the EPA identification number when the project is finished.

1081.4.3.3.2 Container Management.

1081.4.3.3.2.1 The blast residue from cleaning operations shall be stored in contractor furnished, watertight 55-gallon steel drum containers stacked on wooden pallets with labels facing outward. The containers shall be free of structural defects and all other materials including but not limited to construction debris, solvents, flammables, aluminum, magnesium, aerosol cans, rags and any ferrous or non-ferrous metals larger than one cubic inch (16.4 cm^3). The containers shall have removable lids complete with a bolt ring, bolt and nut. Containers shall remain closed at all times, except when necessary to add blast residue. Material other than the blast residue from the cleaning operations shall not be placed in the containers. At the end of each day's work, the containers shall be stored outside the 100-year floodplain in a secure area as approved by the engineer. Containers of approved blast residue destined for recycling, shall be marked with a "Blast Residue" label provided by the engineer or Environmental Section in Design Division and marked with the following information:

(a) Blast Residue.

(b) Marked with one of the following:

(1) Contains Heavy Metals/Lead Compounds.

(2) Contains Non-Lead Compounds.

(c) Generator: MoDOT.

(d) Bridge Site Number.

(e) Date Container was Filled.

1081.4.3.3.2.2 Containers of hazardous waste, such as unapproved blast media, shall be packaged, marked and labeled according to hazardous waste regulations 10 CSR 25-5.262(2)(C)1. Containers of hazardous waste shall be stored separate from containers of non-hazardous waste and approved blast media destined for recycling. The contractor shall maintain an inventory of the quantity of the containers stored at the site and the quantity delivered to an approved facility. All containers shall be delivered to the approved facility within 30 days upon completion of the surface preparation. Copies of container inventories, all test results, shipping papers, hazardous waste manifest signed by the receiving facility, solid waste disposal request, recycling certificates and any other disposal documentation shall be submitted to the engineer with a copy to the Environmental Section in Design Division within 30 days upon delivery to the approved facility.

1081.4.3.3.3 Shipment of Residue. Approved blast media residue containing heavy metals/lead or non-lead residue shall be shipped with a bill of lading to a lead smelter for recycling. Heavy metal/lead contaminated residue determined to be a hazardous waste shall be transported by a Missouri licensed hazardous waste transporter with a hazardous waste manifest and land ban forms, if required, to an approved lead smelter or approved hazardous waste treatment, storage and disposal facility. The contractor shall obtain appropriate shipping papers (bill of lading), hazardous waste manifest forms and land ban forms, if required, from the engineer or Environmental Section in Design Division. These shipping forms shall be completed prior to shipment. The lead smelter or approved hazardous waste treatment, storage and disposal facility will reject any shipment received without the proper shipping paper or hazardous waste manifest. The contractor shall notify the receiving facility at least 2 days prior to shipment to ensure the receiving facility will be able to accept the load.

1081.4.3.3.4 Personal Protective Equipment. Clothing, tarps, hoses and other cleaning material containing lead and lead blast residue shall be managed as a hazardous waste unless determined non-hazardous. Personal protective equipment being disposed, such as tyvek suits, respirator cartridges, boots, etc. but not tarps, shall be placed into 55-gallon steel drums. Spent tarps shall be placed into DOT approved cardboard boxes and stacked on wooden pallets. Container management shall be in accordance with Sec 1081.4.3.3.2.

1081.4.3.3.5 Invoices and Payment. The contractor shall dispose of all lead and non-lead based residue and personal protective equipment in accordance with all Federal and State regulations at the approved lead smelter or hazardous waste treatment, storage and disposal facility. Transporting and disposal cost shall be the contractor's responsibility. A copy of the disposal manifest and paid receipt shall be given to the engineer. Failure to provide proper documentation will result in withholding payment. For more information concerning management of blast residue, approved lead smelters or approved hazardous waste treatment, storage and disposal facilities, contact the Environmental Section in Design Division.

1081.4.4 Joints. All seams and joints that cannot be satisfactorily sealed or coated shall be adequately caulked with compounds compatible with the coating system being applied. Caulking material shall be in accordance with the coating manufacturer's recommendations and shall meet the approval of the engineer. Caulking shall be satisfactorily completed for an entire joint or seam after application of the prime coat and before application of any specified finish or intermediate coats.

