§ 732-01

SECTION 731 (VACANT)

SECTION 732 - DRILLING

732-01 DRILL RIGS

SCOPE. This specification covers the equipment and performance requirements for drill rigs.

GENERAL. Drill rigs shall be specifically designed and manufactured for drilling, coring and sampling soil and rock.

EQUIPMENT. Drill rigs shall have adequate capacity and power to accomplish the required work. Each rig shall be supplemented with the necessary auxiliaries, appurtenances, tools and other equipment required for proper operation.

BASIS OF ACCEPTANCE. The rigs and all necessary auxiliaries, appurtenances, tools, barges, platforms, support vessels and equipment shall be acceptable to the Engineer. Drill rigs that are not adequate, as determined by the Engineer, will not be permitted for use. Drill rigs required under the items for furnishing equipment including drive hammers, all necessary auxiliaries, appurtenances, tools, barges, platforms, support vessels and other equipment must be on site, inspected and approved by the Engineer in conjunction with a representative of the Geotechnical Engineering Bureau before any work is done by that rig. Each rig shall be complete and sharing of equipment between rigs will not be permitted.

732-02 DRIVE PIPE

SCOPE. This specification covers the material and quality requirements for drive pipe used in subsurface explorations.

MATERIAL REQUIREMENTS. Drive pipe shall be extra strong steel pipe, 65 mm or 100 mm nominal diameter as specified, with threaded ends in random 1.5 m lengths and shall conform to the requirements of ASTM A120, Schedule 80.

BASIS OF ACCEPTANCE. Drive pipe shall be subject to inspection and approval of the Engineer in conjunction with a representative of the Geotechnical Engineering Bureau.

732-03 CASING

SCOPE. This specification covers the material and quality requirements for casing used in subsurface explorations.

MATERIAL REQUIREMENTS. The casing shall be diamond drill flush-joint or flush coupled type, fabricated from high quality seamless steel tubing conforming to the requirements of the Diamond Core Drill Manufacturer's Association (DCDMA) Standards. The design shall permit any size casing to telescope into the next larger size.

BASIS OF ACCEPTANCE. Casing shall be subject to inspection and approval of the Engineer in conjunction with a representative of the Geotechnical Engineering Bureau.

732-04 SAMPLERS

SCOPE. This specification covers the material requirements for split barrel samplers.

MATERIAL REQUIREMENTS. Samplers shall be equipped with a ball check in the head section and have a minimum inside length of 0.5 m. For 50 mm diameter samplers, the outside diameter shall be 50.8 mm and the cutting shoe opening shall be 35.1 mm. For 65 mm samplers the outside diameter shall be 63.5 mm and the cutting shoe opening shall be 47.7 mm. For 75 mm samplers the outside diameter shall
be 76.2 mm and the cutting shoe opening shall be 60.4 mm. For 90 mm diameter samplers, the outside diameter shall be 88.9 mm and the cutting shoe opening shall be 73.2 mm.

**BASIS OF ACCEPTANCE.** Samplers shall be subject to the inspection and approval of the Engineer in conjunction with a representative of the Geotechnical Engineering Bureau.

### §732-05 THIN WALL SAMPLE TUBES

**SCOPE.** This specification covers the material and quality requirements for thin wall sample tubes.

**MATERIAL REQUIREMENTS.** Thin walled sample tubes shall be fabricated from Type 304 stainless steel tubing meeting the requirements of ASTM A276 as specified for a nominal 90 mm O.D. seamless or welded tubing with nominal 1.65 mm wall thickness. Specific dimensions and fabrication details shall comply with the current Geotechnical Engineering Bureau Drawing entitled “Stainless Tube for 90 mm Undisturbed Soil Samples.” Liners for 90 mm samplers shall have an outside diameter of 76.2 mm and shall be 450 mm long. Liners shall be fabricated of brass or stainless steel only.

**BASIS OF ACCEPTANCE.** Sample tubes shall be subject to the inspection and approval of the Engineer in conjunction with a representative of the Geotechnical Engineering Bureau.

### §732-06 CORING BITS

**SCOPE.** This specification covers the material requirements for coring bits used in Subsurface explorations.

**MATERIAL REQUIREMENTS.** Coring bits shall be four sizes: AX, BX, NX and HX. The bits shall meet the outside diameter requirements specified by the National Bureau of Standards and the Diamond Core Drill Manufacturer's Association.

**BASIS OF ACCEPTANCE.** Coring bits shall be subject to inspection and approval of the Engineer in conjunction with a representative of the Geotechnical Engineering Bureau.

### §732-07 SAMPLE STORAGE BAGS

**SCOPE.** This specification covers the material requirements for sample storage bags used for containing soil samples.

**MATERIAL REQUIREMENTS.** Sample storage bags shall be moisture-proof, transparent, plastic bags with minimum dimensions 200 mm length, 250 mm width and 0.05 mm thickness.

**BASIS OF ACCEPTANCE.** Sample storage bags shall be subject to inspection and approval of the Engineer.

### §732-08 SAMPLE JARS

**SCOPE.** This specification covers the material requirements for sample jars used for containing soil samples.

**MATERIAL REQUIREMENTS.** Sample jars shall be glass, or plastic, wide-mouthed jars of one-liter capacity with air-tight screw covers fitted with rubber compo-lined caps.

**BASIS OF ACCEPTANCE.** Sample jars shall be subject to inspection and approval of the Engineer.
§732-09

732-09 JAR CARTONS

SCOPE. This specification covers the material and fabrication requirements for jar cartons used to contain soil sample jars.

