610 PAINTING

Structures are painted to improve their visual appearance. Paint that chips and peals in a year or two detracts from the visual appearance of a structure. Of course, this defeats the purpose of painting in the first place. The intent of this section is to give the Inspector the basic knowledge of what constitutes a good, long-lasting paint job.

Painting Concrete

Concrete paint is a surface treatment. Water-based acrylic paints are used to color a concrete surface. Concrete stain, on the other hand, penetrates into the surface of the concrete. Concrete stains cannot be used in Arizona because of the solvent emissions that occur when the stain dries. However, from a maintenance standpoint, stains are preferable over paint because they are less likely to peel and chip after prolonged exposure.

Inspectors can ensure a good paint job by adhering to a few fundamental practices of painting:

- use good paint (ADOT specifies high quality paint); Inspectors should ensure through sampling and proper paperwork that materials used meet or exceed the Standard Specifications;
- focus on surface preparation (paint adhesion is as much a function of how well the surface is prepared as the quality of the paint); careful inspection of the prepared surface is important;
- follow the manufacturer's recommendations closely (this includes humidity, temperature, and wind requirements); and
- apply in thin, even coats (two thin coats are better than one thick coat).

Application

The contractor must develop an Application Plan for painting concrete surfaces in according with the manufacturer's written recommendations. The Plan must include:

- Rate of application
- Number of necessary coats (2 minimum)
- Ambient air temperature
- Application equipment
- Qualification of workers
- Safety and damage protection
- Proposed surface preparation

The Contractor and Resident Engineer or Inspector should discuss which concrete surfaces require paint. Several factors such as type of bridge, posted speed, view from vehicular and pedestrian traffic must be considered. Project Plans may have specific requirements in addition to the general requirements contained in Subsection 610-3.05(B) of the Standard Specifications.

Materials

One thing the Resident Engineer or the Inspector needs to do before the paint is ordered is to ensure the Contractor knows the right color type. Sometimes the Special Provision give the Contractor a color option or leave the color type unspecified. Either way, an agreement between the Department and the Contractor should be reached on the color type before the paint is ordered.

Paint for concrete must be pre-approved by ADOT Materials Group before use. ADOT's Approved Products List contains all pre-approved paint and stains. Pre-approved paints still need to be sampled and tested before application. This is best done when the preliminary or final sample test sections are coated. The Inspector samples the paint at the project site and sends a sample to Materials Group (Structural Materials Testing Section) for testing.

The Inspector should carefully note the lot number on the sample ticket to ensure it is the same as:

- on the sample container drum
- on the Certificate of Compliance, and
- on any paint containers shipped to the project site in the future.

Any paint that arrives on the project that does not have the same lot number as paint previously sampled and tested should be sampled and sent to Materials Group.

Surface Preparation

The greatest impact the Inspector can have on getting a good paint job is the attention paid to surface preparation. The Department requires all painted concrete surfaces to be sandblasted first. The cleaned surface should have a roughened textured appearance consistent with the surrounding concrete surface. Any additional preparation of the surface (washing or rinsing) in accordance with the manufacturer's recommendations then follows. Concrete surfaces must be thoroughly dry and free of dust at the time paint is applied. The Inspector must have a copy of the recommendations and Application Plan during the preparation process.

The Inspector should recognize what constitutes good surface preparation. Consult with the paint manufacturer's representative if you are unsure of what an acceptably prepared surface should look like.

Protection

Before painting begins, talk to the painting Subcontractor about the safety precautions that need to be taken around the paint. Material safety data sheets (MSDS) should be available to you and the painters at the project site. Personal protective equipment such as goggles and face shields may be needed for some paints. Stains that contain solvents need to be used in a well-ventilated area (see the MSDS).

Also discuss with the Contractor how adjacent areas will be protected from paint spray and splashes. When painting near traffic, a means of protecting passing vehicles from airborne paint will be required.

Test Panels

The Contractor must provide a preliminary test panel of concrete with the paint already applied. This sample can be part of the actual surface to be painted as long as any unacceptable paint can be easily removed without marring or disfiguring the surface.

Once the preliminary test panels have been approved, a final test panel on the actual surface should be done. Be careful where you locate the test panels. Use an area that is the least visible to the public. That way if the surface appearance cannot be properly restored, any uncorrectable mistakes won't be as noticeable.

