To: SUPERSEDED BY EI 05-039 EFFECTIVE 5/4/2006		New York State Department of Transportation ENGINEERING INSTRUCTION	EI 00-017

Title: **CLASS A CONTAINMENT SYSTEM GUIDANCE**

Distribution:

- ☐ Manufacturers (18)
- ☐ Surveyors (33)
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- ☒ Consultants (34)
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Approved:

Paul T. Wells, Assistant Commissioner and Chief Engineer — 6/9/00 Date

ADMINISTRATIVE INFORMATION: This Engineering Instruction (EI) supersedes the guidance on Class A containment systems originally included in EIs 93-012, 95-011 and 95-015 and provided in other correspondence.

EFFECTIVE DATE: The material contained herein is effective immediately.

PURPOSE: The purposes of this EI are to:

- Consolidate guidance on the use of the Class A containment systems, including requirements for working drawings and addressing maintenance and protection of traffic.
- Distribute revised guidelines for reviewing Class A containment system plans and for monitoring the operation of Class A containment systems.
- Provide a summary of current guidance on health and safety, environmental management, and other issues associated with lead-base paint removal operations.
- Supersede several existing EIs that are incorporated herein or have been incorporated elsewhere.

TRANSMITTED MATERIAL: This EI transmits the following materials which are for use on projects including Class A containment systems. These guidelines will ultimately be incorporated into the Construction Inspection Manual and other related Department manuals.

- Guidelines for Reviewing Class A Containment System Plans.
- Guidelines for Reviewing Class A Containment System Operations.

DISAPPROVED ISSUANCES: The following EIs are superseded by this EI, effective immediately.

- EI 93-012; Class A Containment Enclosure For Lead Paint Removal.
- EI 95-011; Guidelines for Reviewing Class A Containment Plans.
- EI 95-015; Class A Containment Enclosure For Lead Paint Removal.

BACKGROUND:

Class A containment was introduced into Department operations by EI 93-012. At that time, abrasive blasting was used almost exclusively to remove existing paint from steel structures and prepare the surface for repainting. Class A containment was specified to control the release of dust emissions and lead-based paint debris into the atmosphere. Since that time, the Department's procedures for bridge painting have been revised, as described in EI 97-029, but abrasive blasting is still the primary surface preparation treatment for bridges with widespread paint deterioration and other situations where extensive paint removal is needed.

Several changes have been made in the specifications for Class A containment systems since 1993, and guidelines for designing and operating the containment system have been issued and updated. The current version of the Class A containment system specification was distributed by EI 00-008.

Experience with Class A containment systems has been evaluated over the past six years by means of an ongoing Air Quality Monitoring (AQM) Program administered by the Environmental Analysis Bureau. Those results have demonstrated that ambient air quality standards can be met through strict adherence to the provisions of the Class A containment system specification and operational procedures. EI 00-008 provides details on the AQM program that will continue to evaluate compliance with ambient air quality standards.

The attached guidelines for Reviewing Class A Containment System Plans were originally issued by EI 95-011. Since that initial issuance, only minor changes have been made in terms of eliminating the requirement for Main Office review of the plans. The current version of the Guidelines is attached to this EI and has been updated to include the SI (metric) units.

Guidelines for Class A Containment System Operations were originally distributed by memorandum from P.T. Wells, former Director of the Construction Division, on July 28, 1993. Those Guidelines have also been updated to include the SI (metric) units and are attached to this EI.

Over the past seven years, various other guidance has been issued that relates to the removal of lead-based paint from steel structures. Extensive material on worker health and safety, paint waste disposal, and the selection of appropriate procedures for operations such as steel repair and bridge washing has been issued by EIs and other memos. This EI provides a brief summary of the current guidelines related to work involving lead-based paint. Those guidelines remain in effect, and are simply summarized here to make it easier for designers and construction staff to identify all of the existing guidance relating to lead-based paint issues.

IMPLEMENTATION STEPS:

Designers (Regional, Main Office, Consultant).

