Make the following Section a part of the Standard Specifications:

"SECTION 676 - BRIDGE REPAIR WITH SHOTCRETE AND/OR HAND-PLACED MORTAR, AND CORE DILLING

676.01 Description. The work includes repairing damaged portions of a bridge with shotcrete and/or hand-placed mortar, and core drilling drain holes according to the contract. The Contractor shall do the repairs according to the contract. The Contractor may submit an equivalent material to shotcrete and/or hand-placed mortar for spall repairs for acceptance by the Engineer. The Engineer will determine the actual areas and extent of repairs in the field. Areas shown on the plans are approximate only.

676.02 Materials. Materials shall conform to Subsection 628 - Shotcrete.

Proportion for hand-laid mortar shall consist of one (1) part cement to three (3) parts fine aggregate. If necessary, the Contractor shall increase the cement amount to assure strength requirements are met.

676.03 Construction Requirements.

(A) Traffic and Equipment Control on Bridge. The Contractor shall insure that the vehicular speed on the bridge be ten (10) miles per hour maximum during mortar replacement and until initial set (approximately 4 hours). The Contractor shall comply with Subsection 107.13 - Public Convenience and Safety, regarding opening of lanes to public traffic.

The Engineer will not permit compressors or other equipment that produce vibration on the bridge span during the mortar application and curing period.

When necessary, the Engineer may permit the Contractor to close one (1) traffic lane.

(B) General. Repairs include chipping and removing existing spalled, deteriorated, or unsound concrete, mortar or shotcrete; cleaning or weld-splicing corroded reinforcing steel if more than twenty-five (25) percent of the original cross section area is unsound; and patching unsound concrete areas with hand-placed mortar or shotcrete.

Appearance and texture of exterior surfaces of repaired areas shall match original surface.

The Contractor shall finish the repaired areas on rails and end posts to match the existing lines and grades. For other repair areas, the minimum cover of mortar or concrete at the reinforcement shall be two (2) inches.

The Contractor shall provide galvanized welded wire fabric (Concrete Reinforcing Steel Institute designation 2x2-W1.4xW1.4) and 1/4 inch diameter hot-dip galvanized hooked expansion bolts for spalled surface areas greater than one (1) square foot.

The Contractor shall apply one (1) coat of epoxy bonding agent to the contact area between the existing concrete and newly applied concrete/mortar according to the manufacturer's specifications and accepted by the Engineer. The Contractor shall submit two (2) copies of the manufacturer's specifications and brochures to the Engineer for acceptance two (2) weeks before use.

The Contractor shall apply the shotcrete and hand-placed mortar according to Section 601 - Structural Concrete and Section 628 - Shotcrete.

(C) Surface Preparation. The Contractor shall prepare the surface with suitable hand or pneumatic tools without damaging the remaining structure. If the structure is damaged, the Contractor shall repair the damaged portion according to the contract at no cost to the State.

The Contractor shall not use explosives in this work.

The Contractor shall remove the damaged concrete such as honeycombs, fractures, loose concrete, cracked concrete, or disintegrated concrete. The Engineer will decide the extent of damage of the concrete and amount of concrete that the Contractor will remove.

(D) Spalled Concrete. The Contractor shall remove the concrete at areas resolved and marked by the Engineer. The Contractor shall remove at least one (1) inch of concrete around the reinforcing steel. If the reinforcing steel is found to be unsound, rusted, or corroded, the Contractor shall work according to the Subsection 676.03(E) - Unsound, Rusted, or Corroded Reinforcing Steel. The Contractor shall sandblast according to Subsection 676.03(F) - Sandblasting.

(E) Unsound, Rusted, or Corroded Reinforcing Steel. The Contractor shall remove the existing concrete and reinforcing steel at areas resolved and marked by the Engineer where at least twenty-five percent (25%) of the existing reinforcing steel cross-sectional area is unsound, rusted, or corroded plus the lapped splice distance. The Contractor shall remove at least one (1) inch of concrete around the reinforcing steel plus the splicing distance. The Contractor shall sandblast according to Subsection 676.03(F) - Sandblasting.

The Contractor shall submit the method for removing the unsound, rusted, or corroded reinforcing steel for acceptance by the Engineer. The Engineer will not permit torching or burning for removal of unsound, rusted, or corroded reinforcing steel.

The Contractor shall splice the new reinforcing steel according to Section 602 - Reinforcing Steel.

