Date: September 1, 2006

DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA

SPECIAL PROVISION

Project No:
P.I. No.

SECTION 519 – FAST TRACK PORTLAND CEMENT CONCRETE OVERLAYS WITH HYDRODEMOLITION

519.1 General Description

This work consists of the construction of a Portland Cement concrete overlay of an existing concrete bridge deck and includes the furnishing of all material, labor and equipment necessary to prepare and finish the work in accordance with these Specifications and Plan details.

519.1.01 Definitions

General Provisions 101 through 150.

519.1.02 Related References

A. Related Specifications

Section 107

Section 449

Section 500

Section 510

Section 528

Section 941

B. Related Documents

AASHTO M-171

AASHTO T-126

QPL 10

QPL 86

519.1.03 Submittals

Submit a mix design for approval, including the actual quantity of each ingredient and laboratory designs which demonstrates the ability of this design to attain a compressive strength of 4000 psi (28 MPa) at 24 hours. Determined the acceptable strengths by at least eight laboratory compressive test specimens prepared and cured in accordance with AASHTO T-126. Make the specimens from two or more separate batches with an equal number of cylinders made from each batch.

519.2 Materials

Meet the requirements of the Standard Specifications for all materials.

Concrete Mix Requirements	
Materials	**Requirement**
Type I[1] or Type III Portland Cement, minimum	750 lbs/yd^3 (445 kg/m^3)
Coarse Aggregate Size No.	7
Water/Cement Ratio, maximum	0.43
Slump Limits (Jobsite), maximum	7 in. (180 mm)
Air Acceptance Limits (Jobsite)	3.5 to 7.5%
Admixture (Required)	Type F or G
Admixture[2] (Optional)	Type C
Compressive Strength (Jobsite) @ 24 hours, minimum	3000 psi (20 MPa)
Fibers[3]	3 lbs/yd^3 (1.8 kg/m^3)
1. An additional 10 percent cement is required when using Type I cement. 2. Do not use accelerators containing chlorides. 3. Use macro-synthetic fibers meeting the requirements of Section 941 of the Special Provisions. See QPL 86 for a list of approved suppliers.	

Temperature Limitations	
Concrete Placement Temperature (Range)	70-90 °F (21 – 32 °C)
Air Temperature (Range)	50-90 °F (10 – 32 °C)

Use concrete manufactured at plants that qualify as approved sources according to the Standard Operating Procedure for Ready Mix Concrete. See QPL 10 for a list of approved plants.

Manufacture concrete for Portland cement concrete overlays in accordance with Section 500 of the Standard Specifications.

519.2.01 Delivery, Storage and Handling

Store all materials to prevent damage from the elements and to insure the preservation of its quality and fitness for the work. Avoid contact with flame.

Inspect all stored materials, although accepted before storage, prior to their use in the work. Ensure that all stored materials meet the requirements of the Contract at the time of use.

Remove from the site of the work immediately, any material rejected because of failure to meet the required tests or rejected because of damage. Replace all removed material at no additional cost to the Department.

519.3 Construction Requirements

519.3.01 Personnel

General Provision 101 through 150.

519.3.02 Equipment

General Provisions 101 through 150.

1. The hydro-demolishing equipment consists of filtering and pumping units operating in conjunction with a remote-controlled robotics device.
2. The equipment operates at a noise level of less than 90 decibels at a distance of 66 ft. (20 m) from either the powerpac unit or the remote robot.
3. The equipment is capable of working 24 hours per day.

Provide an external water source for use in the hydro-demolition operations. Do not draw water from any waterway for use in construction. During the hydro-demolition operations, furnish protective platforms in accordance with Section 510 of the Georgia DOT Specifications to prevent material and debris from falling into the waterway or roadway. Furnish, install and maintain erosion control measures, approved by the Engineer, to contain and filter run-off from hydro-demolition operations. Prevent all debris, runoff or other materials from entering any waterway.

519.3.03 Preparation

A. Removal of Existing Concrete

Give the existing deck to be overlaid a machine preparation consisting of removal of the concrete to a minimum depth of ½ in. (12 mm) below the top mat of reinforcement or as shown in the Plans. Remove concrete by the use of high pressure water blasting equipment designed specifically for this purpose. This equipment is capable of removing deteriorated or non-deteriorated concrete, to depths specified on the Plans, and cleaning the existing reinforcing steel of all rust and corrosion products by use of high-velocity water jets acting under continuous automatic control.