1. Use of Class A Containment Systems. ITEM 18570.1504M, CLASS A CONTAINMENT SYSTEM FOR PAINT REMOVAL will be included in maintenance bridge painting projects, bridge rehabilitation and reconstruction projects, and other projects involving abrasive blasting of painted steel. Guidance on the selection of other containment systems (i.e., Class B containment and Environmental Ground/Water Protection) is contained in EI 97-029.

Special specifications and notes to modify the Class A containment system specification will not be allowed. However, notes to identify constraints on the contractor's operations such as traffic clearance, lane closures, hours of work, number or sites where work may occur concurrently, etc. may be necessary, and must be prepared and included by the Regions as appropriate.

Contract completion dates should reflect sufficient time to allow 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 beyond those of traditional projects by 4-8 weeks or longer.

This specification is generally not needed for bridge rehabilitation projects where small quantities of paint are being removed in conjunction with steel repairs, i.e., welding, cutting, and similar operations, and for repainting of structures where the existing paint system remains in good

condition. Designers should consult EIs 94-019 and 97-029 for general guidance, and contact the Structures Division and the Materials Bureau for project-specific guidance.

The Class A containment system is not required for use during paint application to protect against damage from over-spray, or paint drift and spatter. Protection against damage from paint application is provided in the bridge painting specifications. As a practical matter, the contractor may elect to paint inside the containment. When painting inside an enclosure, adequate mechanical ventilation must be supplied to meet OSHA regulations such as those covering worker exposure to solvents, fumes, and lead, along with the requirements of any other appropriate regulation.

2. **Maintenance and Protection of Traffic.** While it is desirable for the contract documents to provide sufficient details on 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 specifications and MUTCD."**

3. **Paint Removal Waste.** In general, designers should use pay item 571.01nnnn. However, designers should contact the Regional Environmental Unit or the Environmental Analysis Bureau for project-specific guidance.

4. **Cost Estimating.** Considerable experience has been gained over the past seven years that provides a cost history on Class A containment systems. Most Regions have sufficient cost histories to estimate costs, and additional cost information is available from Design Quality Assurance Bureau (DQAB).

Environmental Analysis Bureau (EAB).

1. **Air Quality Monitoring**. The Air Quality Monitoring program will continue to evaluate the effectiveness of Class A containment systems in meeting air quality standards. EAB will identify projects to be monitored, provide technical oversight of the consultant, and provide overall management of AQM activities per EI 00-008.

2. **Paint Removal Waste**. EAB will provide assistance to Regional management of the paint removal waste when requested by the Regions.

Regional Construction Groups (RCG).

1. **Working Drawings**. The Regions will be responsible for reviewing the contractor's submittal of working drawings, equipment lists, and operating plan for conformance with the containment specification, and for acceptability of the traffic control plan, according to the attached guidelines. 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.

2. **Paint Removal Waste**. The Engineer-In-Charge (EIC) will ensure that the contractor complies with §Section 571 or other requirements as specified in the contract documents.

3. **Air Quality Monitoring**. There should be no visible discharges from any containment system. Observation of any visible discharges will result in a work stoppage per the Class A containment system specification. RCGs will coordinate Class A containment system activities with EAB, provide general oversight and supervision of consultant AQM staff while on the project, and initiate corrective actions per EI 00-008.

4. **Health and Safety Issues**. Since bridge paint removal work typically involves contact with lead-based paint, worker safety standards must be addressed and implemented by the contractor, consultant and Department employees. The EIC and inspection staff will ensure contractor, consultant and Department employee compliance with Occupational Safety and Health Administration (OSHA) Lead Standards, 29 CFR 1926.62. Guidance is provided in EIs 93-034 and 95-014, and the Department's Health and Safety Program Manual, MURK 1-C. Specific deliverables include the Lead Exposure Control Plan, Exposure and Biological monitoring, training, etc.

   Department employees are to avoid exposure during lead-based paint removal operations and follow the guidance contained in MURK 1-C.