MATERIAL AND FABRICATION REQUIREMENTS. Jar cartons shall consist of corrugated Kraft paper cardboard fabricated into a box with overall nominal dimensions of 300 mm wide, 400 mm long and 180 mm deep. The box shall be partitioned and have sufficient strength to safely support twelve (12) sample jars conforming to §732-08 in a 3 x 4 array.

BASIS OF ACCEPTANCE. Jar cartons shall be subject to inspection and approval of the Engineer.

732-10 BOULDER AND ROCK CORE BOXES

SCOPE. This specification covers the material and fabrication requirements for boxes used to contain core samples of boulders and rock.

MATERIAL AND FABRICATION REQUIREMENTS. Boxes shall be fabricated of white pine, Grade No. 2 common or better, 25 mm stock (finished 20 mm) thickness or an approved equal material. Overall box dimensions for “AX” cores shall be 1.56 m long, 245 mm wide and 70 mm high. Dimensions for “BX” core boxes shall be 1.56 m long, 275 mm wide and 85 mm high. Dimensions for “NX” core boxes shall be 1.56 m long, 275 mm and 95 mm high. Dimensions for “HX” core boxes shall be 1.56 m long, 285 mm wide and 120 mm high. Core rows shall be separated by wooden or tempered hardboard, 3 mm thick strips recessed to 10 mm depth and glued with waterproof glue at the bottom and ends of the box.

Box covers shall be hinged with two, 50 mm steel butt hinges recessed and fastened with flat head wood screws. Box covers shall be secured in a closed position by two, 40 mm hook and eye fasteners. All boxes shall be coated with weatherproof wood preservative. Details are specified on the current Geotechnical Engineering Bureau Drawing entitled “Core Box AX, BX, NX and HX Sizes.”

BASIS OF ACCEPTANCE. Core boxes shall be subject to inspection and approval of the Engineer in conjunction with a representative of the Geotechnical Engineering Bureau.

732-11 OPEN WELL PIEZOMETER

SCOPE. This specification covers the material requirements for open well piezometers.

MATERIAL REQUIREMENTS. Monitoring pipe-riser pipe shall be 25 mm (nominal diameter) threaded PVC schedule 40 pipe. Slotted screen pipe shall be 1.5 m long and be 25 mm (nominal diameter) threaded PVC schedule 40 pipe. Caps shall be 25 mm (nominal diameter) PVC schedule 40 threaded male cap for the top, and 25 mm (nominal diameter) PVC schedule 40 threaded female cap for the bottom.

Sand. Provide well rounded, uniformly graded silica sand, which is correctly sized to the slotted screen. Ottawa sand is acceptable.

Bentonite pellets. Provide 6 mm (nominal diameter) bentonite pellets.

Manhole. Provide a 200 mm (inside diameter) steel flush mount manhole with a 200 mm skirt.

Cement. The material shall meet the requirements of §701-01 Portland Cement Type 1 or 2.

Water. The water for the mix shall conform to the requirements of §712-01 Water.

Bentonite Powder. There are no material requirements for the bentonite, except it shall be supplied in powder form from a reputable manufacturer and pass a 75 μm mesh particle size.
§736-01

BASIS OF ACCEPTANCE. Materials used for the installation of open well piezometers shall be subject to inspection and approval of the Engineer.

732-12 GROUT

SCOPE. This specification covers the material requirements for the grouting of bore holes.

MATERIAL REQUIREMENTS. For cement, the material shall meet the requirements of §701-01.

Portland Cement Type 1 or 2. Water for the mix shall conform to the requirements of §712-01.

Water. There are no material requirements for the bentonite, except it shall be supplied in powder form from a reputable manufacturer and pass a 75 μm mesh particle size.

BASIS OF ACCEPTANCE. The grout shall be subject to inspection and approval of the Engineer.

SECTION 733 AND 734 (VACANT)

SECTION 735 - CONCRETE CYLINDER CURING BOX
735-01 CONCRETE CYLINDER CURING BOX

SCOPE. This specification covers the material requirements, tests and basis of acceptance for a Concrete Cylinder Curing Box.

MATERIAL REQUIREMENTS. The Concrete Cylinder Curing Box shall be constructed of noncorroding materials. A moisture proof seal shall be provided between the lid and body of the box. Provision for automatic control of water temperature to 22°C ± 3°C shall be made when the box is located in an uncontrolled environment. A bimetallic thermometer shall be installed with its sensing element in the storage water. The thermometer shall be capable of being read from the outside without opening the box. The thermometer shall have minimum gradations of 1°C and shall be protected from damage. Electric utility connections shall be made in a lockable switch box securely attached to the outside of the curing box.

A rustproof wire or metal rack shall be set above the bottom of the box to support cylinders in an upright position. This rack and all temperature control elements shall be positioned to allow free circulation of water around the cylinders. A combination hose connection and drain shall be provided at the lower front edge of the box so that it may be drained or water may be circulated. A drain shall also be provided on the box in such a position that when open will drain water to within 25 mm over the top of the cylinders. All areas of the box shall be easily drained and accessible for cleaning.

Test. The Concrete Cylinder Curing Box shall be capable of maintaining the required water temperature through an ambient air temperature range of -23°C to +38°C. The box shall be capable of holding a minimum of nineteen 150 mm X 300 mm cylinders. When filled with water, the box shall not leak.

BASIS OF ACCEPTANCE. The Concrete Cylinder Curing Box shall be accepted upon approval of the Engineer.