B. Surface Preparation

1. Removal and Preparation of Overlay Area

Remove concrete to the limits shown on Plans and expose top mat of reinforcing steel. Remove deteriorated concrete and clean all rust and corrosive products from exposed reinforcing steel including oil, dirt, concrete fragments, laitance, loose scale and other coating of any character that would destroy or inhibit the bond with the new overlay concrete.

At the Contractors' option, mechanical scarifying equipment may be used to remove the concrete to within ½ in. (12 mm) of the reinforcing steel. Use a Rotomill-type mechanical scarifier designed specifically for deep scarifying of bridge decks to accomplish this operation. Ensure the scarifier produces a surface matching the slab cross-section, and that each pass of the machine matches the previous pass.

2. Existing Reinforcing Steel

Take all steps necessary to prevent cutting or otherwise damaging reinforcing steel, including any vertical stirrups, structural steel, and welded shear connectors projecting into the slab and designated to remain in place. If, in the opinion of the Engineer, any such bars or shear connectors are damaged during removal operations, replace with members of equal strength, size and spacing as the exisiting, to the satisfaction of the Engineer at no additional cost to the Department.

3. Areas Not Accesible to Hydro-demolition Equipment

Remove concrete in areas of the deck not accessible or otherwise convenient to hydro-demolition operations using conventional (jackhammer) removal methods. Perform such removal by power chipping or hand tools. Pneumatic hammers heavier than 15 lbs class (6.8 kg) [nominal], {(30 lbs) [13.6 kg] maximum} are not permitted. Do not operate pneumatic hammers and chipping tools at an angle exceeding 60 degrees relative to the surface of the deck slab.

4. Longitudinal Joints

Construct longitudinal joints between lanes vertical and at actual lane lines.

5. Removal of Debris

Remove concrete debris by hand or by mechanical means immediately following the hydro-demolition process to prevent the debris from re-setting or re-adhering to the surface or remaining sound concrete. Exercise care to avoid any damage to the remaining sound concrete, remove any debris allowed to re-settle or re-adhere to the surface of sound concrete.

519.3.04 Operations of Equipment:

A. General Operations

Provide qualified personnel to supervise and operate the hydro-demolition equipment. Avoid removal of sound concrete outside the limits and below the depth indicated on the plans.

Provide lighting as required to allow for the safe conduct of night time removal operations. Position lighting to avoid hazardous glare in the direction of oncoming traffic. Obtain the Engineer's approval for lighting placement and configuration. Store and maintain, on the job site, an inventory of common wear parts and replacement accessories for the equipment adequate to assure that routine maintenance tasks can be performed readily without undue project delay.

B. Run-off Water

Until its removal, contain all water runoff and residue caused by the hydro-demolition operation within the limits of the bridge deck. Submit to the Engineer for approval, a plan detailing containment and removal of the run-off water and slurry prior to beginning work. If satisfactory containment and removal of the runoff water or slurry is not being accomplished,

discontinue operations until adequate containment and disposal methods are approved and employed during removal operations to the satisfaction of the Engineer.

Provide for the disposal of runoff water and residue generated by the hydro-demolition operation. Obtain any required permits and comply with applicable regulations concerning such water and residue disposal. Make provision for the safe handling of runoff water insofar as it may constitute a hazard on the adjacent or underlying traveled roadway surface. Repair all existing slopes and berm areas damaged by scouring water jet, runoff water, or other operations at no additional expense to the Department.

C. Bottom of Deck Blow Through

Take all necessary precautions to prevent any blow through of the bottom of the bridge deck. In the event that blow through occurs, cease all removal or cleaning operations until the removal operation procedures are corrected and the area is repaired to the satisfaction of the Engineer.

Provide protective platforms over areas of vehicular traffic when under portions of bridges where hydro-demolition takes place. See the Plans and Specifications for additional requirements.

519.3.05 Construction

The minimum overlay thickness is to be 3.875 in. (95 mm) with a minimum of 2.25 in. (55 mm) of concrete cover over the top reinforcement mat or as specified in the plans.

