

SECTION 00505 – CONCRETE DECK HYDRODEMOLITION

(Follow all instructions and make all edits with “Track Changes” turned on. This Section is not published in the Oregon Standard. If there are no instructions [purple text] above a subsection, paragraph, sentence, or bullet, then include it in the Project, unless the item(s) that are included in the subsection, paragraph, sentence, or bullet are not required on the Project and then they should be deleted. In general do not renumber or re-letter subsections when item(s) are deleted. Delete all purple text before preparing the final document. All other modifications to this Section will require ODOT Technical Resource and State Specifications Engineer approval.)

Section 00505 is not a Standard Specification and is included in this Project by Special Provision.

Description

00505.00 Scope - This Work consists of partial depth removal and preparing of concrete decks for structural concrete overlays and inlays with hydrodemolition Equipment and associated operations.

00505.01 Definitions and References:

(a) Definitions:

Blow-through - An unanticipated full-depth removal of deck concrete during hydrodemolition operations.

Selective Hydrodemolition - Preparation of deck concrete with hydrodemolition Equipment that creates a scarified surface profile and removes approximately 1/2 inch of concrete in areas of sound concrete and Unsound Concrete is removed in the same operation.

Deep Cut Hydrodemolition - Removal of deck concrete to the depth shown or specified.

Unsound Concrete - Delaminated or otherwise deteriorated concrete identified by a deck delamination survey or during surface preparation operations.

(b) References - In these Specifications, the reference ICRI 310.3R refers to Guideline No. 310.3R, *Guide for the Preparation of Concrete Surfaces for Repair Using Hydrodemolition Methods*.

00505.02 Submittals - Submit the following to the Engineer for approval at least 21 Calendar Days before the pre-placement meeting:

- Wastewater control and debris management plan. Include details of water supply system, pumping system, and vacuum Equipment.

- Plan and Materials to be used to shield traffic from hydrodemolition debris.
- Blow-through contingency plan. Provide a written plan for potential Blow-through scenarios. Include Materials used to contain water and debris both above and below the deck.
- Type of Equipment used for deck preparation.

Equipment

00505.20 General - Provide Equipment to perform hydrodemolition of the concrete deck surface. Remove all Equipment that leaks oil or other contaminants from the work area until they are repaired.

00505.21 Hydrodemolition Equipment - Hydrodemolition Equipment consists of a water supply system, a high-pressure pumping system, vacuum Equipment, and a robotic hydrodemolition unit.

(a) Water Supply System and Pumping System - Provide a water supply system and pumping system compatible with the hydrodemolition units and that supplies water that meets the requirements of Section 02020.

(b) Hydrodemolition Unit - Provide a hydrodemolition unit that is robotic, computerized, and self-propelled, that is capable of removing concrete at a rate and volume as specified and as accepted by the Engineer without leaving a striated surface. Provide either rotating or oscillating nozzles. For Selective Hydrodemolition, provide Equipment capable of operating in the pressure range of 14,000-20,000psi.

(c) Vacuum Equipment - Provide vacuum Equipment suitable for removal of wastewater and construction debris.

00505.22 Wastewater Recycling Equipment - The Contractor may provide a wastewater recycling unit that removes solid waste from the wastewater such that the water may be reused for hydrodemolition operations.

00505.23 Hand Lances - Provide hand-operated high-pressure lances that operate at pressures of 10,000 to 40,000psi.

00505.24 Micro-Milling Equipment - Provide cold plane or rotomill grinding machines using carbide cutting tools on a rotary drum. Provide Equipment with tooth spacing of not more than 1/4 inch, capable of leaving a smooth, uniform pattern of striations. Limit machines to a gross operational weight of no more than 35 Tons and a forward speed to 2.5 feet per minute. Operate at a drum speed of at least 120 RPM.

Construction

00505.40 General - When not in conflict with this Specification, perform hydrodemolition according to ICRI 310.3R.

00505.41 Partial Depth Concrete Deck Removal - Perform partial depth concrete deck removal on Bridge No. (Insert Bridge No.) to the depths shown as follows:

(a) Existing Deck Elevation - Measure and identify existing deck elevations and cross slopes at least every 10 feet, to verify removal depths and to establish final grade. Provide a vertical reference for approval by the Engineer before beginning removal work.

