SPECIAL NOTE FOR USE OF THE HYDRODEMOLITION METHOD

I. DESCRIPTION. Perform all work in accordance with the Kentucky Transportation Cabinet, Department of Highway's 2019 Standard Specifications for Road and Bridge Construction and applicable Supplemental Specifications, the Standard Drawings, this Note, and the attached detail drawings.

This work consists of bridge surface deck preparation using hydrodemolition to provide a uniform depth, highly bondable surface and to remove all variable depth, unsound material. This item also includes the removal and disposal of all concrete and debris, vacuuming, shielding, water control, additional jack hammering, and all other aspects of work necessary to prepare the deck for the placement of the new latex modified concrete overlay.

II. EQUIPMENT.

A. Sawing Equipment. Sawing equipment shall be a concrete saw capable of sawing concrete to the specified depth.

B. Mechanical Scarifying Equipment. The scarifying equipment shall be a power operated mechanical scarifier capable of uniformly scarifying or removing the existing latex modified concrete or integral concrete wearing surface from the bridge deck to the depths required in this Note or as directed by the Engineer. The equipment shall be self-propelled with sufficient power, traction, and stability to maintain accurate depth of cut and slope. The equipment shall be capable of accurately and automatically establishing profile grades along each edge of the machine by referencing the existing bridge deck by means of a ski or matching shoe or from an independent grade control; in addition, it shall be equipped with an integral loading means to remove the material being cut from the bridge deck and to discharge the cuttings into a truck all in a single operation.

C. Hydrodemolition Equipment. The hydrodemolition equipment shall consist of a filtering and pumping unit operating with a self-propelled computerized robot that utilizes a high pressure water jet capable of removing concrete to the depth specified in this Note or as directed by the Engineer and be capable of removing rust and concrete particles from reinforcing steel. The equipment shall provide a rough and bondable surface and remove all unsound concrete during the initial pass. The minimum water usage shall be 43 gal/min operating at 13,000 psi minimum.

D. Vacuum Cleanup Equipment. The vacuum cleanup equipment shall be equipped with fugitive dust control devices and be capable of removing wet debris and water

all in the same pass. Provide equipment capable of washing the deck with pressurized water prior to the vacuum operation to dislodge all debris and slurry from the deck surface.

E. Hand Held Blast Cleaning Equipment. Hand held blast shall be either sand or water as necessary to expose fine and coarse aggregates, thoroughly clean all exposed reinforcing steel, and remove any unsound concrete or laitance layers from the proposed concrete overlay surface. If sand blasting equipment is utilized, the equipment shall have oil traps. If water blasting equipment is utilized, the equipment must be capable of delivering a minimum of 5,000 psi.

F. Power Driven Hand Tools. Power driven hand tools and jackhammers will be permitted but shall not be heavier than the nominal 45 lb. class. Chipping hammers shall not be heavier than the nominal 15 lb. class. Only hand chipping tools shall be used when removing concrete within 1 in. of reinforcing steel. Mechanically driven tools shall be operated at a maximum angle of 45 degrees from the bridge deck surface.

III. CONSTRUCTION.

A. General. Perform hydrodemolition surface preparation over the entire top surface of the reinforced concrete bridge deck to provide a rough and bondable surface and to remove all unsound concrete during the initial hydrodemolition surface preparation pass. The use of hand chipping tools, either hand or mechanically driven, shall be limited to trim work and areas inaccessible or inconvenient for the hydrodemolition equipment.

B. Description. This work shall consist of furnishing the necessary labor, materials, and equipment to provide a rough and bondable surface in accordance with the Specifications and this Note and in reasonably close conformity with the grades, thickness, or sections shown on the attached detail drawings or as directed by the Engineer. This work shall include the removal of patches other than sound Portland cement concrete and all loose and unsound concrete by hydrodemolition; preparation of the sound existing concrete deck; removal, forming, and concrete for full depth repairs; blast cleaning or high pressure water cleaning the existing deck prior to placement of the modified concrete overlay; and all other operations necessary to complete this work according to these specifications and to the satisfaction of the Engineer.

