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ENGINEERING INSTRUCTION

NEW YORK STATE DEPARTMENT OF TRANSPORTATION

SUBJECT: CLASS A CONTAINMENT ENCLOSURE FOR LEAD PAINT REMOVAL

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This Engineering Instruction transmits specifications and procedures for the containment of dust and lead paint waste on bridge painting projects with significant quantities of blast cleaning work.

BACKGROUND

The Department is responsible for maintaining roughly 7600 bridges, 5100 of which are painted steel. An estimated 450 bridges per year are repainted under the current annual maintenance painting program, and additional structures are repainted in conjunction with bridge rehabilitation work.

Bridge painting consists of "overcoating" the existing lead based paint with a high performance epoxy/epoxy/urethane coating system. The existing lead paint must be sound and tightly adhered to the steel in order to be overcoated. Areas that do not meet these requirements are cleaned to bare steel by abrasive blast cleaning to remove all loose paint, rust, and mill scale, and then painted with primer. After priming, the entire bridge is then painted the intermediate and finish coats.

Since 1986, the Department has required the use of tarps and covers on bridge painting projects to collect spent abrasive and paint waste debris (EI 86-019 & EI 92-036, Items 570.09 & .10). The paint debris generated from open abrasive blasting was not generally contained, but rather collected by the tarps or covers beneath the structure. Larger size particles fell to the tarps and were vacuumed into containers for proper disposal. Dust-sized particles usually escape from the work site into the environment. A recent investigation found that the effectiveness of tarps and covers for capturing paint debris is between 40 and 60%.

Increasing concern for dust control and the potential lead hazard in paint debris warrants much tighter containment of the work site when open abrasive blasting methods are being used to prepare surfaces for painting. Recent experiences with painting projects in New York City found that even side drapes in combination with ground covers are inadequate for controlling emissions. Strict EPA regulations are being applied to bridge painting projects involving the removal of existing paint to control the emissions of dust alone, and dust containing lead paint debris into the

atmosphere. Ambient air quality standards that regulate the release of total suspended particles (TSP), lead particles, and PM10 particles (less than 10 microns in diameter) must be complied with.

The Materials Bureau has conducted an extensive investigation into the various options available for surface preparation and the containment/collection of paint debris. A draft report, "Evaluation of Surface Preparation Alternatives for Repainting Structural Steel", was circulated in January, 1993. Recommendations included the creation of improved specifications for the containment of spent abrasive and paint waste debris on bridge painting projects. Since the issuance of this report, meetings with the Department of Environmental Conservation and the Department of Health have been held to address the containment issue. A specification for an improved containment system has been developed with their concurrence for use on Department projects.

SPECIFICATIONS

Effective immediately, the following specification is to be included for use on maintenance bridge painting projects, and bridge rehabilitation/reconstruction projects that include substantial repainting of the structure in the field.

Item 18570.1502, Class A Containment System for Paint Removal.

Provisions for environmental ground and water protection are included in this item. Item 570.09, Environmental Ground Protection, and Item 570.10, Environmental Waterway Protection, are no longer necessary as separate pay items. Section 740 is being revised to eliminate reference to Items 570.09 and 570.10.

Special specifications and notes that may be prepared by the Regions to modify the attached Item 18570.1502 will not be allowed. The effectiveness of the Class A containment system is being determined by an air monitoring program that is being conducted separately by the Environmental Analysis Bureau. Changes to the specification at this time would complicate this evaluation. Notes by the Regions to identify constraints on the contractors operations must be included and will be allowed, i.e. clearances, lane closures, hours of work.

Engineer's estimates for bridge painting must be adjusted upwards to account for containment costs. Because there has been very little use of containment systems of this type, either in New York or nationwide, good cost information is not available. Class A containment is expected to add at least 30% to the total painting project cost in relatively simple situations and 100% or more in other cases. Additional cost estimating guidance will be provided by the Design Quality Assurance Bureau.

Contract completion dates will have to be extended to allow time for approval of the contractor's working drawings, and time for the contractor to assemble, move, and disassemble the containment system as work progresses at the project site. Depending on the complexity of the structure and the number of structures included in the project, completion dates should be extended 4-8 weeks, or longer.

