



Department of Transportation

ENGINEERING
INSTRUCTION

EI
19-002

Title: **MAINTENANCE CLEANING AND WASHING OF BRIDGES**

Approved:

Richard Marchione, PE
Deputy Chief Engineer
(Structures)

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Date

ADMINISTRATIVE INFORMATION:

- This Engineering Instruction (EI) is effective beginning with projects submitted for the letting of September 1, 2019. Designers are permitted to use the specification before that date.
- This EI supersedes EI 07-032 MAINTENANCE CLEANING AND WASHING OF BRIDGES.
- The specifications issued by this EI will be in the AASHTO Preconstruction module and in the Pay Item Catalog.

PURPOSE: This EI issues replacement specifications for Maintenance Cleaning and Washing of Bridges.

TECHNICAL INFORMATION:

- Item Number Serialization
 - The new pay items for Maintenance Cleaning and Washing of Bridges are serialized by length of bridge, type of wash for concrete elements, and type of wash for steel elements. The items are no longer serialized by number of spans since it was found that the correlation between cost and number of spans was very low.
 - The length serialization is designated by the x in the item number as follows:
 - x = 1 for lengths under 500 feet
 - x = 2 for lengths 500 feet to 1,500 feet
 - x = 3 for lengths over 1,500 feet
 - The serialization for the item number contains two codes for wash type. The y code controls the wash type for concrete surfaces and the z code controls the wash type for steel surfaces.
- Water Pressure and Volume – There are three combinations of pressure and volume.
 - Power Washing - Low pressure water with a flow rate of more than a hundred gallons per minute used for all bridge elements and all bridge types, unless one of the other types of washing is specified.
 - Pressure Washing – Water pressure of 1,750 psi (minimum) at a flow rate of 3.5 gallons per minute used to clean surfaces and also prepare concrete bridge decks, sidewalks, barriers, substructures, and beam surfaces for silane coating. When pressure washing is called for, all concrete surfaces shall be pressure washed.
 - High Pressure Washing – Water pressure of 5,000 psi (minimum) at a flow rate of 5 gallons per minute used to clean weathering steel. It is not necessary to use High Pressure Washing every time weathering steel is washed. A policy for frequency of High Pressure Washing will be issued under a future EI.
- Concrete Bridges – Concrete Bridges will be either power washed or pressure washed, per the item number. The bridge deck may be power washed to remove debris prior to pressure washing the deck. If the item for washing steel is included, it can be ignored for a concrete bridge.

- Painted Steel Bridges – Painted steel bridges with intact paint will always use the item for a Power Washing. Painted steel bridges with deteriorating paint will use the item for No Washing for the steel component. If the concrete is being pressure washed, the Contractor may elect to pressure wash intact paint. Flaking paint is considered harmful to the environment, and areas of flaking paint should not be washed at all. This would include all bridges that have a paint rating of CS3 or more. The specification includes a No Wash item for steel which is prohibited to be washed. In addition, the specification requires a contractor to avoid washing areas of steel that have flaking paint on them.
- Weathering Steel Bridges - Unpainted, controlled oxidizing (weathering) steel bridges will be power washed or high pressure washed, depending on the item. If the concrete is being pressure washed, the contractor may elect to pressure wash the steel instead of power washing the steel. High pressure washing is not subject to substitution. For weathering steel bridges which have paint on portions of the steel near bearings, the specification requires the pressure, flow rate, or both be reduced in the painted area when using high-pressure wash.

IMPLEMENTATION:

New Approved Specification

- Item 641.510xyz16 - Maintenance Cleaning and Washing of Bridges

Disapproved Specifications:

- 641.91xx0011 - Maintenance Cleaning and Washing of Bridges
- 641.92xx0011 - Maintenance Cleaning and Washing of Bridges,
- 641.93xx0011 - Maintenance Cleaning and Washing of Bridges, No Lead Based Paint
- 641.94xx0011 - Maintenance Cleaning and Washing of Weathering Steel Bridges
- 641.31xx0016 - Maintenance Cleaning and Washing of Bridges
- 641.32xx0016 - Maintenance Cleaning and Washing of Bridges, Concrete
- 641.33xx0016 - Maintenance Cleaning and Washing of Bridges, No Lead Based Paint
- 641.34xx0016 - Maintenance Cleaning and Washing of Weathering Steel Bridges

TRANSMITTED MATERIALS: Attached is the new specification for Maintenance Cleaning and Washing of Bridges, Item 641.510xyz16.

