

DATE: August 25, 2005

TO: Region Engineers
Region Delivery Engineers
TSC Managers
Resident/Project Engineers
Region Construction Engineers
Region Resource Specialists

FROM: Larry E. Tibbits
Chief Operations Officer

John C. Friend
Engineer of Delivery

SUBJECT: Bureau of Highway Instructional Memorandum 2005-13
Bridge Painting Inspection and Lead Exposure in Construction

This document clarifies the procedures used for inspection on bridge painting projects and lead exposure in construction. It also provides guidance for sampling and testing waste materials, documenting bridge paint inspection, and the use of protective equipment for inspectors. This document supercedes all previous instructional memoranda and construction circular letters concerning bridge paint inspection and lead exposure in construction. This document must be coordinated with the *2003 Standard Specifications for Construction*, Section 715 of the *Construction Manual*, and Michigan Occupational and Safety Health Administration (MIOSHA) Regulation, Part 603, Lead Exposure in Construction.

Health - Lead Exposure in Construction

All bridge painting inspectors and resident/project/delivery engineers (hereinafter referred to as “the engineer”) must be familiar with MIOSHA Regulation, Part 603, Lead Exposure in Construction (http://www.michigan.gov/documents/CIS_WSH_part603_35656_7.pdf), and MDOT’s *Hazard Communication Procedure* (commonly referred to as “Right to Know”), which is available on the Safety Administration Services’ Web page.

Respiratory Protection and Protective Equipment

All bridge paint inspectors must wear respirators and protective equipment, as required by Part 603, when inside containments, exposed to dust containing lead or paint fumes. Do not enter the containment until the air has visibly cleared of dust. At a minimum, MDOT is required to provide a medical evaluation to determine the employee’s ability to wear a respirator. A pulmonary function test is required at least once to determine if the employee’s breathing capacity can tolerate the use of a respirator. For further information, see MIOSHA Regulations –

Part 603, Lead Exposure in Construction, and Part 451, Respiratory Protection (http://www.michigan.gov/documents/CIS_WSH_part451_54075_7.pdf).

Medical Surveillance

Per MIOSHA Regulation Part 603, Lead Exposure in Construction, all employees performing bridge paint inspections are required to have blood sampling and analysis for lead and zinc protoporphyrin before the project begins, every two months while inspecting the project, and again at the completion of the inspection of the project. All MDOT employees' medical surveillance records must be marked "Confidential" and mailed to MDOT Safety Administration, Van Wagoner Building, P.O. Box 30050, Lansing, MI 48909, and copies provided to the employee. MDOT Safety Administration will notify the engineer of the employee test results.

Exposure Monitoring

The engineer must mark the MDOT employee's exposure assessment results "Confidential" and mail them directly to MDOT Safety Administration.

Hygiene Facilities

All inspectors who enter containments must have access and are required to use the hygiene facilities for hand and face washing and/or showers provided by the contractor upon exiting the containment.

Lead Awareness Training

All bridge paint inspectors required to enter containments must attend annual lead awareness training prior to performing bridge paint inspection. The painting contractor will provide awareness training, as required by contract. See the project proposal for the number of MDOT employee trainees per project. Trainees must receive a certificate of completion and wallet card prior to entering the containment. The certificate must be made available upon request.

Documentation for Bridge Paint Inspection

The engineer is responsible for performing all testing and recording the results on the attached Inspector's Daily Report for Bridge Painting (Form 1941). See Sections 713, 715, 716, and 915 of the *2003 Standard Specifications for Construction*, and the contract documents for the contractor's responsibilities.

The contractor must retain copies of the documentation listed here at the project site, and the engineer must retain copies of the documentation in the project files:

- Manufacturer's product data sheets for paint, solvents, and caulk
- Material safety data sheets for paint, solvents and caulk
- Contractor's lead training program
- Contractor's employee lead training records

- Contractor's hazardous waste contingency plan
- Contractor's weekly inspection log of stored materials
- Waste characterization reports
- Waste disposal manifests
- Waste disposal receipts

Inspector's Daily Report for Bridge Painting

The engineer must complete the Inspector's Daily Report for Bridge Painting (Form 1941) in addition to the Inspector's Daily Report (Form 1122) on all bridge painting projects.

Materials

Abrasive – Record under “Profile Measurements” the abrasive product and the gradation as one of these four choices: as a low dusting abrasive, steel grit, steel shot, or any combination of these. If using a low dusting abrasive, verify that the product is on the Qualified Products List (QPL). Steel grit or steel shot can be used as an abrasive, but they are not listed on the QPL.