A. Finishing

Pass the finishing machine or approved screeding device over the existing deck prior to placing the concrete overlay in order that measurements can be made to insure that proper overlay thickness and steel cover is achieved. Equip screeds with surface vibrators sufficient to thoroughly consolidate the overlay full depth, unless other methods are approved by the Engineer. Perform consolidation using hand-held vibrators when placing the mixture around steel reinforcement or structural members.

Satisfy the surface tolerances for the overlay as found in Section 500.3.06.E of the Standard Specifications except as noted on the Plans. After finishing, texture the surface in accordance with the requirements of Section 500.3.05.T.9.C or as required by the Plans and Proposal. Do not begin surface grooving until the curing period specified herein has expired.

B. Construction Joints

Minimize the number of longitudinal and transverse construction joints. Thoroughly clean both types of joints by blast cleaning. Coat the hardened sides of the joints with an approved bonding agent before fresh concrete is placed. When necessary, form longitudinal construction joints vertical by use of a header secured to the deck. After removal of the longitudinal header and transition, saw the overlay 3 in. (75 mm) or more inside the construction joints and the overlay outside the saw cut removed before the adjacent overlay is placed. The volume of the overlay removed is not included in the volume measured for payment**.**

C. Curing

Cure the concrete overlay for a minimum of 24 hours.

Begin curing of the overlay immediately after the water sheen disappears and the surface finish is applied. Maintain a film of water on the surface by fogging until covering materials are in place.

Apply curing covers as soon as the concrete has set sufficiently to prevent marring of the surface. Provide curing material consisting of two layers of wet burlap and at least one layer of plastic sheeting conforming to the requirements of AASHTO M-171. Lap adjacent sheets of curing covers a minimum of 6 in. (150 mm). Immediately replace sheeting materials that become torn, broken or damaged. Make provisions for additional applications of water under the plastic sheeting. This may be accomplished with soaker hoses or other methods approved by the Engineer. In any event, the overlay surface and burlap material are to remain wet throughout the curing period.

D. Weather Limitations

Place the overlay during favorable weather conditions. When the atmospheric temperature is expected to exceed 90 °F (32 °C). during daylight hours, schedule work hours that insure complete placement by 10:30 a.m. Do not schedule placement when wind velocity is expected to exceed 20 mph (32 km/hr) or when rain is expected. The minimum acceptable

temperature of concrete at the point of delivery is 70 °F (20 °C). Keep overlay concrete at a temperature above 70 °F (20°C) for at least 24 hours after placement.

E. Repair of Cracks

Repair cracks, as directed by the Engineer, occurring in the concrete deck overlay surface in accordance with Section 528 of the Special Provisions prior to grooving of the deck surface.

F. Expansion Joints

After the curing process for the overlay is completed, install new expansion joint sealing systems according to Section 449 of the Standard Specifications.

519.4 Measurement

Measurement for the concrete overlay is by the square yard of existing deck surface to be overlaid, complete in place and accepted, and includes all materials and labor to remove the existing concrete, clean and prepare the deck surface, place and finish the overlay.

Make a separate measurement for payment purposes for removing unsound concrete and the reconstruction of the existing deck for the depth directed by the Engineer. Measure the unsound concrete removal for payment by the square foot for each depth of removal category completed and accepted, including all materials and labor to remove the unsound concrete and to reconstruct the existing deck. Include all form work necessary to replace the existing deck.

519.5 Payment

Payment for the concrete overlay as specified above is paid for at the Contract Unit price bid per square yard. Such payment is full compensation for furnishing all equipment and materials and performing the work in accordance with the Plans and Specifications.

Removal of unsound concrete measured as specified above is paid for at the specified rate of payment per square foot for each depth of slab removal category. Such payment is full compensation for furnishing all equipment and materials and performing the work as directed by the Engineer, including the cost for the quantity of concrete required to replace removed unsound concrete and formwork necessary to replace the existing deck.

Payment will be made under:

Item No. 519	Portland Cement Concrete Overlay, Variable Thickness	Per square yard (meter)

Payment rate for unsound concrete removal and replacement:

Item No. 519 category (1) Unsound concrete removal to full depth of deck for slabs over metal deck forms.
Removal and Replacement …… $5.00 per square foot ($54.00 per square meter)

Item No. 519 category (2) Unsound concrete removal to full depth of deck for slabs without metal deck forms.
Removal and Replacement ……. $20.00 per square foot ($215.00 per square meter)