BACKGROUND: Bridge washing is an important part of the maintenance of bridges. The salt that is poured onto highways during the winter accumulates and attacks steel girders and soaks into concrete where it attacks the reinforcement. When a bridge is washed in the spring, that salt is removed and the bridge is preserved for a longer time. The durability of all bridges is increased when bridges are washed on a regular schedule.

Concrete benefits from the application of silane sealer. Silane penetrates the surface of the concrete and prevents chloride-laden water from entering. Silane penetrates better and is more effective when the concrete surface is properly prepared by pressure washing. The concrete pores are opened, giving the silane a better path to the interior of the concrete, where it does a better job repelling water.

Weathering Steel benefits from a wash at a higher pressure. Washing weathering steel using a pressure of 5,000 psi has been shown to dramatically reduce the amount of chloride on the steel surface. Chloride interferes with the patina that protects the weathering steel from deterioration.

CONTACT: Direct questions regarding this issuance to Duane Carpenter of the Office of Structures at (518) 457-5715 or via e-mail at Duane.Carpenter@dot.ny.gov.

ITEM 641.510XYZ16 - MAINTENANCE CLEANING AND WASHING OF BRIDGES

DESCRIPTION

1.01 General. This work shall consist of cleaning bridges by removing and disposing of trash and debris from the bridge, washing the deck, exposed concrete, asphalt, and steel bridge surfaces, and cleaning the drainage system and other drainage ways in accordance with the Contract Documents and as directed by the Engineer.

1.02 Scope. The cleaning and washing of bridges is divided into pay items based on the bridge length, type of washing to be done on steel, if any, and the type of washing to be done on concrete.

1.03 Definitions.

Loose Paint Chips	Paint chips that are no longer adhered to bridge surface.
Flaking Paint Chips	Paint chips that are still partially adhered to bridge surface.
Patina	Iron oxide coating that forms on weathering steel over time under proper environmental conditions. Dark chocolate or purple when properly formed with a tightly adhered texture. Capable of withstanding hammering or vigorous wire brushing.
Loose Flakes	Coarse flakes of rust that do not tightly adhere to the weathering steel surface. Easily dislodged by a wire brushing. Early indication of a non-forming patina.
Delaminations	Larger sheets of rust that are separating from the weathering steel base metal. More severe indication of a non-forming patina.
Trash and Debris	Including, but not limited to, sand, soil, cinders, silt, dirt, mud, salt, glass, paper, rubber, metal, wood, loose paint chips, and loose pieces of concrete and asphalt and rock or stones.
Protected Migratory Birds	Includes all waterfowl, herons, hawks, owls, eagles, and songbirds. Excludes rock doves (pigeons), house sparrows, European starlings, and monk parakeets.
Migratory Bird Treaty Act of 1918 with amendments	Federal law that protects migratory birds and their nests, eggs, and feathers. Conviction of violating the act can result in a fine of \$15,000, imprisonment for six months, or both.

MATERIALS

Water for pressure washing shall be clean, fresh water. Detergents or other agents shall not be used.

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CONSTRUCTION DETAILS

3.01 General. Prior to commencing work, the Contractor shall provide the Engineer with a bridge by bridge schedule of the work in accordance with §108-01 and a work plan including work zone traffic control procedures, equipment proposed for use, identification of water source(s) that will be used, and identification of the disposal facility(s) that will be used.

All structures or bridge drainage systems over water courses shall be washed during the periods indicated in the contract documents. The following shall apply:

- Washing shall occur only when adequate flow in the stream exists to dilute possible contaminants.
- Operations shall be sequenced to clean structures over small bodies of water or small streams in the spring of the year when flows are greatest.
- Bridges over trout spawning streams, categorized by DEC as Ct or Ct(s), or located at DEC yearling trout stocking sites shall be washed during time periods acceptable to the appropriate regional DEC office.
- Washing, whether during a scheduled period or not, shall be stopped if stream flow drops below normal.

Washing shall be performed when ambient temperatures are 40 °F or higher, and when ambient temperatures are forecasted to be 40 °F or higher until the bridge dries.