OTHER RELATED GUIDANCE: The following summary list identifies other Department guidance for use on any project involving paint removal:

1. **EI 93-034; PROTECTING WORKERS FROM LEAD AND MATERIALS CONTAINING LEAD (PAINT)** - provides a Special Note for inclusion in contracts involving only minor or incidental work involving lead exposure. The Special Note alerts the contractor to the existence of lead on the project and the need to implement and adhere to the OSHA Lead Standard, 1926.62. The contractor is further alerted to the Department's requirements to provide OSHA related deliverables to the EIC. This Special Note is to be included on all projects involving lead-based paint that do not include payment items for the contractor's lead health and safety program - see EI 95-014.
2. **EI 94-019; REMOVAL OF EXISTING STEEL; LOCALIZED STRUCTURAL STEEL CLEANING, PAINTING, AND CONTAINMENT SYSTEM** - transmits a revised specification for Removal of Existing Steel, a shelf note amending the specification for removal of structures and obstructions, and new specifications for localized paint removal from structural steel by vacuum contained methods, localized painting of bare structural steel, and containment system for localized steel repair and painting.
3. **EI 94-030; MAINTENANCE CLEANING AND WASHING OF BRIDGES** - provides guidance regarding the maintenance cleaning of bridges including collection and disposal of debris. It transmits two specifications for maintenance cleaning and washing of bridges and for collection and disposal of debris.
4. **EI 95-014; LEAD HEALTH & SAFETY PROGRAM** - transmits specifications and guidelines for the use of a Lead Health & Safety Program on Department projects. The pay items provided are intended for use on projects where the lead-based paint removal work is considered to be a major item of the project as defined in §109 -16 as any item totaling $50,000 or 2% of the total contract bid price.
5. **EI 97-029; BRIDGE MAINTENANCE PAINTING POLICY** - establishes policy for bridge painting and transmits specifications and procedures for painting of existing structures in the field. These requirements specify a single component, moisture-curing urethane paint system, and three different painting methods for use on bridges with good, moderate, and poor paint conditions. Guidelines are presented for the designer to select the most appropriate surface

preparation and painting methods, based on the condition of the existing paint, and the location and complexity of the structure selected for painting, These paint specifications include a requirement for pressure washing of the structure to remove salts prior to removal of any paint. The current specification for a Class B Containment Enclosure for use on bridges cleaned using power tools is also included. Guidance is provided on the appropriate type of containment to be used – Class A, Class B or Environmental Ground/Water Protection.

6. **EI 98-034; SPECIAL NOTE FOR CONTRACTORS, BRIDGE PAINTING POLICY - SSPC/PCCP REQUIREMENT** - provides a special note for inclusion in contracts involving lead-based paint removal, containment and collection, surface preparation, and field painting of structural steel. This note requires contractors/subcontractors involved in certain painting-related work to obtain the Society for Protective Coatings (SSPC) certification or equivalent.
7. **EI 00-008; AIR QUALITY MONITORING (AQM) FOR CLASS A CONTAINMENT** - issues the Department policy for AQM on lead-based paint removal projects and issues AQM protocols. Additionally, it provides a Special Note to alert the Contractor to the Department's AQM program and the conditions for assessing engineering charges should the containment not perform as required. The current version of the Class A containment system specification is distributed by this EI.
8. **STANDARD SPECIFICATION § 571; TREATMENT AND DISPOSAL OF PAINT REMOVAL WASTE** - Covers work consisting of accumulating, packaging, labeling, loading, transporting, treating, and disposing paint removal waste declared to be a hazardous waste containing lead.
9. **MURK 1-C; HEALTH AND SAFETY PROGRAM MANUAL** - This manual covers guidance to construction inspection staff to ensure the contractor adheres to the Department's health and safety requirements. It also provides guidance to construction inspection staff to ensure their own health and safety on the project.
10. **SDA 97-002; REMOVING STEEL SUPERSTRUCTURES OR SUBSTRUCTURES CONTAINING LEAD-BASED PAINT** - provides Special Notes for inclusion in contracts involving removal of one or more steel structures containing lead -base paint. It also advises the designer as to when to include the payment item for the Lead Health and Safety Program.
11. **DRAFT LEAD ACTION PLAN** - This plan, dated March 1991, provides guidance in the handling of lead-based paint removal waste in satisfaction of EPA and DEC hazardous waste regulations.