SECTION 736 - PERMANENT CORRUGATED METAL FORMS FOR BRIDGE SLABS

736-01 PERMANENT CORRUGATED METAL FORMS FOR BRIDGE SLABS

SCOPE. This specification covers the material requirements, method of manufacturer, tests and basis of acceptance for Permanent corrugated Metal Forms for Bridge Slabs for use as described under §§555, Structural Concrete.
§736-01

MATERIALS. Forms and from supports shall conform to the latest specification for ASTM A653/A653M, Grades A thru E, Coating Designation G165. Fabrication shall be in conformance with ASTM A924/A924M.

Prior to fabrication of forms the Contractors shall submit to the Engineer certification for conformity of steel and galvanizing to ASTM A653/A653M.

DESIGN REQUIREMENTS. The following shall govern the design of permanent corrugated metal stay-in place (S. I. P.) forms:

- Design Span shall be the clear span of from plus 50 mm measured parallel to the from flutes.
- Design Load shall be the sum of the weights of from, bar reinforcement, plastic concrete and 2500 Newtons per square meter for construction loads.
- Unit Working Stress shall not exceed 0.725 of the specified minimum yield strength of the material. In no case shall the unit working stress exceed 250 MPa.
- Dead Load Deflection shall not exceed 1/180 of the from span or 13 mm, whichever is less.
- Physical Design Properties shall be computed with the requirements of the American Iron and Steel Institute Specifications for the Design of Cold Formed Steel Structural Members, latest published edition.

Certification. The Contractor shall submit to the Engineer for acceptance, the from manufacturer’s certification, that all forms meet all design requirements stated in this section and all detail requirements shown on the plans.

TEST. No testing will be required.

BASIS OF ACCEPTANCE. All forms delivered to the job site must be accompanied by the manufacturer’s certification that the materials used conform to ASTM A653/A653M as required by this section. Any forms delivered to the job site without such certification or which do not conform to the approved shop drawings shall be rejected by the Engineer.

SECTIONS 737 THROUGH 739 (VACANT)

SECTION 740 - PAINTING PROCEDURES

740-01 PAINTING METAL STRUCTURES

SCOPE. This specification covers painting procedures required for the shop, field and maintenance painting of metal surfaces.

DEFINITIONS

Painting. Painting shall include the surface preparation and application of paint or paint coats to metal surfaces in the shop or field.

Paint. Paint unless otherwise specified in the contract documents, shall mean the Department’s standard structural paints.

Surface Preparation. Surface Preparation shall mean the cleaning, pretreating or repairing of surfaces to be painted as specified in the contract documents.

Shop Painting. Shop Painting the painting of metal surfaces at the place of fabrication prior to shipment.

Field Painting. Field Painting the painting of new prime coated metal surfaces at the construction site.
Maintenance Painting. Maintenance Painting the painting of existing installations or structures in service.

Steel Structures Painting Council (SSPC). SSPC specifications referred to herein, may be obtained through the Council at: Mellon Institute, 4400 Fifth Avenue, Pittsburgh, Penn. 15213.

MATERIAL REQUIREMENTS

Prime Coat. The primer for steel surfaces cleaned in accordance with paragraph “Commercial Blast Cleaning” shall conform to the requirements of material specification §708-09 Blasted Surface Primer.

The prime coat shall be applied to all new steel surfaces with the exception of those specific areas excluded herein, or as noted in the contract documents. The prime coat shall be applied in the shop.

Intermediate Coat. Unless otherwise noted in the contract documents, the intermediate coat or second coat, shall conform to the requirements of §708-10 Gray Paint. The intermediate coat may be applied in the shop or the field.

Finish Coat. The finish or third coat, unless otherwise noted in the contract documents shall conform to the requirements of material specification §708-11, Sage Green Paint or §708-12, Light Gray Paint. The contract documents will designate those areas upon which each finish coat is to be applied. If the contract documents do not designate a finish coat, Sage Green Paint, section 708-11, shall be used. The finish coat may be applied in the shop or field.

ATMOSPHERIC CONDITIONS. No paint shall be applied, either in the field or shop, when the ambient temperature is below 4.5°C or the relative humidity is greater than 85%. No paint shall be applied when the receiving surface temperature is less than 4.5°C nor more than 38°C, or when determined, by the Engineer or Inspector, atmospheric conditions are such as to produce unsatisfactory results.

STORAGE OF PAINT. All containers shall be stored so as to be protected against freezing and excessive heat. In cold weather paint shall be stored in warm surroundings of not less than 0°C. In hot weather conditions the paint shall be stored in such a manner that material temperatures do not exceed 38°C.

SURFACE PREPARATION

General. All metal surfaces and welds to be painted shall be thoroughly cleaned of rust, mill scale, slag, dirt, oil or grease and other foreign substances to the degree specified. All cleaned steel surfaces shall be inspected by and approved by the Engineer or Inspector prior to the application of paint. Surfaces which do not meet these specification requirements shall be cleaned again at the Contractor’s expense.

The following methods of surface preparation or cleaning shall be used unless otherwise noted in the contract documents.

Solvent Cleaning. For the removal of dirt, oil, grease, drawing and cutting compounds, and detrimental weld fume deposits by the use of solvents and other materials.

Solvent cleaning shall be performed in accordance with the requirements of SSPC-SP1, No. 1, Solvent Cleaning.

All solvents and other materials used in cleaning operations shall conform to Federal, State, and local air pollution regulations.

Hand Tool Cleaning. For the removal of loose rust, loose mill scale and loose paint by the use of hand sanding, brushing, chipping, other hand impact tools or a combination of these methods.

Hand tool cleaning shall be performed in accordance with the requirements of SSPC-SP2, No. 2, Hand Tool Cleaning.

The surface, after cleaning, shall be defined by SSPC-Vis 1, Pictorial Standards BST2, CST2, or DSt2
§740-01

as applicable.