Coating – Verify that the coating system is on the QPL prior to beginning the coating. Record the coating manufacturer, product number, batch number, gallons used, and all components of the coating (some zinc primer coatings have three components).

Testing and Inspection

Profile Measurements – The engineer must measure and record the profile of the blasted bridge beams on the Inspector's Daily Report for Bridge Painting. The engineer must measure and record at a minimum of one profile reading daily for each abrasive blasting operator. If the contractor changes the abrasive product or process, measure and record the profile again. Use Extra Coarse Testex Press O Film Replica Tape and a Micrometer to determine the profile. Record the location, including the span and beam line, and attach the replica tape to the Inspector's Daily Report for Bridge Painting.

Temperature and Humidity – Record all the following information on the Inspector's Daily Report for Bridge Painting.

1. Time of inspection
2. Steel surface temperature, as observed with a magnetic thermometer
3. Paint temperature
4. Ambient dry and wet bulb temperatures
5. Relative humidity and dew point obtained by using the sling psychrometer and the charts located in the bridge paint kit
6. The conditions at the start of cleaning, at the start of coating, and at the end of coating

Dry Film Thickness (DFT) Measurements – Determine the DFT of the zinc prime coat by using a calibrated electronic Type 2 magnetic gage (such as the Elcometer 345). To measure DFT, make five separate spot measurements randomly spaced over each 100 square feet of bridge beam surface area or as specified below in the table. The frequency for checking DFT will vary depending on the square foot of area of the bridge beam surface cleaned and prime coated daily (see the table below for testing frequency). Each spot measurement consists of the average of three readings taken within one to three inches of each other. Discard any unusually high or low readings that cannot be repeated. The average of the five spot measurements for each 100 square feet must not be less than the specified DFT. Be sure to include spot measurements on the hard-to-reach areas, as they are likely to have insufficient DFT. Recoat areas with insufficient DFT as soon as possible to enhance the adhesion of the additional coat of paint. Document the test location (including the span and beam line) and the DFT measurements in mils for each reading and test on the Inspectors Daily Report for Bridge Painting. The testing frequency of DFT measurements is also dependent on consistent quality workmanship.

Daily Primed Bridge Beam Surface Area (sft)	Number of Measurements
0-100	5 tests for 100 square foot area
101-200	10 tests total: 5 tests for first 100 sft, 5 tests for second 100 sft
201-300	15 tests total: 5 tests for first 100 sft 5 tests for second 100 sft 5 tests for third 100 sft
301-1000	15 tests total: Randomly select and measure three 100-square foot areas out of the total area
Greater than 1001	Measure the first 1000 square feet as stated above and for each additional 1000 square feet or increment thereof, randomly select and measure one 100 square foot area per 1000 square feet.

If the DFT for any 100-square foot of bridge beam area is not in compliance, identify the area of non-compliance with additional DFT measurements. Mark the deficient area that needs to be recoated with a paint compatible marking tool.

Witness Sampling of Spent Materials – The engineer must witness the contractor's laboratory personnel sampling the spent abrasive, shower water, solvent, and bag house dust. The

laboratory must be approved and certified by the Michigan Department of Environmental Quality. Record the witness date and time in the “Comments” section of the Inspector’s Daily Report for Bridge Painting. Place copies of the chain of custody and test results in the project files.

Documentation

Sealing Perimeter of Beam Plates – Measure the pay item beam plate, seal perimeter by the foot as specified Section 713 of the *2003 Standard Specifications for Construction*. Do not measure it by volume of sealant used or volume of sealant used converted into feet. Manually measure the sealant by the foot to determine the pay quantity.

Solvent – The engineer must retain copies of the contractor’s solvent reuse determination procedures and the solvent tracking log in the project files and at the project site.

Checklists – To aid in documentation, checklists are attached for use by the engineer. The MDOT Bridge Painting Project Office Checklist identifies important documentation items for environmental protection, training, and containment; testing, storage, and disposal of spent material; and for occupational safety of MDOT employees during the bridge painting. The MDOT Bridge Painting Checklist identifies important items to observe during the cleaning and coating operations.

Warranty Inspection – Document the repair work areas, including beams and spans with photos (digital or 35mm) of the inspection and repairs. Attach them to the Bridge Painting Performance Warranty (Form 1802) or place them in the project files.

Waste Manifests and Disposal Tickets – The engineer must sign the manifests and disposal tickets after reviewing the test results of the spent materials. Copies of all manifests and disposal receipts must be located in the project files.