CONTACTS:

- For questions relating to the health and safety issues and to OSHA requirements, contact the Construction Division at 518-485-1834.
- For questions relating to the technical aspects of the Class A containment system specification and working drawings, and general questions relating to the bridge painting program, contact the Materials Bureau at 518-457-4285.
- For questions relating to the review of the structural analysis, contact the Structures Division at 518-457-5715.
- For questions relating to contractual aspects of implementation, including the use of the Class A containment system specifications for ongoing work, contact the Construction Division at 518-457-6472.
- For questions relating to the air monitoring program, contact the Air Quality Section of the Environmental Analysis Bureau at 518-457-5672.
- For questions relating to the handling of the hazardous lead-based paint removal waste, contact the Hazardous Waste Section of the Environmental Analysis Bureau at 518-457-5672.

GUIDELINES FOR REVIEWING CLASS A CONTAINMENT SYSTEM PLANS

The following are guidelines for use in reviewing containment plans submitted by a contractor under Item 18570.1504M (or previous versions). **These guidelines do not have the authority of the specification.** They are offered as a supplement to aid the contractor and Department personnel in interpreting the specification so that an acceptable containment system is provided. No work shall be performed to set up the containment system without the EIC's acceptance of the Class A containment system plans.

These guidelines elaborate on key items in the specification, some of which may be unfamiliar. Specification requirements are summarized for each, and where appropriate, comments are provided on the item's function and importance in the operation of a containment enclosure. Questions that follow the discussion provide a "reasonableness" check for the plan reviewer.

Definitions

Containment Enclosure - The entire localized work area where abrasive blasting operations are performed is enclosed by sheet material affixed to a support structure. The containment enclosure is erected to control releases of airborne debris into the environment and to facilitate collection of the debris for disposal. The deck slab may serve as the ceiling of the containment enclosure if airborne dust would be contained. Includes the containment materials, support structure, and entry way.

Containment System - A system of containment composed of the Containment enclosure and dust collection/ventilation system and other equipment such as auxiliary lighting and generators.

Containment System Plans (Working Drawings) - The drawings prepared by a New York State licensed professional engineer that document the design considerations, materials, support structure, floor, methods of fabrication,

Floor - The floor is the rigid surface from which the worker performs paint removal and related operations. The floor must be covered with the containment material to protect the environment. The type of floor depends on the site conditions; Examples are as follows;

- **Ground or paved surfaces**. These surfaces shall be smooth 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.
- **Elevated platforms**. Work platforms provided by personnel lifts, aerial lifts, scaffolding, etc., shall be described by the contractor as to the method to be used and the procedures and equipment that will be used to protect workers from falls as specified in OSHA 29 CFR 1926.
- **Floating platforms.** If a barge or other type of floating platform is used, the contractor shall include details regarding its construction.

General

- Are the detailed working drawings of the Class A containment system prepared and stamped by a registered, licensed NYS Professional Engineer?
- Is adequate space provided between the containment enclosure and the steel to clean and inspect the prepared surfaces?
- Has a design analysis of loads on the bridge from the containment enclosure, blast abrasive load, equipment load, etc. been performed in accordance with the NYS Bridge Specifications? If the air filtration, air compressor, blast pot, blast material, etc. are to be located on the bridge, insure that they are included in the design analysis.
- Has the access of workers and their safety been adequately addressed, i.e., work surface, aerial lifts, scaffolding?
- Will the containment structure interfere with normal operations, and if so, has a reasonable M&PT plan been provided?
- Have minimum clearances over waterways and railroads been maintained? Have construction plans been coordinated with appropriate authorities, i.e., U.S. Coast Guard, U.S. Army Corp. of Engineers, etc.?
- Can the containment enclosure be assembled and disassembled, and moved to a new location as work progresses, in a timely manner and without causing disruption to essential operations?
- Insure that welding and bolting to the bridge are not included in the design, since welding and bolting to the bridge structure are strictly prohibited.

Containment Materials - Either rigid or flexible materials may be used. Rigid materials consist of panels or modular fabrications constructed of plywood, fiberglass, plastic, or metal materials. Flexible materials include tarps and plastic sheeting that are impervious to wind and dust. Light colored translucent materials are recommended to maximize natural lighting.