(b) Reinforcement Survey - Using a rebar locator or other approved means, measure and mark the depth of reinforcement at least every 10 feet, in each lane of traffic prior to beginning micro-milling operations.

(c) Existing Repairs - Prior to micro-milling or hydrodemolition operations, remove existing repair patches from the deck using power-driven hand tools. The Contractor may elect to proceed with micro-milling and hydrodemolition operations prior to removing existing repairs if it is demonstrated during hydrodemolition calibration that existing repairs can be removed without increasing the depth of removal at the perimeter of the repairs or causing Blow-throughs.

(d) Micro-milling - Limit micro-milling to the depth shown or within 1/2 inch of reinforcement, whichever is least, measured from the nominal roadway surface. If reinforcement is encountered during milling operations, stop Work immediately and notify the Engineer. Repair any damage to the reinforcement caused by micro-milling operations at no additional cost to the Agency.

(e) Hydrodemolition - Perform Selective Hydrodemolition or Deep Cut Hydrodemolition as shown. In the presence of the Engineer, calibrate hydrodemolition Equipment on the deck in a location with sound concrete. Measure the removal depth to the mean paste elevation. Mean paste elevation is defined as the average elevation of parent deck concrete paste, excluding exposed aggregate. Record the calibrated settings, including: water pressure gauge, machine staging control, nozzle size and type, nozzle travel speed, and water usage rate. Provide calibrated settings to the Engineer. Do not adjust calibrated settings without notifying the Engineer. Monitor the removal depths to verify the desired depth of sound concrete and all Unsound Concrete is removed. Perform additional calibration in an area with Unsound Concrete if directed by the Engineer.

Hydrodemolition Equipment is operated in the pressure range of 14,000-20,000 psi during Selective Hydrodemolition operations. During Deep Cut Hydrodemolition operations the prescribed depth of removal is achieved with one or more passes of the hydrodemolition unit.

(1) Depth of Removal - Removal depth is measured from the original parent deck surface, or the top of the milled surface, to the mean paste elevation. When performing Selective Hydrodemolition, remove approximately 1/2" of parent deck concrete. When performing Deep Cut Hydrodemolition, remove parent deck concrete to the depth shown or specified, +/- 1/2". The depth of removal is measured from the original parent deck surface accounting for the depth of milling performed. If shown or specified, remove to a depth below the bottom of the top mat of reinforcement.

(2) Deck Blow-Through - If hydrodemolition operations cause a full depth deck Blow-through, immediately stop Work and notify the Engineer. Contain water and debris above and below deck, as necessary. Use equal to or less than 30-pound class chipping hammers to excavate all remaining Unsound Concrete. Square off the repair area and slope the sides to avoid vertical edges. Perform Blow-through repair Work according to 00140.30.

(3) Wastewater and Debris Management - Contain wastewater and debris as outlined in the wastewater control and debris management plan. Provide sufficient shielding during hydrodemolition process to contain dislodged concrete and prevent damage to surrounding property.

(4) Cleaning - Do not allow debris and slurry to dry. Use pressurized water and vacuum Equipment to remove dislodged debris and slurry from the bridge deck. Repeat cleaning until the wastewater is clear. If slurry dries prior to cleaning, use a minimum of 7500 psi water to remove dried slurry. Remove standing water from deck surface prior to surveying the deck for additional removal.

(f) Post Hydrodemolition Survey - In the presence of the Engineer, perform a visual inspection and sounding of the concrete surface. Identify locations of Unsound Concrete for removal. Remove additional Unsound Concrete using 15-pound class power-driven hand tools or hand lances. Identify locations of exposed reinforcement that require removal of concrete surrounding the reinforcing bars. Using a straightedge, stringline, or other approved methods, ensure minimum overlay thickness is achieved. Remove high areas of concrete with power driven hand tools, hand lances, or additional passes of hydrodemolition Equipment to ensure minimum required overlay thickness. Provide reinforcement chairs or blocks to place reinforcement at required elevation and to prevent deformation of the bars from construction vehicle loading.