**Power Tool Cleaning.** For the removal of loose rust, loose mill scale, loose paint and slag with power sanders, power impact tools, power wire brushes, power grinders, other power tools or a combination of these methods.

Power tool cleaning shall be performed in accordance with the requirements of SSPC-SP3, No. 3, Power Tool Cleaning.

The surface, after cleaning, shall be defined by SSPC-Vis 1, Pictorial Standards BS03, CST3, or DST3 as applicable.

**Brush-Off Blast Cleaning.** For rapid removal of oil, grease, dirt, loose rust, loose mill scale, loose paint and slag. Tight rust, mill scale, and paint is sufficiently abraded to provide adhesion of the paint.

Brush-off cleaning shall be performed in accordance with SSPC-SP7, No. 7 Brush-Off Blast Cleaning.

SSPC-Vis 1-89 or other visual pictorial standards of surface preparation will not be specified to supplement the SSPC-SP7 written definition of surface cleanliness.

After blasting operations are completed, all surfaces shall be cleaned of blasting products and other residue by the use of clean soft brushes, or blown off with compressed air, or vacuumed, or water rinsed.

**Commercial Blast Cleaning.** For the removal of all dirt, grease, rust scale, foreign material and mill scale, rust, old paint and slag to the extent that staining is limited to light shadows, slight steaks, or minor discolorations caused by stains of rust, stains of mill scale, or stains of previously applied paint.

Commercial blast cleaning shall be performed in accordance with SSPC-SP6, No. 6, Commercial Blast Cleaning. After blasting operations are completed, all surfaces shall be cleaned of blasting products and other residue by the use of compressed air or vacuumed.

The surface, after cleaning, shall be accepted by visual comparison to a project prepared standard. The contractor shall prepare the project standard by blast cleaning a representative area on the structure that is being prepared for painting. The prepared standard shall generally conform to SSPC-Vis 1-89, “Visual Standard for Abrasive Blast Cleaned Steel”, Pictorial Standard B SP 6, C SP 6, and D SP 6, as applicable, and shall be approved by the Engineer before the start of general cleaning work.

At least one standard shall be prepared for each structure that is being specified for cleaning. More than one standard may be necessary if the cleaned steel differs significantly from the photographic standards due to surface conditions, abrasive being used, etc. Each standard shall be at least 0.5 m x 0.5 m in size, and shall be located on an area of the structure that is accessible to, and approved by the Engineer.

The contractor shall protect the project standard from corrosion and contamination throughout the duration of work. Protection shall be provided by applying a clear coat of polyurethane, or other means. At the completion of cleaning work the project standard shall be re-cleaned and painted in accordance with the contract documents. If in the opinion of the Engineer the project standard becomes deteriorated, or otherwise ineffective, it shall be re-established in accordance with this specification, at no additional cost.

**Final Preparation.** Unless otherwise noted in the contract documents, the final surface preparation, prior to painting, shall be done by Commercial Blast Cleaning methods.

In the case of rolled or fabricated steel being prepared for installation on Department contracts, only surfaces which generally conform to pictorial standards B SP 6 and C SP 6 will be acceptable.

**MIXING PAINT.** All paint shall be thoroughly mixed prior to application. Preferably mechanical mixers should be used to thoroughly disperse any settled pigment or solids. When hand mixing is performed, the liquid portion of the paint shall be poured into a clean container, leaving any settlement in the original container. The liquid shall then be slowly poured back into the original container while at the same time dispersing any settled material by stirring with a clean paddle or other suitable instrument. When all settlement has been dispersed, the paint shall be poured several times from one container to the other to insure proper mixing.
Solvent Restrictions. No thinning of paint, by the use of solvents or other material shall be allowed, and painters shall not carry or in any other way have access to containers of solvent when painting.

The quantity of solvent permitted on the job site shall be only the reasonable amount necessary for cleaning equipment, wiping dirt and grease from surfaces to be painted and cleaning of paint and spatters.

All solvents used for cleaning operations shall conform to the Federal, State and local air pollution regulations.

Unauthorized use of solvents shall result in the repainting of the surface in conformance with the specifications and to the satisfaction of the Engineer, at the Contractor's expense.

Consistency of Paint. Paints specified are formulated ready for application when delivered to the job site. If during cool weather it is desirable to reduce the consistency so that the paint will flow more freely, the paint may be heated. Heating may be accomplished by placing the container of paint in hot water, wrapping the container with heating coils, using paint heaters or heat exchangers or by other methods approved by the Engineer. Heating by open flame shall not be allowed. In no instance shall paint be heated to a temperature in excess of 38°C.

NUMBER OF COATS. With the exception of those specific areas excluded herein or as otherwise specified in the contract documents, all new structural steel shall be painted at least three coats of paint in the following order: prime coat, intermediate coat, and finish coat.

PAINTING SCHEDULE. With the exception of those areas to be "striped" in advance of general painting and structural steel which has been primed with material specification §708-09, Blasted Surface Primer, at least 48 hours shall elapse between the application of any two coats of paint. Structural steel primed with material specification §708-09, may be painted the intermediate coat not sooner than 16 hours after application of the primer. In no case shall a succeeding coat be applied until the previous coat has dried throughout the full thickness of the paint film.

On new structural steel members subjected to outdoor storage, the intermediate coat shall be applied no later than 120 days after application of the prime coat. The counting of days shall commence on the first day of outdoor storage. Steel stored outdoors and not painted the intermediate coat within 120 days shall be recleaned and repainted another prime coat at the Contractor's expense.

The finish coat may be applied at any time, but in no case sooner than 48 hours after the application of the intermediate coat.