The attached containment specification for a Class A containment system should not generally be used for bridge rehabilitation projects where small quantities of paint are being removed in

conjunction with steel repairs, i.e. welding, cutting, and similar operations. The Structures Division should be consulted on projects of this type. Paint removal using vacuum blast and power tool equipment with vacuum attachments may be appropriate with minimal containment protection. Specifications for vacuum blast equipment are currently being prepared.

Class A containment system is not intended for use during paint application, i.e. to protect against damage from overspray, or paint drift and spatter. Protection against damage from paint application is provided under Section 740.

OTHER ISSUES

1. Working Drawings. The Regions will be responsible for reviewing the contractor's submittal of working drawings, equipment list, and operating plan for conformance with the containment specification, and for acceptability of the traffic control plan. Guidelines to assist with this review are being prepared by the Materials Bureau and will be transmitted separately. Key points to be considered will include containment materials, method of assembly and disassembly, ventilation analysis, design analysis of structural loads, and coordination with Maintenance and Protection of Traffic. By memo dated April 27, 1993, A. M. Shirole distributed to the Regional Directors guidance on structural analysis.

2. Maintenance and Protection of Traffic. While it is desirable for the contract documents to provide detailed traffic control plans, the design of the containment system may significantly impact the traffic control requirements. It may not be possible for the designer of the project traffic control plan to fully address these impacts during design because the contractor must develop the containment system. However, it is important to provide as many details as possible for the contractor's use in developing a suitable traffic control scheme. These details should include typical lane closure and signing layouts, limitations on when the roadway may be occupied, special features such as shadow vehicles, and other considerations. It is not acceptable to merely direct that "the traffic control plan shall be in compliance with the specs and MUTCD".

3. Air Quality Monitoring. The effectiveness of the Class A containment enclosure will be determined by an air monitoring program. The Environmental Analysis Bureau will arrange to perform on-site air monitoring on a sample of projects. Regions will be contacted for a listing of structures that will be included in their painting program, and for assistance in providing support, i.e. power supply for the air monitors. Air quality will be measured on-site using PM10 and high volume air samplers.

   Modifications and adjustments to the requirements for the Class A containment system will be made based on the results of air monitoring.

4. Field Data Collection. Because of the experimental nature of the containment enclosure systems, the Engineer will be asked to maintain records on the size and type of containment, effectiveness, productivity, maintenance and protection of traffic, and related items. A "check off" type form and instructions for this data collection will be prepared by the Materials Bureau and issued separately in the near future.

5. Data Collection for Estimating. To obtain information on the actual cost of bridge painting work, designers will be asked to estimate paint condition and square footage of steel on painting projects. This information will be used to develop a database of costs related to surface preparation, containment, disposal, and painting work, and will be correlated to site-specific conditions, containment type, etc. Additional information on estimating will be provided by the Design Quality Assurance Bureau in the near future.

6. Experimental Work. Alternate methods to contain and to reduce the quantity of paint waste debris air-borne particulates will be evaluated by the Materials Bureau. Several bridges will be used in the repainting program to experiment with new technologies including low dusting abrasives, recyclable abrasives, and wet abrasive blast cleaning. The Regions will be contacted to determine their interest in participating in this evaluation.

7. Health and Safety. The contractor must meet all OSHA and NYSDOH regulations to protect workers from lead exposure. The Construction Division is preparing a special note which highlights the provisions of the 1993 OSHA regulations for lead, and which will provide steps the contractor must take to demonstrate compliance.

   Inspection staff--both DOT and consultants--must also be protected from lead exposure. As a minimum, inspection staff who must enter containment areas must have medical clearance and be fitted and trained for respirator use. This process may require several weeks, and needs to be initiated well in advance of the start of the work.

QUESTIONS AND ASSISTANCE

Questions on the technical aspects of the Class A specification, working drawing approvals, and general questions relating to the bridge painting program should be directed to Gerald Perregaux or David Brewster in the Materials Bureau at 518-457-4285.

Questions related to the review of the structural analysis should be directed to Daniel Feeser in the Structures Division at 518-457-5715 .

Questions related to the contractual aspects of implementation, including the use of the Class A specifications for on-going work should be directed to James Tynan in the Construction Division at 518-457-6472.

Questions relating to the air monitoring program should be directed to John Zamurs in the Environmental Analysis Bureau at 518-457-5672.

Questions relating to the health and safety issues, and to OSHA requirements, should be directed to James Bryden in the Construction Division at 518-457-3225.

