SP- 230234
(New)

SPECIAL PROVISIONS
FOR
PARTIAL REMOVAL OF EXISTING BRIDGE DECK USING HYDRODEMOLITION

Benton County
IMN-380-7(132)44--0E-06

Effective Date
October 15, 2024

THE STANDARD SPECIFICATIONS, SERIES 2023, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SPECIAL PROVISIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

230234.01 DESCRIPTION.

This specification consists of bridge deck preparation using hydrodemolition for removal of sound concrete to a minimum depth of removal as shown on the plans, and for selective removal of unsound concrete at variable depths to provide a rough, bondable surface. Final surface roughness profile of 1/8 inch or greater is required, equivalent to International Concrete Repair Institute (ICRI) CSP 7 or greater.

230234.02 QUALIFICATIONS.

Operation of the hydrodemolition equipment shall be performed and supervised by an operator trained and certified by the equipment manufacturer and having a minimum of two years of experience with the equipment being used.

230234.03 CONSTRUCTION.

A. General.

1. Mill the complete bridge deck surface before hydrodemolition begins. Milling depth shall be between 3/4 inch (minimum) and 1 inch (maximum).

2. Contractor is to ensure all water run-off and debris associated with hydrodemolition and cleaning is contained within the work area and collected for disposal.

3. Clean potable water shall be provided for high pressure removals and the excess water reclaimed using vacuum methods of collection, then filtered and reused as much as practical.

4. Disposal of excess water, run-off, and debris shall meet all applicable federal, state, and local regulations.

5. HMA patch material shall be removed prior to hydrodemolition. Concrete patch material can remain if determined to be sound.

6. All Class B deck repair areas specifically identified in the plans are to be removed and repaired prior to starting hydrodemolition operations.

B. Equipment.

1. At least 10 working days before start of work, submit to the Engineer a Method Statement including a list of all equipment to be used in the hydrodemolition process and certification from the manufacturer that the hydrodemolition equipment is intended for use on bridge decks and can complete the work as described in a single pass. Hydrodemolition shall not begin until the Engineer has provided approval of the Method Statement.

2. Hydrodemolition equipment shall consist of a water supply system, a high-pressure water pumping system, a demolition unit, and a vacuum system capable of quickly removing all debris generated by the demolition unit and water supply system.

3. Equipment shall be a self-propelled robotic machine that utilizes a high-pressure water jet stream capable of selectively removing the unsound concrete and the sound concrete to the minimum depth specified and attaining pressures in the range of 13,000 to 20,000 PSI.

4. The equipment shall be capable of cleaning rust and concrete particles from all exposed reinforcing steel.

5. The machine shall have forward and backward motion that can move the water jet transversely across the concrete surface.

6. The equipment shall be capable of removing all unsound concrete at variable depths and all sound concrete to the depth of removal specified in the plans. All removal shall be achieved in a single pass.

C. Calibration.

1. Prior to the commencement of the removal operation with hydrodemolition, the equipment shall be calibrated on two sections designated by the Engineer to demonstrate the equipment, personnel and methods of operation can produce results in accordance with the contract requirements.

2. The trial sections will be approximately 100 square feet each, consisting of one section of sound concrete then one section of deteriorated concrete. The calibration shall not include any areas of existing overlay or patch material. Document the following initial settings:
   - Water Pressure Gauge (13,000 PSI minimum).
   - Water usage (Anticipated 55 gallons per minute, minimum).
   - Machine Staging Control (Step).
   - Nozzle Size.
   - Nozzle Speed (Travel).
   - Approximate removal depth and surface roughness profile achieved at the current calibration settings.

3. After the initial test on sound concrete, to achieve adequate depth of removal and surface roughness profile, the equipment shall then be moved to the deteriorated area to verify that initial settings will fully remove unsound concrete within the designated area.

4. The initial settings may need to be adjusted within the limits established above, to achieve total removal of unsound concrete. Document the final equipment settings resulting from the calibration process.

5. Conduct calibration of the hydrodemolition equipment for every day of operation and, if

necessary, re-calibrate to ensure removal of known areas of delaminated concrete as well as to guard against excessive removal of sound concrete.

D. Wastewater Disposal.

1. Contain and collect all wastewater generated by the hydrodemolition and cleaning processes. Wastewater shall be recycled or disposed of in a manner which satisfies all applicable federal, state, and local regulations. Maintain documentary evidence of legal disposal of all waste.

2. Prevent wastewater generated by hydrodemolition and cleaning from entering surface waters, storm sewers, floodplains, wetlands, and railroad right-of-way. If wastewater runoff or contamination is identified or suspected, suspend hydrodemolition equipment immediately and notify the Engineer.

3. At least 30 days prior to the beginning of the work, submit to the Engineer details for a collection and disposal plan.
- **a.** Define how the wastewater will be contained, stored, and disposed of.
- **b.** Define the process for preventing wastewater from leaving the deck surface including through deteriorated joints, deck drains, and holes in the deck.
- **c.** Define method for creating a watertight seal at the hole when removals blow completely through the deck.

E. Traffic Considerations.

1. Traffic shall be allowed to operate through the project site as shown on the project plans.

2. Provide shielding, as necessary, to ensure containment of all dislodged concrete and water spray within the removal area to protect the traveling public from flying debris both on and under the work site during hydrodemolition and cleaning.