1081.4.5 Identification. At the completion of recoating, the contractor shall stencil in black paint on the structure the number of the bridge, the word "RECOATED", the system used and the month and year the coating was completed. The letters shall be capitals approximately 3 inches (75 mm) high. The legend shall be stenciled on the outside face of an outside stringer or girder near each end of the bridge as directed by the engineer.

1081.4.6 Property and Traffic Protection. The contractor shall provide protection in accordance with Sec 1081.3.12.

1081.5 Overcoating of Structural Steel (Calcium Sulfonate System).

1081.5.1 Scope. This specification covers the field preparation of structural steel surfaces to be recoated, disposal of paint residues and power washing water, furnishing and applying the specified coatings, protection and drying of the coatings, furnishing protection from coating spatter or disfigurement and final cleanup.

1081.5.2 System of Protective Coatings. All exposed and accessible surfaces of structural steel and steel bearings shall be coated with the Calcium Sulfonate paint system in accordance with Sec. 1081.2 unless otherwise noted. The color of the topcoat shall be as shown on the plans. Recoating the structural steel shall be in accordance with all requirements of Sec 1081.3.

1081.5.3 Surface Preparation. Surface preparation shall be in accordance with Sec 1081.4.3, except that blast cleaning will not be required.

1081.5.3.1 Removal of Existing Paint. The existing steel shall be cleaned by approved methods in accordance with Sec 1081.5.3.2.

1081.5.3.1.1 Environmental Regulations. The paint removal operation shall be in accordance with all local, state and federal regulations, including those defined in Sec 1081.4.3.2.

1081.5.3.1.2 Water for Power Washing. The water used for power washing shall be clean, potable water, free from contaminants. Non-hazardous wastewater shall be collected and disposed of in accordance with all applicable state, local and federal clean water regulations. Wastewater determined to be hazardous waste in accordance with Sec 1081.5.3.1.3 shall be collected and disposed of in accordance with Sec 1081.5.3.1.3. The wastewater shall not be discharged onto the ground or into waters of the state without a permit. Water collected from the power washing operation shall not be reused in the power washing operation.

1081.5.3.1.3 Collection of Residue. Collection of lead or non-lead based residue shall be in accordance with Sec 1081.4.3.3 with the addition of the following requirements. The containers shall remain closed at all times, except when necessary to add additional residue or wastewater. Material other than the residue or wastewater from the cleaning operations shall not be placed in the containers. Wastewater collected during cleaning operations shall be tested in accordance with 40 CFR 261.24. Wastewater that test results indicate is a hazardous waste as determined by 40 CFR 261.24 shall be handled as hazardous waste in accordance with the 10 CSR 25. The contractor shall keep an inventory of the quantity of heavy metal contaminated wastewater generated and delivered to the storage site and the quantity of heavy metal contaminated wastewater that has been disposed. Wastewater that has been tested and determined to be non-hazardous shall be handled in accordance with Sec 1081.5.3.1.2. Any remaining hazardous or non-hazardous residues shall be disposed of in accordance with Sec 1081.4.3.3. Any testing required for the disposal of the wastewater or residues shall be the responsibility of the contractor. Copies of the inventory, all testing data, required certifications and shipping manifests shall be provided to the engineer and to the Environmental Section in Design Division in accordance with Sec 1081.4.3.3.2.2.

1081.5.3.1.4 Testing of Water Samples. At the conclusion of the power washing operation, the contractor shall obtain samples of the wastewater in the presence of the engineer. The samples shall be analyzed by an independent testing laboratory for total metals, oil and grease, biochemical oxygen demand, total suspended solids, pH and Toxicity Characteristic Leaching Procedure (TCLP) heavy metals. Samples shall be collected and analyzed in accordance with EPA approved methods. Copies of all test reports shall be supplied to the engineer and the Environmental Section in Design Division. Additional testing required to comply with any federal, state or local regulations shall be provided by the contractor.

1081.5.3.2 Cleaning of Structural Steel. All exposed steel surfaces shall be mechanically cleaned in accordance with Sec 1081.5.3.2.1 and in accordance with the paint manufacturer's recommendations prior to application of the coating. Power washing will not be required. However, the contractor may use power wash cleaning if desired during surface preparation. All surfaces cleaned shall be approved by the engineer prior to application of the coating.