(g) Removal of Concrete Surrounding Reinforcing Bars - Remove a minimum of 3/4 inch of concrete around and below reinforcing steel in the following scenarios:

- When there is exposed reinforcement that exceeds 24 inches in length, is within the mean paste elevation, and is not bonded to the concrete as identified by hammer sounding.
- When power-driven hand tools are used to remove Unsound Concrete that exposes greater than 50 percent of the reinforcing bar.

(h) Reinforcing Bar Repair - Abrasive blast reinforcing steel that is pitted or has flaking corrosion, that would inhibit adequate bonding to the concrete, to a bright finish. Light rust staining may remain in place.

When exposed reinforcement has greater than 50 percent section loss, required repairs will be designated by the Engineer and performed according to 00140.30.

(i) Surface Preparation Accommodations - Clean the entire surface by using abrasive blast or 7500 psi high pressure water blast. Saturate the surface with water for a minimum of 1 hour before resurfacing. Remove standing water with compressed air or wet-dry vacuum ahead of concrete placement. Repeat cleaning and water saturation on areas that are allowed to dry or become contaminated before resurfacing. Immediately after surface preparation is complete cover the prepared deck with clear plastic, overlapping it to prevent contaminants from construction vehicles or other sources from contacting the deck. Maintain the covering until overlay installation.

(Use the following subsection .43 ONLY when there are special repair zones identified in the Plans. Special repair zones are Project specific. Obtain information from the Bridge Designer and the BDM.)

00505.43 Special Repair Zones - A special repair zone is a specific zone or location on the bridge deck as indicated in the plans. Perform Work in special repair zones as shown according to the following:

(Use the following paragraph when negative moment regions are required. This is sample language and needs to be bridge specific. Obtain information from the Bridge Designer and the BDM.)

(a) Negative Moment Regions - In areas designated as negative moment regions with negative moment reinforcement, do not excavate below the top of the reinforcement. If negative moment reinforcement is exposed, stop Work and re-calibrate the hydrodemolition Equipment in the presence of the Engineer.

(Use the following paragraph when full depth removal is required. This is sample language and needs to be Bridge specific Obtain information from the Bridge Designer and the BDM.)

(b) Full Depth Removal - Perform full-depth removal as shown. Full depth removal requires project specific language based on size, location, containment, and shoring requirements.

(Use the following subsection .44 when milling is incorporated on the Project.)

00505.44 Use of Micro-Milled Surface - Traffic is allowed on the micro-milled surface for up to 14 Calendar Days. Remove dust, residue, and loose milled material from the micro-milled surface immediately before opening to traffic. Do not open to traffic until approved by the Engineer.

00505.45 Use of Hydro-Demolitioned Surface – Traffic is not allowed on the hydro-demolitioned surface, except construction equipment required for the work.

When reinforcement is exposed, protect all exposed reinforcement from direct loading by construction equipment using wood blocks, plywood sheets, or other protection methods approved by the Engineer.

Measurement

00505.80 Measurement - The quantities of Work performed under this Section will be measured on the area basis.

(Delete Pay Item(s) from the list that are not included in the Schedule of Items, but do not change the alpha characters next to the Pay Items.)

Payment

00505.90 Payment - The accepted quantities of Work performed under this Section will be paid for at the Contract unit price, per unit of measurement, for the following items:

Pay Item	Unit of Measurement
(a) Concrete Deck Micro-milling, _____ inch depth	Square Yard
(b) Selective Hydrodemolition	Square Yard
(c) Deep Cut Hydrodemolition, _____ inch depth	Square Yard
(d) Full Depth Removal	Square Yard

In items (a) and (c), the depth is inserted in the blank.

(Use the following paragraph when Pay Item (b) is included in the Pay Item list above.)

Item (b) includes hand tool removal of concrete surrounding reinforcing bars.

(Use the following paragraph when Pay Item (c) is included in the Pay Item list above.)

Item (c) includes hand tool removal of concrete surrounding reinforcing bars.

(Use the following paragraph when Pay Item (d) is included in the Pay Item list above.)

Item (d) includes the full depth removal work required by 00505.43(b), including all formwork and staged work as shown.

Removal of Unsound Concrete is included in the hydrodemolition operations and the associated Pay Item including additional removal of Unsound Concrete following the post hydrodemolition survey.

Payment will be payment in full for furnishing and placing all Materials, and for providing all Equipment, labor, and Incidentals necessary to complete the Work as specified.