3. If nighttime work is approved by the Engineer, provide adequate lighting as required for nighttime removal.

F. Hydrodemolition.

1. After calibration of the equipment, conduct concrete removal by hydrodemolition on the bridge deck.

2. Verify the hydrodemolition removal settings as necessary to maintain consistent removal depth and surface profile.

3. Provide the initial and daily equipment calibration settings to the Engineer. Notify the Engineer when revisions to the calibration settings are needed to maintain consistent material removal depth and texture.

4. Remove sound concrete to the depth shown in the plans to achieve a rough and bondable surface.

5. In areas of concrete girders and diaphragms, do not remove concrete below the bottom of the slab, unless otherwise called for in the plans.

6. Any damage or excess removal resulting from hydrodemolition to any portion of the structure outside the designated removal limits shall be restored as directed by the Engineer at no additional cost to the Contracting Authority. Nominal instances of over depth removal not

extending more than ½ inch below the target removal depth may be addressed with localized thickening of the overlay at no additional cost to the Contracting Authority.

7. Prevent damage to existing reinforcing that has been exposed and do not allow equipment on exposed bars that have been left unsupported by the removal process. Repair or replace any damaged reinforcing steel at the Contractor's expense.

8. Hand operated hydrodemolition equipment or hand-powered or mechanically driven chipping tools (15 pounds maximum), operated in accordance with Article 2413.03 of the Standard Specifications, may be used in areas that are inaccessible to the self-propelled or hand operated hydrodemolition equipment such as adjacent to the gutterline. These removals shall be considered incidental to the hydrodemolition bid item.

9. If removal blows completely through the bridge deck, immediately stop the equipment, plug the hole, and notify the Engineer.

G. Additional Removal.

1. After concrete bridge deck removal by hydrodemolition has been completed, the deck will undergo sounding to assure that all unsound concrete has been removed.
   - **a.** Sound the bridge deck for delamination in accordance with ASTM D 4580 and mark the areas of deteriorated concrete to be removed as directed by the Engineer.
   - **b.** There shall be no standing/ponding water present during sounding.
   - **c.** Perform subsequent soundings and remove additional concrete as required to ensure that all delaminated and debonded concrete has been removed.

2. Perform additional concrete removal by hand chipping and/or hydrodemolition.

3. Where reinforcing steel is exposed and the concrete and the steel are no longer bonded, remove any concrete to clear at least 3/4 inch around the exposed bars.

4. Un-bonded bars shall be determined by the Engineer. More than one-half of the bar perimeter may be exposed and still be determined to be bonded.

5. Take extreme care to ensure that no damage is done to any reinforcing bars exposed during the removal process. Any damage done shall be repaired as approved by the Engineer at no additional cost to the Contracting Authority.

H. Full Depth Repair.

Where the deck is sound for less than half of its original depth, remove the concrete full depth (designated as Class B repair) except for limited areas as determined by the Engineer. The work shall be paid for separately.

I. Final Cleaning Prior to Overlay Placement.

1. **Vacuuming.**
   - **a.** Vacuum all debris, slurry, and wastewater resulting from the hydrodemolition process. Vacuuming shall be performed concurrent with or immediately following hydrodemolition work. Vacuuming and cleanup shall be completed before debris and slurry are allowed to dry on the bridge deck.
   - **b.** Vacuuming equipment shall be equipped with dust control devices and shall be capable of removing wet debris and water in the same pass.
   - **c.** Equipment shall be capable of washing the deck with high-pressure water in conjunction with the vacuum operation if vacuuming alone is insufficient to dislodge all debris and slurry from the bridge deck surface.
   - **d.** Vacuuming and cleanup operations will not be accepted as complete until all debris,

slurry and wastewater are removed as accepted by the Engineer. Repeat passes of water washing or vacuuming equipment, as may be required for complete cleaning, shall be completed at no additional cost to the Contracting Authority.

2. **Sandblasting or Water Blasting.**
   - **a.** After completion of the hydrodemolition and additional removals, but not more than 24 hours prior to the placement of the overlay, sandblast or water blast (at 7500 psi minimum) the entire deck to expose fine and coarse aggregates and to remove laitance from the surface.
   - **b.** Thoroughly clean the exposed reinforcing steel and the concrete under and around the exposed steel by sandblasting or water blasting.
   - **c.** Clean the surface using compressed air to remove all dust, chips, and water.
   - **d.** Air lines for sand blasting and compressed air cleaning shall be equipped with oil traps.

230234.04 METHOD OF MEASUREMENT.
Measurement of Partial Removal of Existing Bridge Deck Using Hydrodemolition will be the quantity shown in the contract documents in square yards.

230234.05 BASIS OF PAYMENT.
Payment will be for the contract unit price of Partial Removal of Existing Bridge Deck Using Hydrodemolition. Payment is full compensation for furnishing all work, materials, water, and equipment required to prepare the bridge deck for overlay including milling and subsequent remaining removal by hydrodemolition (including removal and disposal of debris and wastewater, vacuuming and water washing, final sandblasting or water blasting), shielding, water control, and hand chipping of areas adjacent to the gutterline and other areas inaccessible to the milling or hydrodemolition equipment.