- Are the materials impervious to dust and wind?
- Are the materials durable, e.g., resistant to wind forces?
- Is the method, grommets or the equivalent, for securing materials to the support structure adequate?
- If flexible materials are used are they fire retardant?
- Are flexible materials proposed for covering the floor of the containment enclosure? If so, the underlying ground or pavement or supporting surface has to be smooth so paint debris can be vacuumed. Rigid materials would span unevenness and provide a smooth surface for vacuuming. If necessary, due to site conditions, does the plan address clean up of the ground or pavement prior to placement of the flexible materials?

Support Structure - Either a rigid or flexible support structure may be used. Rigid support structures are comprised of scaffolding and framing to which containment materials are secured. Flexible support structures use cables, ropes or chains.

- Is movement of the support structure and containment materials sufficiently constrained so joints and seams will remain sealed?

- Is the containment floor covered with flexible materials or are the joints of the rigid floor sealed?

For suspended containment enclosures:

- If containment is a down draft design, is the working platform an open grate so as to not restrict air flow?
- If containment is a down draft design, does the support structure provide a funnel-shaped bottom to facilitate the collection of waste material?

For containment enclosures that are not suspended:

- Is the pavement or ground used as the floor of the containment enclosure? If so, the surface must be covered with flexible or rigid containment materials. Refer to the previous section on containment materials for discussion on cover materials.

Joints and Seams - Joints are mating surfaces between containment materials and the bridge structure. Seams are formed where containment materials are joined. Sealing of joints and seams may be accomplished by overlapping the materials, or by taping, caulking, etc.

Check joint details -- joints are particularly difficult to seal.

- Are the sides of the containment enclosure sealed against the bridge structure?
- Are the air supply and exhaust ends of the containment enclosure properly sealed against the bridge structure, or specially designed end sections, to prevent the escape of dust?

Check seam details.

- Are rigid materials taped or caulked?
- Are flexible materials overlapped 610mm (24 inches) and secured by tape or some type of clamp or tie at 610 mm (24 inches) intervals along the seam? It is permissible for some outside air to be drawn through seams into the containment enclosure by the exhaust fan.

Entryway - Multiple overlapping door tarps are required as a minimum. The entryway is a potential area for dust escape if used frequently by workers.

Check entryway details.

- Are two or more sets of overlapping door tarps provided with adequate space between so that one set of tarps remains closed when entering or leaving?
- Are details provided to support alternate entryway proposals?

Dust Collection/ Ventilation System - Air laden with lead paint and abrasive dust will be drawn from the containment enclosure by the exhaust fan and forced through dust collectors for filtration before being discharged into the environment. A Class A containment system will, by design, operate under negative pressure. Air pressure inside the containment enclosure will be less than air pressure outside.

A specified air flow -- 0.50 m/s (100 fpm) for air moving in the horizontal direction past the workers (0.25 m/s [50 fpm] for vertical air flow ventilation systems) -- is used to roughly size exhaust fans. Fan capacity is determined by a theoretical calculation taking into account the cross sectional area of the containment enclosure.

The ducts carrying air from the containment enclosure to the dust collector should be sized to achieve a minimum air velocity of 17.75 m/s (3500 fpm) and a maximum air velocity of 35.50 m/s (7000 fpm). This velocity range is necessary to effectively transport the dust laden air.

Usually radial type centrifugal fans are used to move air containing abrasive materials. The fans are designed to operate at an air flow rate at a given number of mm (inches) water gauge (wg). The latter term is the ventilation system resistance, or head loss, due to air flow inefficiencies that the fan is able to operate against. The ventilation system resistance for a typical bridge containment enclosure is not known at this time, but is expected to be at least 150 mm (6 inches) water gauge. The ventilation system resistance could be higher or lower depending on design of the air make-up points, duct losses, the type of dust collector, etc. The largest source of the ventilation system resistance will likely be the dust collector, which experiences a pressure drop as air passes through the filter media. Fabric collectors are usually selected with ratings in the range of 50 to 125 mm (2 to 5 inches) water gauge.

