DESIGNER NOTES

*The full text of this Special Provision as presented below is written to be included as part of Item 960.1, STRUCTURAL STEEL – COATED STEEL, or as a Heading within a Lump Sum item, such as Item 995.01, where coated structural steel is used.*

*DELETE ALL DESIGNER NOTES, AND REMOVE HIGHLIGHTING PRIOR TO SUBMITTAL*

**HOT DIP GALVANIZED COATING FOR NEW STRUCTURAL STEEL**

**A. GENERAL**

Fabricated steel shall be either galvanized or galvanized and coated (*Designer shall delete coating not required)* as indicated on the plans. All fabrication shall be completed prior to surface preparation and the application of any coating.

*(Designer shall delete the following 5 highlighted paragraphs if members are galvanized only)* Duplex coating systems shall be submitted by the contractor for approval by the Engineer. The submittal shall contain a minimum 2 year field history of the proposed system with a minimum of 5 uses in the Northeast on galvanized surfaces utilizing a minimum of 25 total gallons. The end user contact information shall also be included.

Prior to the start of any coating application, each batch of paint shall be sampled, tested and approved in accordance with Section M7. On projects that require less than 40 total gallons of paint to complete all painting, the paint shall not require sampling and testing. In lieu of sampling, a letter stating that less than 40 gallons is required to complete all painting shall be submitted to the Engineer along with a manufacturer’s certificate of compliance. When steel is painted, the finish coat color shall conform to the Federal Standard 595D, “Colors Used in Government Procurement”. Finish coat colors shall be as called for on the plans.

Coating applicators shall submit a written Quality System Manual (QSM) in accordance with AASHTO R38 to the Engineer for acceptance. All coating facilities shall be audited by the Department before final approval is granted. For contracts requiring greater than 1,500 square feet of coated steel surfaces, the applicator performing surface preparation and coating of structural steel shall have a current American Institute of Steel Construction (AISC) Sophisticated Paint Endorsement or Society of Protective Coatings (SSPC) QP3 certification for painting or a QP 6 certification for metalizing. Applicators shall be approved by the Department prior to the bid opening date. Applicator approval shall be valid for a 5 years.

All painting in the field required to complete the coating system or touch up of the coating shall be in accordance with the MassDOT specification 961. Specification for Field Maintenance Painting of Bridges.

All coating shall be applied according to the latest requirements of the manufactures data sheet unless modified per these specifications. The dry film thickness of all coated surfaces shall be measured in accordance with SSPC PA2. The maximum recoat times of the intermediate and finish coats shall not be exceeded.

The faying surfaces of all field bolted connections shall be coated based on the design of the connection. Class B connections shall be masked prior to galvanizing to allow for application of an approved class B slip coefficient primer. After galvanizing the masked surface will be cleaned in accordance with SSPC-SP11 and coated with the approved zinc rich primer. A galvanized connection will result in a faying surface meeting a class C slip coefficient. (*Designer shall delete paragraph if Class C slip is required in lieu of Class B)*

When grinding, drilling or any other operation produces steel turnings, filings, shavings, etc. the contractor shall completely clean all areas of all accumulation prior to the end of the work shift.

Locations of field applied studs shall require masking or removal of galvanizing and paint prior to welding.

The Engineer shall provisionally accept the shop coated items before shipment to the jobsite but final acceptance of the coating system will occur after erection of the coated items, and after all required repairs and coating application has been completed.

The contractor shall be responsible for failure and damage of all applied coating. Failures include but are not limited to, visible corrosion, blistering, checking, cracking, or delamination (peeling) and loss of gloss and color of the coating system. Damage includes but is not limited to damage from installation or from external agents, such as scraping, vandalism, debris impacts, and collisions. The extent and method of repair must be approved by the Engineer.

**B. GALVANIZING**

The following shall be hot dipped galvanized in accordance with Section M7 of these Specifications: (Designer shall modify list as required)

1. Members identified on the contract documents.
2. Diaphragms, cross frames, utility supports and bottom lateral bracing elements that are composed of non-weathering steels or weathering steels designated to be coated.
3. All sole plates and masonry plates (except sole plates for sliding elastomeric bearings).

Galvanized members requiring shop fabrication and assembly shall be cut, welded, and/or drilled prior to galvanizing. Bearing members to be milled shall be galvanized prior to milling. A thin layer of a rust inhibitor shall be applied to the milled surface. Material to be painted shall not be quenched after galvanizing.