Unless otherwise indicated below, all bridge surfaces shall be cleaned, including but not limited to bridge decks, sidewalks, curbs, approach slabs and shoulders, wing walls, backwalls, bridge seats, railings, parapets, bridge bearings, piers and pier caps, columns, drainage features, structural steel, light standards, signs, concrete paving block, concrete beams and other surfaces.

Limited paved drainage ways and gutters off-structure shall be cleaned of debris that, if permitted to remain, would direct runoff back onto the structure or into its drainage ways including those that may exist underneath the structure. The extent of such removal shall be less than 100 feet but it is intended that they be only the minimum necessary to ensure that runoff is not directed back onto the structure being cleaned or its drainage ways.

Block paving and paved surfaces other than asphalt paving between adjacent or parallel bridges shall be cleaned. Such cleaning shall be limited to narrow areas less than 25 feet in width.

3.02 Environmental Protection.

3.02 A. Waste. All sand, dirt, cinders, and other trash and debris collected from the bridge shall be disposed of at a suitable off-site disposal facility in accordance with the provisions of §107-10 *Managing Surplus Material & Waste*.

3.02 B. Water. The Contractor shall either withdraw water from local on-site sources or use water from a municipal source for bridge washing. If water is to be drawn from a local on-site water

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source, to protect aquatic life, there may not be any loss of water elevation at the site of withdrawal or immediately downstream of the site. Water withdrawal shall be accomplished with use of an inlet screen, with a screen size not to exceed 1/4" square. To prevent the unintentional spread of invasive species, wash water withdrawn from a local on-site water source may not be transported to be used at another bridge site in a different watershed. If water is withdrawn from an onsite source, cleaning and sanitizing of equipment shall be conducted prior to leaving that watershed. All small equipment (pumps, hoses, barriers, floating booms, shovels, rakes, jumping jacks, plate tampers, boots, buckets, industrial vacuums, etc.) and large equipment (backhoes, excavators, trucks, tankers, rollers, trailers, etc.) that comes into direct contact with water withdrawn from a local on-site water source must be cleaned (internally and externally) by soaking, dipping in, or scrubbing with a chlorine solution, and/or hot water or steam cleaned and allowed to dry before the next use. The Contractor shall discharge wash water near an original body of water in accordance with the provisions of §107-12 *Water Quality Protection*. Otherwise, wash water will be collected in suitable containers and disinfected prior to final disposal.

3.02 C. Birds and Bats. All nests of protected migratory birds on bridges are presumed to be active and occupied between April 15 and August 15. The areas within 3 feet laterally of the nest shall not be cleaned or washed; washing shall start at the 3 feet line and progress away from the nest.

Before April 15 and after August 15, nests of protected migratory birds on bridges will most likely be inactive and unoccupied. If confirmed to be unoccupied, the nests shall be removed as part of the cleaning operation.

The areas within 3 feet laterally of a bat nest shall not be cleaned or washed; washing shall start at the 3 feet line and progress away from the nest.

Nests of unprotected species shall be removed as part of the cleaning operations. Pigeons should be treated as humanely as possible. In socially and environmentally sensitive situations removal of young from the nest for raising by a wildlife rehabilitator should be considered.

3.03 Preparation. Prior to any other cleaning work, the Contractor shall inspect and confirm that the bridge drainage system is not blocked by unremovable debris by rodding with a sewer rod or similar tool. A blocked drainage system is one from which debris cannot be removed using the means specified in Section 3.05 below. If the drainage system is blocked prior to performing other cleaning work, then clearing, dismantling and reinstallation of the drainage system will be extra work. If the Contractor does not inspect the bridge drainage system and notify the Engineer prior to beginning work, any blocked drains will be considered the result of the Contractor's operations, and all clearing and cleaning of the drainage system shall be performed as part of the work.

3.04 Cleaning. All loose trash and debris shall be collected by sweeping, shoveling, vacuuming and other suitable methods. Equipment for collecting trash and other debris from bridge decks shall be determined by the Contractor, subject to the approval of the Engineer, and will normally consist of, but not be limited to, industrial vacuums, brushes, brooms, and shovels. Plastic shovels shall be used if other shovels would damage coated surfaces. The contractor shall not cause or allow trash and/or debris from the bridge to be deposited into a wetland, stream, other water body,

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bridge drainage system, or active traffic lanes during the cleaning of the bridge.