Chief Operations Officer

Engineer of Delivery

BOHD:C/T:EMB:kab
Index: Environment, MIOSHA, Structures
Attachments

- | | | | | |
|-----|-------------|------------|-----------------|-----------------|
| cc: | C & T Staff | M. DeLong | M. VanPortfleet | J. Reincke |
| | J. Culp | B. O’Brien | S. El-Ahmad | C. Rademacher |
| | P. Sebenick | G. Moore | K. Reincke | T. Fudaly, FHWA |
| | APAM | MCPA | MCA | MAA |
| | MITA | CRAM | ACEC | MPA |

MDOT BRIDGE PAINTING PROJECT OFFICE CHECKLIST

Control Section:	Project No.:	Date:
Structure No.:	Structure Location:	
Painting Contractor:		Engineer:

<u>Contractor Training & Records</u>	<u>Yes</u>	<u>No</u>	<u>Action/Comments</u>
Accessible safety container at the project site with the waste container storage	<input type="checkbox"/>	<input type="checkbox"/>	_____
Hazardous Waste Training Program	<input type="checkbox"/>	<input type="checkbox"/>	_____
Employee Hazardous Waste Training (all employees)	<input type="checkbox"/>	<input type="checkbox"/>	_____
Hazardous Waste Contingency Plan and Equipment	<input type="checkbox"/>	<input type="checkbox"/>	_____
Emergency Phone numbers for Contractor 24 hr, Fire Department, Police Department(s), Hospital	<input type="checkbox"/>	<input type="checkbox"/>	_____
Weekly Inspection Log of Stored Material	<input type="checkbox"/>	<input type="checkbox"/>	_____
Material Safety Data Sheets (Paint, Solvent, Etc.)	<input type="checkbox"/>	<input type="checkbox"/>	_____
Product Data Sheets (Paint, Solvent, Etc.)	<input type="checkbox"/>	<input type="checkbox"/>	_____
Solvent Reuse Determination Procedure	<input type="checkbox"/>	<input type="checkbox"/>	_____
Solvent Tracking Log	<input type="checkbox"/>	<input type="checkbox"/>	_____
 <u>Facilities (on the project site and functioning prior to blasting)</u>			
Contractor provided shower and/or wash facilities	<input type="checkbox"/>	<input type="checkbox"/>	_____
Contractor provided respirators and protective clothing	<input type="checkbox"/>	<input type="checkbox"/>	_____
 <u>Containment</u>			
Total Enclosure	<input type="checkbox"/>	<input type="checkbox"/>	_____
Negative pressure (Where applicable) with sufficient airflow to provide visibility and a safe work environment	<input type="checkbox"/>	<input type="checkbox"/>	_____
Dust Collectors & Filters (clean air being discharged from collector/filter)			
Clean when brought to the site	<input type="checkbox"/>	<input type="checkbox"/>	_____
Clean when leaving the site	<input type="checkbox"/>	<input type="checkbox"/>	_____
Containment of all spent material	<input type="checkbox"/>	<input type="checkbox"/>	_____
Removal of Containment			
Tarps must be cleaned/vacuumed before removal	<input type="checkbox"/>	<input type="checkbox"/>	_____
Barge used if over waterway	<input type="checkbox"/>	<input type="checkbox"/>	_____
Floating boom across waterway for secondary containment	<input type="checkbox"/>	<input type="checkbox"/>	_____
 <u>Cleanup and Storage of Spent Materials</u>			
Daily cleanup of spent blasting material prior to painting	<input type="checkbox"/>	<input type="checkbox"/>	_____
Spent materials placed in suitable containers and tightly covered (Barrels and/or gondolas)	<input type="checkbox"/>	<input type="checkbox"/>	_____
Waste containers are placed together and covered (barrels tied together) to prevent spillage	<input type="checkbox"/>	<input type="checkbox"/>	_____
Waste containers properly located out of potential wet areas	<input type="checkbox"/>	<input type="checkbox"/>	_____
Hazardous waste label(s) placed on the waste containers	<input type="checkbox"/>	<input type="checkbox"/>	_____
Label(s) completely filled out	<input type="checkbox"/>	<input type="checkbox"/>	_____
Non-Hazardous Waste label(s) placed over the existing label when the tests indicate that the material is non-hazardous	<input type="checkbox"/>	<input type="checkbox"/>	_____