(F) Sandblasting. The Contractor shall clean the surfaces to receive concrete thoroughly by sandblasting. The Contractor shall clean the reinforcing of rust and concrete. The reinforcing steel shall present a shiny surface after sandblasting. The Contractor shall wash the sandblasted areas down with fresh water.

The Contractor shall sandblast with a standard commercial equipment accepted by the Engineer. The Contractor shall maintain a minimum pressure of seventy-five (75) psi at the nozzle during sandblasting operations. Spare sandblasting equipment shall be on the project site during working hours.

(G) Dust Pollution Control. The Contractor shall protect the public from dust pollution or other damages resulting from the sandblasting operation. The Contractor shall submit the method of controlling pollution for acceptance to the Engineer.

The Engineer will suspend the sandblasting operations if the Contractor does not control the dust pollution according to the Contract. No sandblasting operation shall resume until the Contractor has taken the necessary measures to minimize dust pollution and to protect the public from damages as required by this contract. The Contractor shall repair damages due to the its operation at no cost to the State.

(H) Reinforcement. The Contractor shall use galvanized welded wire reinforcement with shotcrete and mortar placement greater than one (1) square foot in surface area. Minimum cover of mortar over wire mesh shall be two (2) inches. The Contractor shall cut the wire mesh to the required size and shaped to fit neatly to the contour of the area. The Contractor shall secure the wire mesh by 7/32-inch diameter and 4-inch minimum length galvanized anchor bolts placed twelve (12) inches in each direction and by tying to the existing rebar to prevent displacement during mortar placement. Space between the wire mesh and existing concrete surface shall be at least half (1/2) inch.

(I) Placement. The Contractor shall place the shotcrete according to Subsection 628.03.

(J) Finishing and Curing. The Contractor shall finish the shotcrete or hand-placed mortar surfaces above the soffit of the bridge deck slab with a wood trowel to match existing lines. Surface finish of other areas shall be the natural finish as applied.

The Contractor shall cure the shotcrete or hand-placed mortar surfaces according to Subsection 503.03(L).

The Contractor shall treat concrete spall repairs with a silane waterproofing chemical as recommended by the manufacturer and accepted by the Engineer.

(K) Inspection, Strength Requirements and Testing. Finished work shall be sound, free from cracks and thoroughly bonded to the existing surface. Surface shall be reasonably smooth and to neat lines. The Contractor shall remove and replace loose or defective work at no cost to the State.

The contractor shall test the areas that have attained the desired strengths to detect unsound concrete, including honeycomb or drummy areas. The Contractor shall cut out and repair the defective work with new mortar at no cost to the State.

Shotcrete or hand-placed mortar shall develop compressive strengths of not less than two thousand (2,000) pounds per square inch at seven (7) days and not less than three (3,000) pounds per square inch at twenty-eight (28) days. If the test cylinders of cores from the shotcrete test panel indicate that shotcrete or hand-placed mortar in any portion of the finished work does not meet the minimum strength requirements, the Contractor shall core and test such mortar at no cost to the State. When cores of repaired areas are taken and test reveal that the mortar is deficient in strength, the Contractor shall replace the cores with new shotcrete or hand-placed mortar at no cost to the State.

The Contractor shall take two (2) sets of three (3) test cylinders of hand-placed mortar by placing into a mold (cylinders 6 inches in diameter and 12 inches long) and duplicate actual field conditions as close as possible. The Contractor shall test the cylinders according to ASTM C 39.

The Contractor shall take test panels for shotcrete according to Subsection 628.03.

676.04 Method of Measurement. The Engineer will measure the spalled concrete repair by the square feet complete in place. The Engineer will compute the actual area within the neat lines and dimensions shown in the contract or ordered by the Engineer.

The Engineer will measure the core drilling drain holes per each complete in place.

676.05 Basis of Payment. The Engineer will pay for the accepted spalled concrete repair at the contract unit price per square foot.

The price shall be full compensation for repairing damaged portions of a bridge, installing wire fabric or reinforcing steel, preparing the surface, sandblasting, finishing, curing, testing, and furnishing materials, labors, equipment, tools, and incidentals necessary to complete the spalled concrete repair work.

The Engineer will pay for the accepted core drilling drain holes at the contract unit price per each. The price shall be full compensation for drilling drain holes, and furnishing materials, labors, equipment, tools, and incidentals necessary to complete the core drilling work.

The Engineer will make payment under:

Pay Item	Pay Unit
Repair Spalls	Square Foot
Core Drill 6 Inch Diameter Drain Hole	Each"

END OF SECTION 676