No changes to the painting schedule will be permitted without the express written consent of the Director, Materials Bureau.

PAINT APPLICATION

General. All paint shall be applied in a neat and workmanlike manner. Paint shall be applied uniformly at the specified wet film thickness and coatings shall be free of runs, sags, drips, ridges or other defects. Paint may be applied by brushes, or rollers, or air-less spray, or a combination of these methods provided the method does not cause damage to public or private property.

Hand Brushing. The paint, shall be applied with brushes, shall be so manipulated by the brush as to produce a uniform even coating. When applying a coating to a previously painted surface, strokes should be made perpendicular to those of the receiving surface to insure adequate anchorage. Brushes shall be of good quality and the length of the exposed bristle shall be equal to or greater than the width of the brush.

On those areas which are inaccessible to brushes, the paint shall be applied by the use of rollers, or air-less spray equipment, or daubers, or sheepskins.

Rolling. Rollers for the application of paint shall be of such a quality to produce a smooth uniform coating. Roller covers shall be "all-mohair" made from Angora Goat wool; "mohair" made from blends of mohair, wool and/or rayon or as approved by the Engineer.
§740-01

The roller cover shall be uniformly loaded with paint by rolling on the slanted surface of a tray, framed screen wire or other suitable device. Roller application shall be done at such a pace that no spinning of the roller or throwing off of paint occurs when the roller is lifted from the surface. The paint shall be applied by rolling from a dry to a wet area while varying the direction of the stroke. The paint shall be feathered out by using light pressure at the end of the stroke to promote uniformity.

On those areas which are inaccessible to roller application, the paint shall be applied by brushes, or air-less equipment, or daubers, or sheepskins.

Air-less Spraying. Air-less spray equipment shall be capable of applying paint in a fine, even spray so as to produce a uniform coating. Air-less spray equipment shall consist of a hydraulic pump (air or electric power) mounted over a paint tank, high pressure hoses, spray gun, valves, gages, regulators, screens, traps and other equipment necessary to satisfactorily complete the work.

Spray painting shall be done by experienced and qualified painters. Painters shall determine the best distance between the spray gun and receiving surface so as to promote uniform coverage and prevent and discontinuity of the applied paint film. The spray gun shall be moved uniformly across and perpendicular to the receiving surface. To insure a uniform coating each spray pass should lap the other by 50%. Any sags, drips, air holes or other film defects shall be immediately corrected by hand brushing.

On those areas that are inaccessible to air-less spray application, the paint shall be applied by brushes, or rollers, or daubers or sheepskins.

Electrostatic Spray. Electrostatic spray application will be permitted only upon approval of the Deputy Chief Engineer (Structures).

The Contractor shall give proof of the following:

- That it is familiar with electrostatic spray painting and has successfully used the process.
- That painters applying the paint are experienced in the operation of the electrostatic spray equipment.
- That additives, if any, to the paints in section 708 of these specifications, to make said paints compatible with the electrostatic spray process shall not be detrimental to the normal life expectancy of said coatings.

The spraying operation shall be conducted in strict accordance with the recommendations of the manufacturer of the electrostatic equipment. The Contractor shall make available at the site of the work, for not less than a total of 5 working days, a technical advisor employed by the equipment manufacturer to instruct the Engineer in proper application techniques and inspection methods.

Termination of Spraying or Rolling Operations. The Engineer is empowered to terminate spraying or rolling operations, temporarily or permanently, if he determines that any of the following conditions exist:

- Satisfactory results are not being obtained.
- The required wet film thicknesses are not being obtained.
- Areas not specifically designated to be painted are likely to be or are being affected by the application method.
- The application method is causing damage to public or private property.

The Engineer may permanently terminate spraying or rolling operations by verbal order or in writing. The Engineer shall notify the Contractor in writing, identifying the reasons for termination within one week of such termination. The Engineer may temporarily terminate painting operations by verbal orders. Spraying or rolling operations which are terminated due to damage to public or private property shall not be resumed unless the Contractor takes appropriate measures to protect such property and demonstrates to the Engineer's satisfaction that such property damage will not recur. If spraying or rolling operations are permanently terminated, the Contractor may apply paint in accordance with another approved method. No extra compensation will be paid for the substitution of another method of application.
§740-01

PAINT INSPECTION EQUIPMENT. Prior to the start of and throughout the duration of work the Contractor shall be required to supply the Engineer with the following:

- Air Thermometer, pocket type, -10°C to +100°C (2)
- Surface Thermometer, -10°C to +100°C (2)
- Wet Film Thickness Gage, prong type (1)
- Dry Film Thickness Gage, magnetic type (1)

Number in parentheses designate minimum quantity required.

PAINTING

General. The painting of metal surfaces shall include, but not limited to the following:

- The proper penetration of surfaces.
- The application, protection and drying of the paint coatings.
- The protection, from paint spatter or spillage, of pedestrian, vehicular, marine or other traffic upon, beneath or adjacent to the painted surfaces.
- The protection against disfigurement of all portions of bridge and other structures as well as highway appurtenances. Disfigurement may be caused by abrading, scoring, spattering, overspraying, splashing and smirching of paint or cleaning materials.
- The prevention of spillage of paint or any other pollutants into any waterway or body of water.
- The supplying of all equipment, tools, tackle, scaffolding, labor and materials necessary to complete the entire work.

Unless otherwise specified herein, all new structural steel shall be painted the prime coat in the shop or plant. The intermediate coat or both the intermediate and finish coats may be applied either in the shop or field, at the Contractor's option.

No painting shall begin until cleaned surfaces have been inspected and approved by the Engineer or Inspector.