MDOT BRIDGE PAINTING PROJECT OFFICE CHECKLIST

<u>Items/Activities</u>	<u>Yes</u>	<u>No</u>	<u>Action/Comments</u>
<u>Contractor Testing</u>			
Witness Sampling of Spent Abrasive Material	<input type="checkbox"/>	<input type="checkbox"/>	_____
Witness Sampling of Bag House Dust Material	<input type="checkbox"/>	<input type="checkbox"/>	_____
Witness Sampling of Wash Facility Wastewater	<input type="checkbox"/>	<input type="checkbox"/>	_____
Witness Sampling of Solvent Waste	<input type="checkbox"/>	<input type="checkbox"/>	_____
<u>Hazardous</u> <u>Non-Hazardous</u>			
Test Results for Spent Abrasive Material		<input type="checkbox"/>	<input type="checkbox"/>
Test Results for Bag House Dust Material		<input type="checkbox"/>	<input type="checkbox"/>
Test Results for Wash Facility Wastewater		<input type="checkbox"/>	<input type="checkbox"/>
Test Results for Solvent Waste		<input type="checkbox"/>	<input type="checkbox"/>
 <u>Disposal of Spent Material</u>			
	<u>Yes</u>	<u>No</u>	<u>Action/Comments</u>
Within 90 days from the start of collection	<input type="checkbox"/>	<input type="checkbox"/>	_____
Hazardous Waste Manifests signed by Engineer	<input type="checkbox"/>	<input type="checkbox"/>	_____
Liquid Industrial Waste Manifests signed by Engineer	<input type="checkbox"/>	<input type="checkbox"/>	_____
Disposal Facility Receipts	<input type="checkbox"/>	<input type="checkbox"/>	_____
 <u>MDOT Employees, Paint Kits, and Site IDs</u>			
Attend Lead Awareness Training	<input type="checkbox"/>	<input type="checkbox"/>	_____
Hazard Communication Training (Right to Know)	<input type="checkbox"/>	<input type="checkbox"/>	_____
Initial Employee Tests			
Blood Lead Level	<input type="checkbox"/>	<input type="checkbox"/>	_____
ZPP	<input type="checkbox"/>	<input type="checkbox"/>	_____
Pulmonary Test	<input type="checkbox"/>	<input type="checkbox"/>	_____
Post Employee Tests			
Blood Lead Level	<input type="checkbox"/>	<input type="checkbox"/>	_____
ZPP	<input type="checkbox"/>	<input type="checkbox"/>	_____
Paint Kits and Instruction	<input type="checkbox"/>	<input type="checkbox"/>	_____
Return Paint Kits to C & T	<input type="checkbox"/>	<input type="checkbox"/>	_____
Deactivate Site Identification Numbers upon completion of work	<input type="checkbox"/>	<input type="checkbox"/>	_____

MDOT BRIDGE PAINTING CHECKLIST

Control Section:	Project No.:	Date:
Structure No.:	Structure Location:	
Painting Contractor:		Engineer:
Coat: <input type="checkbox"/> Prime <input type="checkbox"/> Intermediate <input type="checkbox"/> Top coat		Inspector:

Abrasive Blasting Operation

	<u>Yes</u>	<u>No</u>	<u>N/A</u>
Were surfaces scraped to remove dirt and debris prior to blasting?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Were areas of oil and grease solvent cleaned as per SSPC-SP 1 prior to blasting?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Does the surface meet SSPC-SP 10 (Use reference photos – SSPC Visual Standards)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is the surface profile within the required 1.0 to 2.8 mils?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Were fins, tears, slivers, and burred or sharp edges ground to SSPC-SP 11?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is the surface clean and free of excess dust, oil, dirt, or other foreign substances after blow down and vacuuming?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Air and surface temperatures greater than 50°F?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Relative humidity not above 90%?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Surface temperature 5°F above the dew point?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Any moisture on surface?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Any rust bloom forming on the surface?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Does the blasted surface meet with the requirements of the specifications?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Coating Materials and Equipment

Did Contractor supply product data sheets?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are the coating products on the Qualified Products List?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Coating materials temperature greater than 50°F?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Has the product information (product numbers for each component and thinners, batch numbers, etc.) been recorded on the IDR?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Proper mixer available per the product data sheets?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Has the coating been strained with the proper screen per the data sheets?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Coating Application

Is the paint mixed in accordance with manufacturer's recommendations?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Was the primer continuously agitated during application?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If thinning was necessary, was the proper amount of thinner added?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Was the temperature of the mixed coating above 50°F for the primer?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Was the temperature of the mixed coating above 50°F for the intermediate?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Was the temperature of the mixed coating above 40°F for the top coat?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>