C. Preparation of Existing Deck. No operations performed without reasonably available engineering controls that limit fugitive dust will be acceptable.

The Contractor shall be aware that there are federal, state, regional, and local government agencies that have requirements regarding the control of fugitive dust generated by concrete removal and blasting operations.

The Contractor is responsible for protecting traffic traveling adjacent to and under the work zone while removing bridge deck concrete.

Where the deck is sound for less than one third of its original depth, the concrete shall be removed full depth for limited areas as designated by the Engineer. Full depth repairs shall be completed as specified for Full Depth Repair.

D. Removal of Existing Modified Concrete Overlays

The existing latex modified concrete overlay on the original bridge deck surface to be prepared by hydrodemolition must be removed, and the bridge deck cleaned, prior to commencement of the hydrodemolition operation. The Contractor may utilize conventional scarifying equipment conforming to these specifications to remove the existing concrete overlay from the original bridge deck. Mechanical scarification shall be performed to between 1/8" and 1/4" above the original bridge deck surface (top of the precast concrete deck panels). Total surface hydrodemolition is used to provide a highly bondable surface and to remove partial depth deteriorated concrete. A depth of no more than 1/16" of the surface of the existing precast concrete panels shall be removed by hydrodemolition unless deteriorated concrete is encountered; ideally the hydrodemolition equipment will be calibrated to not remove any depth of the precast deck panels. If deteriorated concrete is encountered, notify the Engineer immediately.

Existing overlay material, which is sound and well bonded following both mechanical scarification and hydrodemolition shall be left in place.

If hydrodemolition extends to a depth more of more than 1/16" into the precast deck panels, hydrodemolition shall be immediately stopped and recalibrated to meet the removal limits described above.

E. Bridge Decks with No Existing Concrete Overlay

The Contractor shall use mechanical scarification equipment conforming to these specifications prior to performing hydrodemolition on the original bridge deck surface without a concrete bridge deck overlay to remove 1½" of the existing deck surface. Total surface hydrodemolition is used to provide a highly bondable surface and to remove partial depth deteriorated concrete.

If the use of mechanical scarifying equipment results in the snagging of the top mat of steel reinforcement, the scarifying equipment shall be immediately stopped

and the depth of removal adjusted. Damaged or dislodged reinforcing steel shall be repaired or replaced at the Contractor's expense. Replacement shall include the removal of any additional concrete required to position the new reinforcing steel at the correct height and required lap splice lengths.

F. Concrete Removal by Hydrodemolition.

i. **General.** The total surface area of the reinforced concrete bridge deck shall be completely prepared by hydrodemolition as necessary to provide a highly roughened and bondable surface prior to placement of the proposed bridge deck overlay while removing any deteriorated and unsound concrete in the initial pass. Unsound concrete is defined as existing bridge deck concrete that is deteriorated, spalled, or determined by the Engineer to be unsound.

With the use of hydrodemolition surface preparation, the requirement to provide a minimum ¼" clearance around all reinforcing bars that are more than ½" diameter exposed is waived, providing that the existing concrete is sound. The amount of steel exposed shall be kept to a minimum.

Damaged or dislodged reinforcing steel shall be repaired or replaced at the Contractor's expense. Replacement shall include the removal of any additional concrete required to position the new reinforcing steel at the correct height and to provide the required lap splice lengths as required.

ii. **Calibration.** Prior to commencement of the hydrodemolition removal operation, the hydrodemolition equipment shall be calibrated on an existing sound concrete surface on the approach spans as designated by the Engineer. The calibration area shall be a minimum of 7 feet wide by 7 feet long to demonstrate the desired result of this specification.

Move the hydrodemolition equipment to a second area (7'x7') on the main spans as designated by the Engineer to demonstrate the desired result of this specification which is providing a highly rough and bondable surface and removing all unsound concrete during the initial pass is being achieved without removing more than a 1/16" depth of the precast concrete deck panels.