All receiving surfaces shall be clean and dry. Steel surfaces that have been cleaned by wet blasting or water rinsed shall not be painted sooner than 24 hours after the cleaning operation has been completed.

All containers of paint used shall be approved and sealed by the Department in accordance with Materials Method 6 and 6.11 prior to use. The seals shall not be broken nor containers resealed during the progress of the work without authorization of the Engineer or Inspector.

Metal surfaces coated with unauthorized paint and those surfaces not coated in accordance with paragraph, “Painting Schedule” shall be cleaned and repainted in accordance with these specifications and to the satisfaction of the Engineer.

Painting requirements for structural steel members embedded in, partially embedded in, or in contact with: cast-in-place, or pneumatically projected concrete are as follows:

- Fully embedded steel, defined as a steel member completely surrounded by concrete, shall not be painted.
- Partially embedded steel, defined as steel member with a portion fully surrounded by concrete, shall have its exposed surfaces painted. Such painting shall extend at least 0.3 m along the embedded portion. If the steel is weathering steel and is not to be painted, the embedded portions shall not be painted.
- A steel member, or portion of a steel member, neither fully, nor partially embedded, but still in contact with concrete shall have all its surfaces painted unless otherwise required by the contract documents. The sole exception to this requirement is top flanges of steel girders, beams and stringers against which concrete is to be placed. These shall not be painted.

Whenever painting is required, the prime, intermediate, and finish coats shall be applied in accordance with the requirements of this subsection.

Metal to metal contact surfaces shall not be painted. Contact surfaces shall be given a coat of clear lacquer or other protective coating as approved by the Engineer or Inspector if exposure is to exceed three
§740-01

months prior to erection. This coating shall be removed at the time of erection.

Machine finished surfaces shall be protectively treated in accordance with subsection 207.4, Protective Coating for Machined Surfaces, of the New York State Steel Construction Manual.

Structural steel which is to be welded, except for preblasted material which has been treated with a washcoat approved by the D.C.E.S., shall not be painted until all welding is complete. If welding is to be done in the shop only, the welds shall be cleaned, "Striped" and painted in the shop with one extra coat of primer. Steel which is to field welded shall be left unpainted for a minimum of 100 mm from the weld area.

To secure a maximum thickness of paint film all welded areas, rivet heads, bolt heads, nuts and edges of plates, angles or other shapes shall be "striped" with one coat of shop primer in advance of general painting and shortly thereafter shall be given a second coat when the general coat is applied. Preferably, welds to be "striped" in advance of general painting operations should be coated immediately after the steel has been cleaned and accepted. The paint shall be worked into all joints and open spaces.

Surfaces of iron and steel castings milled for the purpose of removing scale, scabs, fins, blisters or other surface deformation shall be painted one coat of primer in the shop.

Shop Painting. All structural steel surfaces shall be cleaned in accordance with the requirements of "Surface Preparation," subdivision F. Commercial Blast Cleaning, and subdivision G. Final Preparation. Surfaces may be primed with either material specification §708-03, Dull Orange primer, or §708-09, Blasted Surface Primer.

Surfaces cleaned in accordance with paragraph, “Commercial Blast Cleaning” may be preblasted and treated with an approved washcoat prior to fabrication.

On welded work, special care shall be taken to insure the removal of all weld spatter, flux, slag and fume deposits which could cause paint failure. Detrimental weld residue shall be removed in accordance with an approved method as listed in “Surface Preparation.”

Final cleaning of welded work shall directly precede "striping" operations. Striping shall be performed in accordance with one of the methods in "Paint & Application Methods."

All structural steel specified to be painted shall receive at least the prime coat of paint in the shop after fabrication work is completed and accepted. Unless otherwise specified, the intermediate coat and finish may also be applied.

Cleaned structural steel, except for that material which has been preblasted and treated with approved washcoat shall be painted one coat of primer within 24 hours after cleaning operations have been completed.

The application of additional coats of paint shall be done in conformance with “Painting Schedule.” Prior to the application of the intermediate or finish coats, the previously painted steel shall be cleaned of all grease, dirt, oil, or other foreign material in accordance with “Solvent Cleaning.” If detrimental rusting has occurred, these areas shall be cleaned by one of the methods in “Surface Preparation” and “touched-up” or repainted the previous coat to the satisfaction of the Engineer, to Inspector. After drying, each paint coat shall be examined for damage and "touched-up" prior to recoating or shipment.

Unless otherwise specified, the inside surfaces of boxed members and other surfaces that will be sealed from the atmosphere after assembly shall not be painted.

The manufacturer of fabricator shall not paint his name upon any structural member. Shipping pieces shall not be loaded until thoroughly dry. Erection marks for the field identification of members shall be painted on the prime intermediate coats. Markers or attached tags shall be used to identify those members which have been painted the finish coat in the shop. All marking shall be done in accordance with the requirements of subsection 206.11, Marking and Shipping, of the New York State Steel Construction Manual.

For recoating purposes, after the prime coat has thoroughly dried, the date (month/day/year) of application of the paint shall be painted upon the previously painted surface.
Field Painting. Structural steel not previously painted with the intermediate and finish coats in the shop shall be painted in the field.

The intermediate coat shall be Gray Paint as specified in “Intermediate Coat.” The finish coat shall be as specified in the contract documents and in accordance with “Finish Coat.”

The application of the intermediate coat shall be completed within the time limits of “Painting Schedule.”

Painting operations may be performed either prior to or after erection. Preferably the finish coat should be applied after erection and when all concrete work is completed.