A "multi-rating table" available from the fan manufacturer is used for selecting fan equipment. The table shows a range of capacities for a particular fan size. Air flow and pressure (resistance) requirements of the ventilation system determine fan size and operating RPM. Fan capacity in equipment specifications is reported as an air flow rate at some given pressure.

Specifications require that dust collection equipment be 99.9% efficient against the passage of dust and particles 2 microns and greater in size. Under these conditions, the effluent from the dust collector theoretically would contain a particulate emission concentration in the order of 23 micrograms/dry standard cubic meter. This concentration is well within the no-visible-dust range.

Fabric collectors are suitable for the heavy dust concentrations associated with abrasive blasting. Interruptible-operation dust collectors shut down for a couple of minutes after several hours operation to recondition the filter media by vibration or by reversing the air at low pressure. Continuous-operation dust collectors recondition only a section of the filters periodically, so operations are never interrupted. Reverse pulses of high pressure air are used to recondition the filter media.

Fabric collectors are sized in terms of air flow rate versus fabric media area. This is called the "air-to-cloth-ratio" with units of cm/s per square meter of fabric. This ratio represents the average velocity of air through the filter media. Air-to-cloth ratios ranging from 1:1 to 7:1 are acceptable (filter velocity 0.005 - 0.035 m/s [1-7 fpm]).

- Are the exhaust ducts leading from the containment enclosure to the dust collector sized to achieve an air velocity between 17.75 and 35.50 m/s (3500 and 7000 fpm)? Determine this by dividing the exhaust duct air flow rate by the area of the duct opening.
- Will the fan deliver the specified air flow rate at 150 mm (6 inches) (minimum) water gauge? Refer to the multi-rating table for the specified fan to verify capacity. Fabric collectors with pressure drop ratings on the high side (greater than 100 mm [4 inches] water gauge, for example) may require fans that efficiently operate at pressures higher than 150 mm (6 inches) water gauge.
- From the manufacturer's specifications, is the air-to-cloth ratio within the range of 1:1 to 7:1 at the speed at which the dust collector will be operated?

Air Make-Up Points - Fresh outside air has to enter the containment enclosure to replace the air that is exhausted. A lack of replacement air will raise the internal negative air pressure (increase ventilation system resistance) and overtax the fan, severely decreasing the exhaust flow rate. Under these conditions the fan will operate inefficiently with increased operating costs, and will cause air inside containment to flow well below the specified theoretical rate of 0.05 m/s (100 fpm) (0.25 m/s [50 fpm] for vertical air flow ventilation systems).

Openings required for air make-up are expected to total 1/5 of the containment enclosure cross-sectional area. A small amount of outside air may be drawn through overlapped seams in the containment enclosure. Additional air may have to enter through specially constructed air make-up points in the containment enclosure wall opposite the fan. Simple wooden-framed openings covered with furnace air filters can be installed to function as air make-up points. They will distribute the incoming air and prevent the outflow of airborne debris should the exhaust fan suddenly shut down. More elaborate air make-up points include louvered or baffled openings. Fans or blowers at air entry points to assist air flow into the containment enclosure are not required, nor are they desired.

- Are the air make-up points located at the opposite end of the containment enclosure from the exhaust fan so that the work area is between?
- Are the openings spaced and positioned to distribute make-up air across the face of the containment enclosure at the entry points?
- Is the total area of air make-up points, including openings in overlapped seams and joints, approximately 1/5 the cross-sectional area of the containment enclosure?
- Are air entry points sized to ensure air velocities through openings range between 1.0 and 2.5 m/s (200 and 500 fpm) (divide air flow rate through opening by area of opening)?
- Are air make-up points covered by filters, like those used for furnaces, or louvered or baffled?
- Are obstructions inside the containment enclosure minimized so as to not block or disrupt the flow of air, e.g., is air flow parallel to the beams?

Other Concerns

- Will natural lighting be adequate inside the containment enclosure? If not, are artificial means provided and capable of producing a light intensity of 535 lx (50 foot-candles)?
- Are there provisions to redirect water from deck drains through or around the containment enclosure?
- Does the method of access to the containment enclosure and the working platform include safety and fall protection measures in compliance with OSHA?
- Are other safety concerns, created by the contractor's approach to the project, addressed in the Project's Health and Safety Plan. (Equipment, work platforms, aerial lifts.....)