ITEM 18570.1502
CLASS A CONTAINMENT SYSTEM FOR PAINT REMOVAL

DESCRIPTION:

This work shall consist of furnishing and installing a total containment enclosure around the immediate work area to contain and collect debris generated during paint removal operations. The work associated with dismantling and moving the enclosure to new locations on the structure as paint removal operations progress, and with removing the enclosure when paint removal operations are completed, is also included. The containment enclosure shall contain all spent materials, dust, and other debris generated: (1) during blast cleaning and paint removal operations; (2) when air blowing or vacuuming the steel surfaces on the structure in preparation for field painting; (3) when collecting and removing paint waste debris. The performance of the containment enclosure will be judged on its ability to prevent visible emissions (releases) of spent materials, dust, or other debris into the environment.

The Class A containment enclosure provided shall be constructed of impermeable materials affixed to a support structure. All seams in containment materials and all joints between the containment enclosure and the bridge shall be sealed by overlapping. An entryway into the work area shall be made using multiple overlapping door tarps. A forced exit air system shall maintain a lower air pressure inside the containment than outside so as to produce an inward air flow at open air entry points. The exhaust system shall be sized to produce a minimum theoretical air movement inside the containment enclosure. Air movement shall be verified by visual inspection. Exit air shall be exhausted into a dust collection system for filtering.

Reference information on containment enclosures can be obtained from the following:

1. SSPC - Guide 6I (CON), Guide for Containing Debris Generated During Paint Removal Operations, Steel Structures Painting Council, Pittsburgh PA.

2. SSPC - Steel Structures Painting Manual, Volume 1, Steel Structures Painting Council, Pittsburgh, PA.

3. Industrial Lead Paint Removal Handbook, by Kenneth A. Trimber, SSPC Publication 91-18, Steel Structures Painting Council, Pittsburgh, PA.

MATERIALS

Materials and equipment as described in Construction Details shall be selected by the contractor and approved by the Engineer prior to use.

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CONSTRUCTION DETAILS

Rigid or flexible materials may be used to construct the containment enclosure. Rigid materials shall be impermeable and may be comprised of plywood panels, or corrugated panels of steel, aluminum, reinforced fiberglass, or another suitable material. Flexible materials shall be impermeable and fire retardant. Flexible covers will be allowed for flooring only if the ground and paved surfaces are smooth surfaces from which debris can be collected by vacuuming. If a smooth ground surface is not available, rigid materials shall be used for the floor of the enclosure.

A rigid support structure comprised of scaffolding and framing or a flexible support structure comprised of a cabling system may be used as a framework for the enclosure. Containment materials shall be secured to the support structure.

All mating surfaces between the bridge structure and the containment enclosure, and all joints and seams formed in the fabrication of the enclosure shall be sealed. Joints and seams may be sealed by taping or caulking, or by overlapping materials, providing the other provisions of this specification are adhered to. Flexible materials shall be sealed by overlapping. The minimum overlap shall be 24", and the overlapped materials shall be secured by clamping or taping or other suitable methods at intervals not exceeding 24". Multiple overlapping door tarps shall be used for the entryway.

Dust collection equipment shall be 99.9% efficient against the passage of dust and particles 2 microns and greater in size. The size of the exhaust fan system supplied shall be designed to produce an average minimum crossdraft air velocity or an average minimum downdraft air velocity inside the containment enclosure. For enclosures designed with horizontal air flow, the exhaust fan shall have the capacity to produce an average minimum crossdraft velocity of 100 feet per minute, based on theoretical calculations.

> Example: The maximum cross-section of the enclosure in the direction of air flow measures 20' x 10' (200 square feet). Minimum volume of air required for crossdraft is 20,000 cubic feet per minute (200 square feet x 100 feet per minute).

For enclosures designed with vertical air flow, the exhaust fan shall have the capacity to produce an average minimum downdraft velocity of 50 feet per minute, based on theoretical calculations.

> Example: The floor space of the enclosure measures 15' x 16' (240 square feet). Minimum volume of air movement required for downdraft is 12,000 cubic feet per minute (240 square feet x 50 feet per minute).

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Light intensity by natural or artificial means inside the containment enclosure shall be maintained at a minimum of 50 foot-candles, on the steel surface, throughout surface preparation, inspection, and painting activities. Auxiliary lighting shall be provided as necessary. The contractor shall supply the Engineer with one(1) portable light meter, with a scale of 0 to 50+ foot-candles. The meter will be returned to the contractor at the completion of work.