Prior to general field painting, previously painted steel shall be thoroughly cleaned of oil, grease, dirt, concrete spatter and other detrimental material in accordance with “Solvent Cleaning.” Particular care shall be taken in cleaning field rivets and bolts and in cleaning field welds.

The Contractor shall take all necessary precautions to protect cleaned surfaces and wet paint from dust and other foreign material at the construction site.

After erection, all areas where paint has become damaged or deteriorated shall be thoroughly cleaned and “touched-up” or repainted the appropriate number of coats as directed by and to the satisfaction of the Engineer. When the finish coat is applied prior to erection, any portions of the structure that have been damaged, marked (including touch-up work) or otherwise abraded, to the extent that the aesthetic continuity of the structure is interrupted, shall be repainted another finish coat, as directed by the Engineer, at the Contractor's expense.

Maintenance Painting. Maintenance painting shall be performed in accordance with the requirements of this Section (740) as modified by Section 570, "Cleaning and Painting" and the following:

A. Surface Preparation.

1. Abrasives for Blast Cleaning. Abrasive materials for blast cleaning operations may be selected by the Contractor, except that they shall be approved by the Engineer before the start of the work.

   All abrasives shall be free of corrosion producing contaminants and also free of oil, grease or other deleterious contaminants.

   The size of the abrasive selected for use in cleaning Category I steel surfaces to bare metal shall be such as to produce a cleaned surface that is suitable for the application of the specified paint.

2. Solvents and Cleaning Agents. Solvents and other cleaning materials for use in surface preparation work may be selected by the Contractor except that they shall be approved by the Engineer and must conform to all applicable Local, State or Federal law, regulation or code.

3. Brush-off (SSPC-SP7) and Commercial Blast Cleaning (SSPC-SP6). Before any blast cleaning work begins all visible deposits of oil, grease, dirt, salt or similar contaminants shall be removed by any of the methods specified in SSPC-SP1, Solvent Cleaning.

   On surfaces cleaned to bare metal (Category I) the perimeter(s) or edges(s) of adjoining intact paint shall be feathered back and the adjoining paint must be tightly adhered. Ragged edges on adjoining paint will not be allowed. Adherence will only be considered satisfactory if the adjoining remaining paint is smoothly feathered and cannot be removed by lifting with a dull putty knife.

   On surfaces cleaned to bare metal (Category I), small pieces of intact paint that measure 2500 mm² or less in area, and that remain within the cleaned surface area, shall be completely removed. Small pieces of intact paint that are greater than 2500 mm² will be allowed to remain only if their perimeter(s) can be satisfactorily feathered back in accordance with this specification.

After blast cleaning work is complete, any remaining visible deposits of oil, grease, dirt, salt or similar contaminants shall be removed in accordance with SSPC-SP1. All blasting residues
§740-01

shall be removed. All surfaces cleaned to bare metal shall be inspected for cleanliness by comparison with the pictorial standards.

B. Paint Film Thickness. All paint shall be applied at the specified wet film thickness so as to produce a minimum dry film thickness as specified in the contract documents.

C. Painting. No work shall begin until the Contractor has supplied the Engineer with the inspection equipment specified in §740-01.

Stripe painting with primer will be required on the following surfaces cleaned to bare metal (Category I). All welds, rivets, bolts, nuts, and edges of plates, angles, lattice pieces or other shapes, and corners and crevices shall be "striped" with primer before the general touch-up prime coat is applied. The stripe coat shall be allowed to set to touch, before the general touch-up primer coat is applied. All strip painting will be performed using a brush only. No other method of paint application will be allowed for stripe painting.

On surfaces painted with primer, the intermediate coat shall be applied no later than 120 days after application of the primer coat. Steel surfaces not painted the intermediate coat within 120 days shall be reclaned and repainted another prime coat at the Contractor's expense.

On surfaces cleaned to bare metal (Category I) the dry film thickness for each coat of paint (primer, intermediate and finish) shall be determined in accordance with SSPC-PA2, Paint Application Specification No. 2, Measurement of Dry Paint Thickness with Magnetic Gages.

Wet film thicknesses shall be recorded on previously painted surfaces (Category II).

On any painted surface (Category I and Category II) the total dry film thickness as determined by SSPC-PA2, shall not be less than the total thickness for all coats specified in the contract documents. Should the dry film thickness measure less than specified on any completed surface, the Contractor shall repaint the surface to obtain the specified film thickness. All recoating work done for this purpose shall be performed as directed by the Engineer, and at no additional cost to the State.

740-02 PAINTING TIMBER AND LUMBER

SCOPE. This specification covers the procedures for the shop and field painting of timber and lumber surfaces. The requirements of section 740-01, Painting Metal Structures shall apply as applicable. Paint material shall comply to the requirements of section 708, Paints.

PAINTING. Prior to application of paint, all wood surfaces shall be clean and dry. Cracks, splits, gouges or other surface defects shall be repaired with a high quality wood putty or caulking compound. Cleaning shall be accomplished by wiping, sanding or wire brushing.

Unless otherwise permitted by the Engineer, paint shall be applied by brushes.

New timber and lumber surfaces shall be primed with a mixture of §708-20, Stain Resistant White Paint and pure linseed oil. The composition used for priming new surfaces shall be mixed in the following proportions:

1 liter white paint : 1 liter pure linseed oil

Previously painted timber and lumber surfaces shall be primed with the finish paint as specified in the contract documents.

When painting wood surfaces which have been treated with Creosote Oil, Oil Borne wood preservative is specified or noted upon the plans or in the proposal, the clean, dry, cured surface shall be given a prime coat of material specification §708-08, Ready-Mixed Aluminum Paint prior to application of the specified finish paints.
740-03 PAINTING GALVANIZED SURFACES

Scope. This specification covers the procedures required for painting galvanized surfaces.