GUIDELINES FOR MONITORING OPERATIONS OF CLASS A CONTAINMENT SYSTEMS

The following are guidelines for inspecting containment systems installed by a contractor under Item 18570.1504M (or previous versions). **These guidelines do not have the authority of the specification.** They are offered as a supplement to aid the contractor and Department personnel in interpreting the specification so that an acceptable containment system is provided.

Department staff will need to perform a variety of quality assurance checks to verify that the contractor's implementation of containment plans are in compliance with specifications. Paint removal operations involving open abrasive blasting methods generally must be performed within a fully enclosed containment structure to prevent the release of paint debris and dust. Selected projects will be monitored by consultants for air quality to verify proper design and operation of containment systems. The Environmental Analysis Bureau will correlate air quality readings with engineering controls to determine which are effective and provide a measure of quality assurance. The contractor must maintain control over containment and blasting operations and be accountable for paint debris emissions. All project personnel need to become familiar with the Class A specification, containment system plans, plan review guidelines, and the following operational guidelines for containment systems.

Equipment

Special equipment needed for determining specification compliance include a smoke tube kit, a vaneometer, and a light meter. A smoke "gun" provides discrete puffs or a continuous stream of smoke on demand by squeezing a rubber bulb handle. Smoke is generated by chemical reaction when a glass vial containing the chemical is broken. The smoke gun is used for observing direction of air movement - at seams and air inlet points of the containment enclosure. A vaneometer (swing vane anemometer) is an inexpensive hand held instrument for measuring air velocity inside containment enclosures. A velometer, which is a more accurate and expensive swinging vane anemometer, is preferable though not necessary. A light meter of the type used by photographers is used to measure light intensity inside the containment enclosure. All equipment is commercially available. Specifications do not require the contractor to provide this equipment, however, a contractor will need this equipment to demonstrate compliance. Inspectors may utilize readings obtained with the contractor's equipment. Regions may opt to supply equipment to their field personnel to independently verify specification compliance.

Working Drawings

Regions are responsible for reviewing and approving working drawings for conformance with the containment system specification. No containment enclosure shall be erected without drawings first being approved. If unanticipated field conditions are encountered that require the approved drawings to be modified, the contractor shall prepare amended drawings for Regional approval. The "As Built" plans are essential when reviewing air monitoring results and for improving specifications.

Installation

Containment enclosures are to be erected in accordance with the approved working drawings. The following items need to be checked for conformance to plans:

- Rigidity of the support structure.
- Use of specified containment materials.
- Securing of the containment materials to support structure.
- Floor covers.
- Sealing of openings in ceiling (deck underside) of containment enclosure.
- Sealing details at joints and seams.
- Sealing details at bulkheads or end walls.
- Sealing details at entryway.
- Redirection of deck drain water.
- Illumination intensity inside containment enclosure.
- Obstructions to air flow inside containment enclosure.
- Specified dust collection/ventilation system (fan, duct sizes and number, air filters).
- Location and sizing of air make-up points.
- Compliance with health and safety requirements, e.g., safe access, vacuum for cleanup.
- Compliance with traffic control plan and any restrictions such as coordination with RR, Coast Guard, etc.

Trial Run

After completion of the checks on the installation of the containment enclosure, the next step is to evaluate the dust collection/ventilation system which provides ventilation through the containment enclosure. Two features of the containment enclosure need to be confirmed: (1) the inward flow of air; and, (2) the specified rate of air movement inside. The contractor should start up the dust collection/ventilation system without abrasive blasting and perform their own verification checks.

To check for inward flow of air, activate the smoke gun and walk around the outside of the containment enclosure holding it near all joints, seams, and air entry points. The direction of smoke indicates the direction of air movement. At all openings in the containment enclosure, smoke should flow inward. Joints and seams that are completely sealed will have no effect on the direction of smoke. In no case shall smoke be blown away from the containment enclosure by air emitted from inside the containment enclosure. This would indicate an outward flow of air, which is prohibited. To correct this situation the contractor win have to improve operation of the exhaust fan to obtain a negative air pressure inside the containment enclosure. Pay close attention to joints between the containment enclosure and the structure, for these locations are more difficult to seal. The contractor will have to provide safe access to hard to-reach places.