Prior to the start of any abrasive blast cleaning or paint removal work, the contractor shall submit for approval detailed working drawing(s) of the Class A containment system that is to be supplied for each structure. The drawings shall be prepared and stamped by a registered, licensed Professional Engineer. Eight (8) complete copies of the working drawings shall be directly submitted for approval as follows:

Regional Director - 5 copies
Director, Construction Division - 1 copy
Director, Materials Bureau - 1 copy
Director, Structures Design and Const. Division - 1 copy

Upon receipt, 15 working days shall be allowed for the Regional Director to review and approve the contractor's working drawings.

The working drawings shall detail the proposed containment enclosure and include the following information:

1. Plan and elevation of the containment enclosure in relation to the bridge structure.

2. The type of solid or rigid floor and working platform with appropriate safety and fall protection measures. A description of the method that will be used to provide worker access to the enclosure (personnel lifts, scaffolds, etc.), and the procedures and equipment that will be used to protect workers from falls shall be specified (OSHA Safety and Health Requirements, 29 CFR 1926). If a barge of another type of floating platform is used, include details regarding its construction, such as materials and dimensions, how the platform will be tied-off, how the debris will be collected and off- loaded, etc.

3. A description of how the drainage run-off from existing deck drains will be routed through the enclosure.

4. A description of the type of rigid or flexible material(s) for the containment walls, floor, and ceiling.

5. The type of rigid or flexible support structure that will be used for the floor, walls, and ceiling, including the method by which the containment enclosure materials are to be affixed to the support structure.

6. The method by which the containment enclosure will be supported or attached to the bridge, i.e. rollers, clamps. Welding, bolting, or similar connections will not be allowed.

7. The method that will be used to seal the joints (seams) formed when fabricating the containment enclosure, and the method that will be used to seal the mating joints between the containment enclosure and the bridge structure.

8. The method that will be used to seal the entryway. At a minimum, the use of multiple overlapping door tarps shall be provided to minimize dust escape through the entryway.

9. The ventilation system including open air make-up points, the dust collector and exhaust fan(s), the location, type of equipment, the manufacturer's data sheets, and the airflow capacities.

10. The type, size, and configuration of auxiliary lighting that will be provided for inside the containment enclosure.

11. A design analysis of the loads on the bridge due to the containment enclosure including: maximum dead and live loads of the enclosure, the workers, blast abrasive, and equipment; maximum allowable load for the floor and working platform; wind loads imposed on the structure by the enclosure; and, maximum wind velocity that the containment enclosure is designed to withstand.

    If the containment system is supported by the bridge, the working drawing submittal shall include certification by the Professional Engineer that the loads imposed do not cause the overall stress level of any element of the bridge to exceed the Operating Rating Allowable Stresses defined in AASHTO Manual for Maintenance Inspection of Bridges (current edition).

    The analysis shall account for all loads on the structure, including the enclosure dead load, worker liveload, blast abrasive load, equipment load, wind load, structure dead load, and liveload plus the impact. The highway

liveload used for analysis purposes shall be either a HS20 truck or equivalent lane loading, whichever is greater, unless a different highway liveload is shown on the plans. Except as noted, the analysis shall use the loadings and design assumptions in the NYSDOT Standard Specifications for Highway Bridges.

12. Provide details on how the containment enclosure is assembled and disassembled, and moved to a new location on the structure as surface preparation work progresses. Indicate how the dust collector will be included in the containment enclosure. All other pertinent details relating to the containment enclosure shall be included with the working drawings as notes, or as written narrative.

13. Provide details on how the use of the containment enclosure will be coordinated with the maintenance and protection of traffic. Encroachments onto roadways, and clearances over waterways and railroads shall be clearly identified. Whenever a structure spans a railroad, the requirements of §105-09 shall apply. Structures that span a navigable waterway may be subject to regulation by the U.S. Coast Guard, the U.S. Army-Corps of Engineers, the N.Y.S. Thruway Authority - Office of Canals, and the N.Y.S. Dept. of Environmental Conservation.

All abrasive blast cleaning and paint removal work, and all work associated with the collection of paint waste debris, and with the subsequent air blow-down or vacuuming of debris from the steel surfaces on the structure in preparation for painting, shall be performed inside the containment enclosure.

