

ENGINEERING DIRECTIVE

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Acceptable Grade of Steel and Steel Coatings for MassDOT Steel Bridges

Effective immediately, MassDOT is revising *Bridge Manual* policy on the grade of steel to be used on steel bridge projects and acceptable steel coating systems. These revisions apply to all projects advertised after June 8, 2022, and to other active projects as determined and directed by the State Bridge Engineer.

Subsections 3.6.1.1 and 3.6.1.2 of Chapter 3 of Part I of the *Bridge Manual* are replaced with the following:

3.6.1.1 Coated AASHTO M 270 Grade 50 shall be the first choice of steel for all MassDOT steel bridges. Previously, AASHTO M 270 Grade 50W uncoated weathering steel was the primary option for all steel bridges constructed by MassDOT due to its perceived low life cycle cost because it did not require periodic re-coating. However, evaluations over the last decade of weathering steel bridges that have been in place for ten years or more have shown that the salt water spray kicked up by vehicles, even on secondary roads, contaminates the steel surface and prevents the protective patina from forming. This results in the continued corrosion of the steel, creates future maintenance problems, and negates the perceived life cycle cost benefits of weathering steel. Furthermore, bridge types where salt spray and dirt accumulation may be a concern (e.g., trusses or inclined-leg bridges) have also proven vulnerable to continued corrosion. Based on these new guidelines, the use of uncoated weathering steel will be limited exclusively to bridges over railroads alone with no adjacent roadways or bodies of water for the bridge to span over.

3.6.1.2 Acceptable steel coatings. Hot-dip galvanized steel will provide the best protection and should be specified wherever practical. However, the size of the galvanizing kettle typically limits the length of a beam that can be galvanized to about 80 feet (for a 36" deep beam). Due to the expense of preparing and painting galvanized steel as well as the care needed to ship painted beams to the field, galvanized beams should not typically be painted. If a painted beam is desired for aesthetic considerations, only the fascia beams shall be painted, while the interior beams can be left galvanized.

In addition to component dimensions fabricated steel details can be very important to the galvanizing process and in some situations poor detailing can present a potential safety issue during galvanizing. The fabricated steel must allow for the easy flow of the molten zinc over and through it. Overlapping weld surfaces must be seal welded and drain and vent holes must be provided in the proper locations. It is the Designer's responsibility to ensure this by evaluating all details, even MassDOT standards, for appropriateness to the galvanizing process. A resource which should be consulted is the American Galvanizing Association (AGA), either through the AGA publication, *The Design of Products to be Hot-dip Galvanized after Fabrication* (available on their website), or with direct consultation with the association.

In order to reduce the need for field splices or to eliminate them altogether, for beams longer than the limits specified above, metalizing should be specified as the coating method. Because the metalizing process results in a zinc coating that is somewhat porous, a sealer must be applied to all exposed surfaces

to extend the life of the metalizing. Similar to galvanized beams, if a painted beam is desired for aesthetic considerations, only the fascia beams shall be painted, while the interior beams will be left metalized with a sealer. The type of thermal spray feedstock and the coating thickness shall conform to Table 3.6.1-1 below. The Designer shall specify on the Construction Drawings which zone is applicable.

Table 3.6.1-1: Application Requirements for Metalizing

ZONE	WIRE TYPE	THICKNESS (mils)**	COATING SYSTEM
Zone 1*	Zinc-Aluminum	6-10	Sealer and Three Coat
Zone 2*	Zinc-Aluminum	8-12	Sealer and Three Coat
Zone 3*	Zinc-Aluminum	10-14	Sealer and Three Coat

***Zone 1** – Bridges in rural environments, not over waterways, and not over high speed state or interstate highways with potential for salt spray and heavy salt use and de-icing chemical use.

***Zone 2** – Bridges in urban environments, near industrial and manufacturing plants, power plants, or warehouses, over heavy road traffic, or over waterways.

***Zone 3** – Bridges in marine environments, over or close to saltwater waterways, or over high-speed state or interstate highways with potential for salt spray and heavy salt use and de-icing chemical use.

****** Mil thickness on faying surfaces shall meet the requirements of the slip certificate.