The Engineer shall verify the following settings:

1. Water pressure gauge (13,000 psi minimum)
2. Machine staging control (step)
3. Nozzle size

4. Nozzle speed (travel)
5. Depth of removal
6. Minimum water usage (43 gallons per minute)

During the hydrodemolition operations, any or all of the above settings may be modified in order to achieve removal of all unsound concrete and to provide a highly bondable surface. The settings may be changed by the Contractor to achieve total removal of unsound concrete, but the Engineer must be notified of all changes. The Engineer may change any or all of the settings in order to achieve the desired results with hydrodemolition. The removals and depth shall be verified, as necessary, and at least every 30 feet along the cutting path. The readings shall be documented and, if necessary, the equipment recalibrated to insure the hydrodemolition process achieves the desired results and removal of unsound concrete.

Calibration shall be required on each structure, each time hydrodemolition is performed, and as required to achieve the results specified by the plan.

iii. **Debris and Fluid Containment.** Prior to commencement of the hydrodemolition operation, the Contractor shall submit a plan for approval to the Engineer for control and filtering of all water discharged during operation. The Contractor, at a minimum, shall block all drains on the deck and install aggregate dams every 150 feet; 6 inches high by 1 foot wide minimum, to strain runoff. The deck shall be used as a settlement basin within itself unless an alternate method of water control, satisfactory to the Engineer and meeting the environmental requirements of any associated Regulatory Agency, is required.

The Contractor shall provide shielding, as necessary, to insure containment of all dislodged concrete within the removal area in order to protect the public from flying debris both on and under the work site.

G. Cleaning. Cleaning shall be performed with a vacuum system capable of removing wet debris and water all in the same pass. The vacuum equipment shall be capable of washing the deck with pressurized water prior to the vacuum operation to dislodge all debris and slurry from the deck surface. Cleaning shall be done in a timely manner, before debris and water is allowed to dry on the deck surface.

H. Resounding. After the hydrodemolition operation has completed the removal, and the deck is cleaned and allowed to dry, the deck shall be resounded to assure that all unsound concrete deck material has been removed. The final sounding of the deck shall be done by the Engineer and shall be performed only when the entire

deck is completely dry. In no case shall the final sounding be made unless the deck is dry and frost-free. Final sounding shall consist of as many successive resoundings as required to ensure that all deteriorated and fractured concrete has been removed. Additional removal shall be performed with 45 lb. maximum weight jackhammers operated at an angle of not more than 45 degrees from horizontal. Aerosol spray paint for outlining and sounding chains shall be provided by the Contractor.

I. Full Depth Repair. Where the deck on the approach spans is sound for less than one third of its original depth, the concrete shall be removed full depth except for limited areas as may be designated by the Engineer. Forms shall be provided to support concrete placed in full depth repair areas. The forms for areas of up to 4 square feet may be suspended from wires from the reinforcing steel. For areas greater than 4 square feet, the forms shall be suspended from the primary members of the superstructure or by shoring below. Areas of full depth repair shall have the concrete faces and reinforcing steel cleaned. Only those areas marked in the field by the Engineer as full depth repair will be paid for as full depth repair.

Full depth repairs are not anticipated on the main spans. If conditions warrant full depth repairs on the main spans, the Engineer will provide a method to perform the repairs.

J. Preparation Prior to Overlay Placement. Vehicles other than approved construction equipment will not be permitted on those sections of the deck where hydrodemolition has begun. Contamination of the deck by construction equipment or from any other source shall be prevented.

IV. MEASUREMENT. See Section 606, the Special Note for Bridge Restoration and Waterproofing with Concrete Overlays, and the following:

A. Surface Preparation Using Hydrodemolition. The Department will measure the quantity hydrodemolition as the actual deck area in square yards overlaid and shall include the costs of hydrodemolition, removal of the surface preparation debris, cleaning, any incidental materials, and all labor and equipment necessary to complete the work as described in this Note, in the attached detail drawings, and the Specifications.

V. PAYMENT. The Department will make payment for the completed and accepted quantities per Section 606 and under the following bid item:

A. Hydrodemolition. The Department will make payment for the hydrodemolition under bid item #08550 "HYDRODEMOLITION" for the deck area prepared by hydrodemolition.

The Department will consider payment as full compensation for all work required in this provision.