Painting. Unless noted otherwise in the Contract Documents all visible portions, after erection, of the galvanized system shall be painted with one coat of finish paint in accordance with the following:

A. Color shall be in accordance with the Contract Documents or as ordered by the Engineer. For a "rustic" appearance, if no color is mentioned in the Contract Documents, the color of the finish coat shall be Weathered Brown and conform to Federal Color Standard No. 595b, Color 20059.

B. Paint shall be one of the products on the Department’s Approved List titled “Moisture-Curing Urethane Paint Systems, C. Finish Paint”. Acceptance shall be based on the appearance of the paint on the Approved List.

C. All galvanized surfaces to be painted shall first be cleaned of oil, grease and similar contaminants by hand wiping with solvent in accordance with SSPC SP-1, Solvent Cleaning.

D. After solvent cleaning, all galvanized surfaces to be painted shall be lightly abraded by brush blast methods in accordance with ASTM D2092-95 Method G - Abrasive Blast Cleaning or an approved equal as approved by the Engineer. The purpose of the abrasive blasting is to roughen the surface, not to remove material.

E. Paint shall be applied using brushes or rollers in accordance with the Manufacturer’s instructions to a minimum dry film thickness as given in the approved list. Manufacturer’s instructions for mixing and paint application shall be supplied to the Engineer at least one week prior to the beginning of any painting work.

740-04 PAINTING ALUMINUM SURFACES

SCOPE. This specification covers the procedures required for painting aluminum surfaces. The requirements of §740-01, Painting Metal Structures, shall apply as applicable.

Painting. Those portions of aluminum or aluminum alloy surfaces that will be in contact with cast or pneumatically projected concrete shall be painted one coat of a good quality zinc chromate primer or another type of paint material specifically formulated to reduce alkali attack.

Aluminum surfaces not in contract, but which are required to be painted, shall be coated the appropriate number of coats of paint as specified in the contract documents. Unless otherwise specified, pretreatment of the aluminum surface, prior to the coating application, shall not be necessary.

SECTION 741 - PAINT REMOVAL AND CONTAINMENT

741-01 LOCALIZED PAINT REMOVAL FROM STRUCTURAL STEEL
BY VACUUM CONTAINED METHODS

SCOPE. This specification covers removing paint, corrosion products, dirt, salt, and other materials required by the contract documents from structural steel. All removals will be performed by means of solvents and vacuum containing paint removal equipment.

EQUIPMENT REQUIREMENTS. Equipment used for this work may be shrouded power tools with vacuum attachments; a vacuum blaster; a combination of the two; or any other vacuum containing method which:

- Is capable of removing all existing paint from the surface.
- Will collect and contain the removed material, and all abrasive employed.
- Does not permit the release of visible quantities of dust or debris into the atmosphere.
- Will not vaporize existing paint into the atmosphere.

NEW YORK STATE DEPARTMENT OF TRANSPORTATION
STANDARD SPECIFICATIONS of January 2, 2002 7-299
The contractor is hereby notified that some types of vacuum containing removal equipment are patented. The possibility of royalty payments exists.

All equipment will be approved by the Engineer prior to the beginning of any work. Equipment will be approved on the basis of a paint removal demonstration. For each type of equipment the Engineer will choose a demonstration site which is part of the work. Each demonstration site shall be at least 1 m² in area unless otherwise permitted by the Engineer. Each demonstration site shall be reflective of the different configurations to be encountered and exhibit all material in need of removal. If this is not possible, the Engineer shall choose separate demonstration sites which meet the foregoing requirements. Each type of equipment will be required to remove all materials as noted in the contract documents, and conform to the requirements of this specification.

If the equipment uses abrasives, the contractor may supply any recyclable abrasive which contains less than one percent free silica. The supplied abrasive shall be compatible with the requirements of the equipment.

The Engineer is empowered to rescind approval of any piece of equipment which, in his/her opinion, is not performing as required. All such equipment shall be immediately removed from the work site.

CONSTRUCTION DETAILS. Unless otherwise provided by the contract documents, all existing paint shall be removed for a minimum distance of 100 mm on each side of the centerline of cut, bolt row, rivet row, or weld, as applicable. If the steel is to be heated prior to straightening, or other similar operation, the minimum removal limits shall be 100 mm beyond the direct heat application area or as shown on the plans.

Unless otherwise noted by the contract documents, the contractor shall assume that all paint removed is lead-based; therefore, all waste resulting from the removals shall be treated, handled and disposed of as hazardous waste in accordance with all applicable Federal, State, and Local rules and regulations. The contractors attention is directed to §107-05 Safety and Health Requirements.

All material not contained by the paint removal equipment shall be collected by vacuum methods only. No shoveling, dry sweeping, wet sweeping, or air-blowing will be permitted. All vacuums shall be equipped with high efficiency particulate (HEPA) filters.

After the paint has been removed by vacuum containing methods, the location shall be inspected for cleanliness. No existing paint will be permitted to remain. If the contractor is able to effectively demonstrate that vacuum containing methods are incapable of removing remaining paint, the Engineer may permit paint removal by a supplemental method such as hand tools or chemical stripping.

Rust, mill scale, and other similar materials that are not paint, demonstrably not removable by vacuum containing methods, may be permitted to remain, or may be required to be removed by one, or more, of the foregoing methods. Removal will be ordered by the Engineer.

All removed material generated by power tool or hand cleaning methods shall be collected by vacuums equipped with HEPA filters. No other method will be permitted.

SECTION 742 THRU 799 (VACANT)