Weathering Steel Structures
Inspection and Maintenance Suggestions

An effective inspection and maintenance program is essential to realizing the full design life of weathering steel structures. Unlike structures with other finishes, the inspection of weathering steel is more difficult because the entire structure can appear to be covered in "rust". Additionally, the nonprotective oxide coating can often times only be detected at close range. An effective plan can include the following:

1. Implement maintenance and inspection procedures designed to detect and minimize corrosion. Develop inspection guidelines that highlight the structural features to be inspected and also illustrate the difference between the desired oxide coating and excessive rust scaling.
2. Control drainage to divert runoff away from the structure.
3. Regularly remove all dirt, debris and other deposits from the structure that could trap moisture against the structure surface.
4. Regularly remove all vegetation that can prevent the natural drying of the steel surfaces after they become wet.
5. Maintain covers and screens over access holes to prevent entrance by animals and birds that can create nests that trap moisture against the steel surface.

Because inspection based on visual appearance alone can be deceptive, it may be necessary to test the surface by tapping with a hammer or vigorously wire brushing to determine if the oxide is tightly bonded or if it has formed granules, flakes or laminar sheets.

The protective oxide film on weathering steel structures requires from 3 to 5 years to stabilize in urban environments with some industrial activity. In rural areas the color stays light and the texture stays dusty for a longer period of time. The more tightly adherent chocolate brown oxide eventually begins to form. In proper protective oxide formation the color changes from an early yellow orange to light brown and is generally referred to as "dusty" because loose oxide particles can be easily rubbed off. Eventually the color approaches a chocolate brown and little can be rubbed off, as the surface becomes smoother.

Weathering steel does not form a protective oxide film when the time-of-wetness is long or when the steel is contaminated with salts. The texture of the nonprotective oxide is typically laminar or granular. See the charts below for color and texture variations and the conditions they can represent:

Color	Condition
Yellow orange	Initial stage of exposure
Light brown	Early stage of exposure
Chocolate brown to purple brown	Development of protective oxide
Black	Nonprotective oxide

Texture	Condition
Tightly adherent, capable of withstanding hammering or vigorous wire brushing	Protective oxide

Dusty	Early stages of exposure; should change after a few years
Granular	Possible indication of problem depending on length of exposure and location of structure
Small flakes, ¼ in. diameter	Initial indication of nonprotective oxide
Large flakes, ½ in. diameter and greater	Nonprotective oxide
Laminar sheets or nodules	Nonprotective oxide, severe corrosion

- Bethlehem Steel Technical Bulletin TB-307, “Uncoated Weathering Steel Structures”
- National Cooperative Highway Research Program Report 314, “Guidelines for the Use of Weathering Steel in Bridges”