After cleaning of the scuppers, downspouts, and troughs has been completed and the system allows the unimpeded flow of water, the cleaned system will be inspected by the Engineer. If flow is still impeded because of the presence of dirt or other removable matter or objects in the system, the Contractor shall reclean the system, including dismantling and reinstallation, at no additional cost to the State.

3.05 Washing. When trash and debris collection from the bridge is complete, the Contractor shall wash all bridge surfaces, including the underside of the bridge, with clean, fresh water. The washing shall remove all visible dirt, salt, animal waste, human waste, and similar debris.

If the required water pressure and flow rate damages the paint or other coatings on the bridge or undercuts the grout or harms the masonry plates beneath the bearings, then the Contractor shall reduce either or both to a level that stops the damage. When washing stream and wetland bridges, the flow rate of the water used shall be the minimum necessary to properly clean the surfaces.

Any dislodged material resting on the top of girder flanges shall be washed off. Flakes and delaminations shall be washed off metal surfaces.

Scuppers, troughs, and downspouts to the first cleanout above ground level or to their outlet if above ground shall be cleaned by using high pressure water, vacuum, or other techniques that produce satisfactory results. Debris from the cleaning operations shall not be deposited in, or around the structure, highway roadway slopes, drainage systems or streams. It shall be disposed of at a suitable off-site disposal facility.

When concrete paving block is cleaned and washed, the removal of weeds between the blocks will not be required under this item.

Work shall be conducted in such a manner so as not to damage or remove existing epoxy protective coatings or any other protective coating on the bridge.

The cleaned bridge surfaces shall be free of trash and debris and the drainage system free running except those systems that were damaged prior to any cleaning work on the bridge.

Drainage of wash water shall be controlled to avoid causing a hazard to traffic or causing erosion of adjacent ground or drainage ways. Under no circumstances shall wash water be discharged directly into active traffic lanes.

3.05 A. Power Washing. The Contractor shall power wash using a centrifugal water pump or comparable pump capable of delivering 100 gallons per minute (minimum) unrestrained flow coupled to a 1^{1/2}" hose. The angle to the surface being washed should be no more than 30 degrees and the distance from the surface should be no more than 15 feet.

On painted steel bridges with intact paint, the Contractor may substitute Pressure Washing for Power Washing when the concrete elements of the structure are being cleaned with Pressure

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Washing.

3.05 B. Pressure Washing. The Contractor shall pressure wash all concrete surfaces of the structure using water pressure between 1,750 psi and 2,000 psi at a minimum flow rate of 3.5 gallons per minute. The pressure washing is intended to clean the surface and not to remove concrete or paint. The wand shall be held no further than 24 inches from the surface. While cleaning, the wand shall be within 45 degrees from perpendicular to the surface being cleaned, both vertically and horizontally. Greater wand angles are permitted for flushing debris from horizontal surfaces.

3.05 C. High Pressure Washing. The Contractor shall high pressure wash using water pressure of between 4,750 psi and 5,000 psi at a minimum flow rate of 5 gallons per minute. The wand shall be held between 6 inches and 12 inches from the surface. While cleaning, the wand shall be within 30 degrees from perpendicular to the surface being cleaned, both vertically and horizontally. Greater wand angles are permitted for flushing debris from horizontal surfaces.

METHOD OF MEASUREMENT

The quantity to be measured for payment will be on an each bridge basis.

BASIS OF PAYMENT

The unit price bid shall include the cost of all labor, materials, and equipment necessary to satisfactorily complete work including the cost of cleaning the drainage system; collecting, removing and disposing of trash and debris including that off structure but necessary to prevent backup of runoff onto the structure or its drainage ways, and repair of any damage caused by the Contractor.

Payment will be made under:

<u>Item No.</u>	<u>Item</u>	<u>Pay Unit</u>
641.510xyz16	Maintenance Cleaning and Washing of Bridges	Each

Note: xyz denotes a serialized pay item.

<u>x</u>	<u>Length of Bridge</u>	<u>y</u>	<u>Concrete Wash</u>	<u>z</u>	<u>Steel Wash</u>
1	Under 500 feet	0	No Wash	0	No Wash
2	500 to 1500 feet	1	Power Wash	1	Power Wash
3	Over 1500 feet	2	Pressure Wash	3	High Pressure Wash