



Florida Department of Transportation

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TO: District Directors of Operations, District Directors of Production, District Design Engineers, District Structures and Facilities Engineers, District Maintenance Engineers, District Construction Engineers, District Structures Design Engineers, District Materials Engineers

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SUBJECT: Temporary Design Bulletin C04-04
Interim Policy for Steel Bridge Superstructures in Extremely Aggressive Environments
Effective Immediately

A formal bridge design policy is recommended for establishing the limits for allowing steel bridge superstructures over salt water. This policy is needed to allow for competition of alternate materials at the same time as recognizing the corrosion limitations of these different materials.

Until research can be completed dealing with this issue and a final Department policy or procedure can be appropriately developed, the following interim guidelines are to be implemented:

1. All steel superstructures must be located at least 36' above MHW when located in extremely aggressive environments. (Moveable bridges are exempt from this criteria)
2. Consider special details that minimize the retention of water and debris and thus minimize the corrosion potential when located in extremely aggressive environments.
3. Consider special coatings developed to provide extra protection in harsh environments.
4. Box structures should be evaluated as well as plate girders and the differences in corrosion potential of these two shapes considered. Box Girders are preferred compared to plate girders when located in extremely aggressive environments.

Commentary: With an increase in interest in steel structures it has become necessary to establish basic requirements for locating steel bridges in areas over salt water. There is limited data available to our knowledge that specifically addresses this situation. The amount of salt in the air is affected by wind velocity, wave action, chloride content of the water, type of waterway (inter-coastal, bay, protected, etc.), humidity, temperature, elevation above the water, structure shapes, etc. Most of this data has been collected with regard to concrete mix designs. To determine this elevation we considered the performance of some other steel structures located across the state. Several steel structures that are considerably lower than 36' above MHW are experiencing severe corrosion while structures located higher seem to be performing satisfactorily. Based on the limited information available and the possible complexity of refining the limits we settled on using 36' above MHW.

Box structures may perform better than I-girder sections in environments with air borne salts. On an I-girder, both sides of the web and the bottom flange are directly exposed to the environment. In a box structure the interior of the box will maintain a more stable controlled environment and should have a reduced exposure to salts causing corrosion. Most corrosion on a box would be to the exterior surfaces only so the rate of section loss should be about half that of an I-girder.

Background: In the past, while there was no official prohibition on constructing steel bridges over salt water, most of the recent bridges constructed in extremely aggressive environments were constructed of concrete. This was largely due to the inability of coating systems to provide adequate corrosion protection to the steel in these harsh environments. Improvements in the coating systems, which are now available, should perform better and protect steel bridges in these harsh environments better than in the past and thus reduce the maintenance issues. New detailing practices and new steel types should also be incorporated into the bridge design to increase the performance of the bridge and minimize maintenance concerns in this harsh environment.