Proper operation of the ventilation system shall be maintained after each assembly of the containment and during all phases of work. The Engineer shall require that the contractor visually demonstrate inward airflow movement into the enclosure at air entry points with smoke tubes.

Extreme care shall be taken to prevent emissions (releases) of waste materials when abrasive blast cleaning and paint removal work are being performed near joints that are formed between the enclosure and the bridge structure, and near seams in the enclosure materials.

The contractor shall make every attempt to limit workers from entering or exiting the containment enclosure when blast cleaning and paint removal operations are being performed.

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All waste material that results from abrasive blasting and paint removal operations shall be cleaned up and collected from the floor, walls, and other surfaces inside of the containment enclosure by vacuuming. Sweeping, shoveling, or other mechanical means to remove the waste materials will not be allowed. Clean up operations shall be performed daily, before new paint is applied, or before a prolonged work stoppage, such as for weather interruptions.

Prior to disassembly or moving of the paint enclosure, the inside surfaces of the enclosure (walls, floors, ceiling, etc.) shall be cleaned of dust and other spent material by vacuuming. The contractor shall take all measures necessary to prevent the release of waste material during moving or removal of the containment.

All air exhausted from the containment enclosure shall pass through the dust collection system.

The effectiveness of the containment enclosure shall be determined by the Engineer, by visual inspection for dust plumes or other visible evidence of emissions (releases) of waste materials into the environment. Throughout the duration of work there shall be no visible discharges. If the Engineer observes a visible discharge, the contractor shall immediately stop work and perform necessary repairs to the containment enclosure or modifications to blast cleaning operations to the Engineers satisfaction.

The Engineer may direct the contractor to stop all work activities and require the contractor to immediately clean up all waste materials within the enclosure when in the Engineer's opinion, threatening weather conditions exist. This measure may be exercised when an apparent threat exists that could cause the release of waste material to the surrounding environment, such as high winds or heavy rain.

If the wind velocity causes the containment enclosure to billow, or to emit dust, or to otherwise be a hazard in the opinion of the Engineer, the contractor shall immediately cease work and clean-up all the debris. Under severe conditions the contractor shall disassemble the containment enclosure.

For bridge structures that are located over or adjacent to water, if it is determined by the Engineer that floating waste materials may accidently form on the water surface they shall be contained from moving upstream or downstream by the use of floating water booms (straw or screens). Floating waste material shall be collected daily, or more frequently, as directed by the Engineer.

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Any waste material that is released outside the containment enclosure shall be immediately cleaned up using vacuums. Care shall be taken on pavement and other surfaces to collect all waste material so as to prevent it from being redistributed into the air and environment by traffic.

All used filters from dust collectors and vacuums, and straw and screening from dam devices, shall be disposed of in accordance with all applicable Local, State, and Federal Laws, regulations and codes. The cost for disposing of these materials shall be included in the lump sum price bid for this item.

METHOD OF MEASUREMENT

Payment will be made at the lump sum price bid.

BASIS OF PAYMENT

The lump sum price bid shall include the cost for preparing the working drawings, and all labor, materials and equipment necessary to complete the work. All work shall be done in a manner satisfactory to the Engineer.

Progress payments will be made. They will be based upon the number of work days required to complete all of the abrasive blast cleaning and paint removal work.

Prior to the beginning of any work, the Contractor shall supply the Engineer with an initial estimate of work days required to complete all of the abrasive blast cleaning and paint removal work. This initial estimate will not be considered final. The Engineer may request a revised estimate at any time during the progress of the work.

The Engineer will determine a daily rate of payment using the lump sum price bid, distributed over the estimate of work days. The daily rate will be used to authorize payment in accordance with §102-17, Article 7.

Should the Engineer request a revised estimate and use that estimate to establish a new daily rate, the lump sum bid price shall be reduced by the total of the amounts previously authorized for payment, prior to the establishment of the new daily rate. Failure on the part of the Contractor to supply a revised estimate when requested, will be cause for the progress payment procedure to be immediately terminated.

Progress payments for this work will be made only for days during which abrasive blast cleaning and paint removal work is actually performed.

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Payment will be made under:

Item No.	Item	Pay Unit
18570.1502nn	Class A Containment For Paint Removal	Lump Sum (for each Structure)

NOTE: nn denotes serialized pay item. See §101-53.