The rate of air movement inside containment enclosure is measured by a hand-held vaneometer. Care has to be taken to level the instrument which relies on a vane type

pendulum to measure air flow. A minimum of six measurements are taken in a cross-sectional plane inside the containment enclosure in the area where blasters will be working. No individual velocity reading shall be less than 0.40 m/s (90 fpm), and the average of readings shall be 0.50 m/s (100 fpm) or higher for containment enclosures designed with horizontal air flow. The minimum velocity reading for downward air flow containment enclosures shall be 0.225 m/s (45 fpm), and the average velocity shall not be less than 0.25 m/s (50 fpm). Avoid taking readings along the periphery of the containment enclosure and near obstructions, as air flow in these areas will not be representative. The flow of air through the work area should be evenly distributed. If acceptable velocity readings are not obtained, the contractor must adjust imbalances in the ventilation system to improve air flow. Procedures for balancing a ventilation system are quite technical; balancing adjustments will be made by the contractor to one or a combination of the following: inlet air openings, fan speed, duct sizes before and/or after the exhaust fan and air filters.

The contractor may begin paint removal operations only after the containment enclosure and dust collection/ventilation system have been determined to be in conformance with specifications. The above check-out procedure will be repeated after each stoppage of work, e.g., at the start of the workday, breaks and lunches if shut down, an emission sighting, repositioning of the containment enclosure.

Operation

For the duration of work, there shall be no visible emissions of waste materials escaping the containment enclosure. If a discharge occurs, it shall be cause for immediate stoppage of work until corrective action is taken. The contractor shall perform necessary repairs to the containment enclosure or modify blast cleaning operations to the Engineer's satisfaction before work may resume.

Review proper blasting procedures and operation of the containment system with the contractor before work is started.

- Ensure that air velocity criteria continue to be met throughout the work period. Direct the nozzle blast away from the containment materials. Joints and seams are particularly vulnerable to releases of paint debris.
- Minimize entering and leaving the containment enclosure during blasting operations. Observe that the dust collector filters are being periodically reconditioned (cleaned) of their dust cake to maintain filtration efficiency. This will usually be an automated process. As dust accumulates on the fabric media, air flow is reduced and the fan works harder to overcome the increased head loss. If it appears that the filters are not being reconditioned, the contractor should verify that the dust collector is working properly. A lowering of air velocity inside containment may be detectable.
- The dust collection/ventilation system must be operating at all times during abrasive blasting activities and clean-up operations that follow.
- Proper clean-up requires that blast-cleaned steel surfaces shall first be air-blown down or vacuumed, and then all paint debris shall be vacuumed from the ceiling,

walls, and floor of the containment enclosure, in that order. Paint debris is collected in containers for disposal under a separate pay item.

Adverse weather, particularly strong winds and heavy rain accompanying thunderstorms, could affect the integrity of the containment enclosure. If there is a threat of a storm that may cause waste materials to be released into the environment, abrasive blasting operations should be stopped immediately and clean-up begun.

Due to the hazardous nature of lead, inspectors should not go inside the containment enclosure during blasting or before cleanup unless essential to perform their duties. All inspectors involved in these operations are potentially exposed to lead, and must therefore consult with the Regional Construction Safety Coordinator to determine appropriate protective measures.

QA CHECKLIST RE: CONTAINMENT - ITEM 18570.1504M

Before Blasting

- Accept plan.
- Installation per plan.
- Ensure availability of required equipment (smoke, air flow, light meter, H & S, cleanup).
- Require a trial run to verify conformity to specification by contractor.

During Blasting

- Monitor for visible emissions.
- Monitor for maintenance of negative pressure.
- Monitor for blasting operations in vicinity of tarps, seams, doors, etc.
- Monitor for worker entrance/exit.
- Monitor ventilation system operation.
- Monitor weather conditions.
- Stop work when visible emissions or other serious problems are noted.

After Blasting

- Monitor cleanup w/ventilation system operational.
- Monitor waste disposal control.