Where material is required to be welded after galvanizing, the steel shall be masked 3 inches on each side of the weld center line. Prior to field welding the masked surface shall be cleaned in accordance with SSPC-SP11. After welding the area shall be repaired in accordance with ASTM A780 “Repair of Hot Dip Galvanizing” section 4.2.2, “Paints Containing Zinc Dust” and Annex 2. Repair paint shall meet M7.04.11 and application shall be in accordance with the manufacturer’s recommendations. (*Designer shall delete paragraph if there will not be any welding required after the galvanizing is completed)*

Damaged galvanized surfaces shall be repaired in accordance with ASTM A780 “Repair of Hot Dip Galvanizing” section 4.2.2 Paints Containing Zinc Dust “High Zinc Dust Content”. The paint shall be applied to achieve a minimum dry film thickness of 3 mils and not more than 5 mils. Repair paint shall meet M7.04.11 and application shall be in accordance with the manufacturer’s recommendations.

The contractor shall provide protection of the adjacent coating in areas that will be field welded. After welding, the weld areas shall be prepared in accordance with SSPC-SP-11.

**C. COATING OVER GALVANIZING (***Designer shall delete section C if there is no coating over the galvanized surface.)*

General

The work under this heading shall include the surface preparation and the application of a duplex coating system to galvanized components including but not limited to beams (girders), bearings, diaphragms, cross frames, bridge rail, and other components as shown on the drawings.

Proposed coating systems shall be submitted by the Contractor for approval by the Engineer.

Surface preparation and application of the coating system shall be completed within 14 calendar days of galvanizing. The Contractor shall take all necessary measures to prevent wet storage stain and accumulation of dirt, dust, grease, or oil while being handled or staged prior to application of the coating.

All galvanized pieces shall be visually inspected to determine the cleanliness of the surface. All contaminated surfaces shall be cleaned in accordance with SSPC-SP-1.

All material shall be checked for wet storage stain. Wet storage stain shall be removed prior to abrasive blasting in accordance with SSPC-SP-16 Appendix A.

Prior to surface preparation, all components shall have a finish that is smooth and uniform. The surface shall be free of protrusions greater than 1/8 inch above the surrounding surface and meet the requirements of ASTM A123 section 6.2

The thickness of the galvanizing shall be checked before and after the completion of abrasive blasting using SSPC PA-2 to confirm that prepared surfaces still have the minimum thickness requirements of AASHTO M111 or AASHTO M232 as applicable.

Provide abrasives that are clean, dry, and sized properly to provide the specified surface profile. The profile shall be dense, uniform and of sufficient angularity to be acceptable for the application of the coating. Abrasives shall conform to the following as applicable:

* SSPC-AB 1 for mineral slag abrasives
* SSPC-AB 2 for recycled ferrous metal abrasives
* SSPC-AB 3 for new steel abrasives

 The abrasive shall be tested weekly for grease, oil or non-abrasive residue using ASTM D 7393 - Standard Practice for Indicating Oil in Abrasive. Contaminated abrasives shall be changed out and not be used for surface preparation. The use of steel shot abrasive is not allowed for final blasting prior to coating application.

All compressed air sources shall have properly sized and operational oil and moisture separators to allow for oil and moisture free air.

Surfaces to be painted shall be blast cleaned in accordance with requirements of SSPC SP16 “Brush-off Blast Cleaning Non-Ferrous Metals” producing a minimum surface profile of 1 mil. Profile shall meet the requirements of the manufacturer for the coating being applied. Abrasives, nozzle size, nozzle pressure and dwell time shall be sufficient and controlled to thoroughly clean and produce a uniform surface profile. Surface preparation shall not loosen, cause flaking or disbonding of the galvanized surface. Unacceptable thickness and damage shall be cause for rejection of the entire piece.

Surfaces unacceptable after abrasive blasting and approved for repair shall be repaired in accordance with ASTM A780. Surface preparation of approved repair areas shall be done in accordance with SSPC SP-10 or SP-11. Repairs to the galvanized surface in excess of one percent of the total surface area of the piece being repaired are not allowed. The repair coating shall be a zinc rich primer as specified by the coating manufacturer compatible with the coating system approved.