The Resident Engineer is free to streamline this process if the painting Subcontractor has recent experience (last 6 months) using the identical paint on another ADOT project. For example, the Resident Engineer could omit the preliminary test panel and go right to the final test panel.

The Resident Engineer and any other project stakeholder concerned about the color should inspect test panels. This would include any local officials, Bridge Designers, or landscape architects associated with the project

Sampling and Testing

Paint must be sampled in accordance with the Sampling Guide. At least one peeling and flaking test must be done per project.

The product must be approved before it is applied to any permanent surface.

Peeling and flaking testing must be done on all test panels after any required observation period. The Structures Materials Testing Section of Materials Group has the proper equipment to perform peeling and flaking testing. The field offices can either borrow the equipment or have a technician from Materials Group perform the test.

Painting Steel

Painting of structural steel serves two purposes. The primary function of paint application is to prolong the life of the metal by means of a continuous film or coating which will mechanically seal the surface against corrosion. The secondary function is to produce and maintain a pleasing appearance.

Material

The materials used in painting must conform to Specification 1002 and either be listed on ADOT's Approved Products List or pre-approved by Materials Group. Manufacturer's certificates of analysis shall be furnished as required by the Standard Specifications and samples shall be taken in accordance with the Special Provisions or the Sampling Guide Schedule.

Inspection

Steel is normally cleaned of all dirt, grease, rust, and mill scale by profile blasting in the fabricator's shop. Then a coat of primer paint is promptly applied. The primer will serve as a rust inhibitor but is easily scarred during handling, transporting, and erecting the steel. After the steel has been erected, the areas where the prime coat has been damaged or is otherwise defective should be cleaned and given another coat of primer.

After all the necessary spot priming has been done and the primer has dried, the intermediate (first) field coat of paint may be applied. Before painting in the field, the surfaces must be dry. Morning dew and high humidity conditions are to be avoided when painting. Wind will not only result in dirt and other undesirable material being blown onto fresh paint but coverage may be uneven or paint may be blown onto surfaces that are not intended to be painted.

Care should be exercised by the painters in order for paint to not be accidentally applied or blown onto passing vehicles or parts of the structure not to be painted. It may be necessary to apply paint by brush on some areas of the steel.

It is not possible to get a good durable paint film that will protect and preserve the metal and also provide an attractive structure unless a thorough job of cleaning and preparation has been done. Imperfections, such as runs or sags in the shop coat, cannot be covered up with the field coats so it is imperative that the Inspector insist on proper cleaning and correction of defects prior to the application of the first field coat.

In applying paint with a spray gun, the gun should be held perpendicular to the surface and the trigger released at the end of each stroke. All runs or sags should be brushed out immediately.

The Standard Specifications require each coat, including the shop primer coat, intermediate (first) field coat, and top (second) field coat to have a minimum thickness of 2.0 mils (50 micrometers). The Inspector should check areas such as the edges of beams, bolt heads, and the like for compliance with this specification, as these are the areas where the paint film is likely to be thinnest. These checks should be documented.

An instrument for measuring paint thickness (micrometer) may be obtained from the Materials Group's, Structural Materials Testing Section. SSPC has developed a specification (SSPC-PA 2) that ADOT uses for measuring paint thickness with a micrometer. A copy of this specification is available from Materials Group.

Some inspection points for painting steel include:

1. Are the necessary personal protective equipment and safety devices available and being properly used?

2. If paint had not received prior approval, have samples been obtained by the project personnel, submitted to Materials Group, and approved by Materials Group prior to use?

3. Has the paint been formulated and mixed in accordance with Section 1002 and the manufacturer's recommendations?

4. Has the surface to be painted been thoroughly cleaned of rust, loose mill scale, dirt, oil, or grease and all foreign substances?

5. Is the metal dry and free of frost; are atmospheric conditions satisfactory?

6. Is the temperature above 40° F (4° C) at time of application?

7. Are proper precautions taken to protect both vehicular and pedestrian traffic from spotting?

8. Is paint being applied in a smooth and uniform manner so that no excess paint will collect at any point? After paint is applied, are there "runs" or "thin" areas? If runs occur, are they sanded out and the area repainted?

9. Has the paint thickness been checked with a micrometer?