1081.5.3.2.1 Mechanical Cleaning. Exposed structural steel where mechanical cleaning is required shall be cleaned in accordance with SSPC-SP2 or SSPC-SP3. Blast cleaning as a substitute cleaning method will be acceptable. Mechanical cleaning will be required for areas of rusted steel, loose, cracked or brittle paint or areas indicated by the engineer. The cleaning shall be performed 2 inches (50 mm) beyond the areas of rust or defective paint in all direction or until tightly adhered paint is obtained with no rust or blisters. Edges between the bare steel and the paint shall be feathered. Collection of the residue removed shall be in accordance with Secs 1081.5.3.1.3.

1081.5.3.2.2 Power Wash Cleaning. The contractor may clean the steel by a low-pressure power wash to remove loose paint, dirt and other loose deleterious material. The maximum pressure for the power washing shall be 1500 psi (10 MPa). If necessary, solvent cleaning in accordance with SSPC-SP1 shall be employed to augment the power washing. Collection of the wastewater, solvents and other residues from the power washing operation shall be in

accordance with Sec 1081.5.3.1.2. After the power washing operation, areas that have remaining rust or loose paint shall be recleaned in accordance with Sec 1081.5.3.2.1, except that vacuum power tools will be required for power tool cleaning. All surfaces washed shall be completely free of all foreign matter, surface dry and approved by the engineer prior to application of the coating.

1081.5.4 Application. Coating shall be applied in accordance with Sec 1081.3 and the manufacturer's recommendations. The steel shall be free of all cleaning residues prior to coating. Areas that have been cleaned to bare steel shall be prime coated on the same day as the cleaning. Any areas that rust prior to application of the prime coat shall be recleaned. The prime coat and topcoat shall be applied to all steel surfaces with the exception of steel encased in concrete. Any existing paint that curls or lifts after application of the Calcium Sulfonate system shall be removed, the area recleaned and the coating reapplied. Application of the rust penetrating sealer will only be required if specified in the contract documents or as determined by the engineer. Application of the rust penetrating sealer shall be in accordance with the rust penetrating sealer manufacturer's recommendations.

1081.5.5 Identification. At the completion of the final coating application, the contractor shall, stencil in black paint on the structure the number of the bridge, the words "RECOATED – Calcium Sulfonate" and the month and year the coating was completed. The letters shall be capitals approximately 3 inches (75 mm) high. The legend shall be stenciled on the outside face of an outside girder near each end of the bridge as directed by the engineer.

1081.5.6 Property and Traffic Protection. The contractor shall provide protection in accordance with Sec 1081.3.12.

1081.6 Galvanized Metal. Galvanizing shall be applied after fabrication. Galvanized material on which the galvanizing has been damaged will be rejected or may, with approval from the engineer, be repaired in the field by the zinc alloy stick method. Required field welds and adjacent areas on which galvanizing has been damaged shall be galvanized by this same method. The area to be regalvanized shall be thoroughly cleaned, including the removal of slag on welds. Touch-up of galvanizing of sheet material less than 3/16 inch (5 mm) may be completed by the use of an approved aluminum epoxy mastic coating if the material will not be in direct contact with concrete or with an approved non-aluminum epoxy mastic coating if the material will be in direct contact with concrete.

1081.7 Aluminum & Gray Epoxy-Mastic Primer.

1081.7.1 Scope. This specification covers the application of other approved primer coatings for touch-up and other repair applications.

1081.7.2 Surface Preparation. The epoxy-mastic shall be applied over an SSPC-SP2, SSPC-SP3 or SSPC-SP6 surface preparation, including removal of all rust scale, loose rust, loose mill scale and loose or non-adherent paint. Oil and grease shall be removed in accordance with SSPC-SP1 Solvent Cleaning. Areas adjacent to required areas will not be required to be masked to prevent overspray.

1081.7.2.1 Environmental Regulations. The surface preparation operation shall be in accordance with all local, state and federal regulations, including those defined in Sec 1081.4.3.2.

1081.7.2.2 Collection of Residue. The collection of residue shall be in accordance with Sec 1081.4.3.3 and 1081.5.3.1.3.

1081.7.3 Application. Material application methods, air and surface temperatures and relative humidity shall be in accordance with the manufacturer's written instructions and Sec 1081.3. The most restrictive application and environmental requirements for the epoxy-mastic shall be used when applying the primer to the steel.