Prior to coating bolted connections, galvanized fasteners shall be cleaned of all lubricating wax. Cleaning shall be in accordance with SSPC-SP-1, Solvent Cleaning, method 4.1.1. The contractor is responsible to identify the solvent and method needed to remove all lubricant. Cleanliness will be determined by the use of a white cloth wipe test. The wipe test will be performed by the Engineer using a clean white cloth and the same solvent used for cleaning. The cloth shall be wetted and rung to a damp condition, placed on the selected fasteners and rubbed with a twisting motion around the entire surface of the previously waxed surfaces. Acceptance is with no color transfer to the cloth.

Coating application shall be completed within six hours after surface preparation has been accepted by the applicator and the Engineer.

Paint over Galvanizing

The coating system shall consist of a polyamide epoxy and an aliphatic polyurethane over galvanizing. All paint shall be applied in accordance with these specifications and the coating manufacturer’s product datasheet.

Application of full coats of paint shall be accomplished by spray equipment. Spray equipment shall meet the requirements of the coating manufacturer and be in proper working order. Application by brush and roller will be limited to stripe coating, limited access areas and small touch up areas.

Brushes and roller covers recommended by the coating manufacturer shall be used. Areas brushed and rolled will have a uniform thickness and be free of defects and excessive coating thickness. Spray or brush applied coatings shall not exhibit, runs, sags, holidays, wrinkling, pinholes, nap hair, topcoat color or gloss variations, or other discontinuities.

Application of coating shall be sequenced and components staged to minimize overspray and dry spray falling onto nearby surfaces. In process components shall be covered to provide protection from overspray and dry spray as needed.

Paint application shall not be performed when the relative humidity is above 85% or when the surface temperature of the steel is less than 5°F above the Dew Point. Paint shall not be applied when the surface temperature is below 40°F or when the surface temperature is above 120°F. All changes to ambient and surface parameters shall be approved by the Engineer. Ambient conditions should be closely monitored so that proper cure is achieved prior to recoat.

If force curing of applied coating is utilized, it shall be performed in accordance with the manufacturer’s recommendations. The coating facility shall provide a letter of recommendation from the manufacturer to the Engineer stating the minimum and maximum temperature range and time required for cure. Exceeding the temperature range or time recommended by the manufacturer shall be cause for rejection by the Engineer. Curing ovens shall have instrumentation for monitoring both temperature and time and be suitable for the size of the oven. Instrument readings for temperature shall be able to provide an average temperature throughout the entire oven.

All surfaces coated prior to the Engineer’s approval, shall require the complete removal of the applied coating. All labor, materials, and associated costs with the removal of any unapproved coating shall be done at the Contractor’s expense to the satisfaction of the Engineer in accordance with these specifications.

Repair of unacceptable areas shall require surface preparation and coating equal to that specified. Repair procedures used for any unacceptable coating shall be those supplied by the manufacturer and approved by the Engineer. The finish coat for these areas shall be from the same batch as the coating originally applied.

Repair procedures used for any unacceptable coating shall be those recommended by the paint manufacturer and approved by the Engineer.

Powder Coating over Galvanizing

The coating shall be a two-coat, electrostatically shop-applied, oven-baked, powder coat system. The first coat shall be an epoxy primer suitable for application over galvanized steel. The finish coat shall be polyester TGIC super durable powder. All coats of the applied system shall be from the same manufacturer. All powder shall be stored per the manufacturer’s data sheet.

Application and curing shall be performed in conformance with the powder coating manufacturer's recommendations and shall consist of the following:

* All parts to be coated shall be pre-baked after galvanizing to reduce the potential for outgassing. Pre-baking shall be done at a minimum of 55°F above the manufacturers recommended curing oven temperature for 30 minutes unless otherwise recommended by the manufacturer.
* The powder shall be applied maintaining even coverage on all surfaces to be coated. The Applicator shall ensure that a stable transfer between powder application and the curing oven is accomplished to prevent the loss of powder from the parts.

Each coat shall be visually inspected and shall not exhibit film discontinuities including but not limited to discontinuities, pinholes, runs, excess build at edges, topcoat gloss or color variations.

 Any part that does not meet the specified coating thickness may be recoated immediately without undergoing additional preparation and pretreatment.

The contractor shall obtain all field repair and touch-up material from the applicator. Coating material used for repairs and touch up shall be from the same manufacturer as the powder used on that project or from a manufacturer recommended by the powder manufacturer. Touch up shall be applied in accordance with the powder manufacturers written recommendations and the applicators approved touch up procedure.

The DFT of the touch up areas shall be the same as the DFT of the powder system and can be applied in multiple coats. The color, gloss and appearance shall match that of the topcoat being repaired.