SECTION 423 — PNEUMATICALLY APPLIED MORTAR

423.01 DESCRIPTION. This work shall consist of removing existing concrete, and furnishing and placing pneumatically applied mortar as specified in the Contract Documents or as directed by the Engineer.

423.02 MATERIALS.

Curing Materials	902.07
Reinforcement Steel	908.01, 908.02, and 908.08
Anchor Bolts	909.06
Water	921.01

Cement shall be Type II conforming to 902.03, and shall be furnished in the original 94 lb paper sacks supplied from the cement manufacturer.

Fine Aggregate. Fine aggregate shall conform to the Fine Aggregate-Portland Cement Concrete requirements of 901.01. Maximum moisture content of fine aggregate shall be 6 percent by weight.

Mortar Mixes. Pneumatically applied mortar shall have a 28 day compressive strength of 5000 to 9000 psi. All mixes shall be approved by the Engineer prior to starting work.

423.02.01 Test Panels. When specified in the Contract Documents, test panels of various mix combinations, admixtures, and materials shall be prepared and cured by the Contractor. One test panel shall be prepared for every 100 ft^3 of mortar in place. Additional test panels shall be prepared as directed by the Engineer. Each panel shall be 36 in. square and 8 in. deep. At least half of each panel shall contain the same reinforcement as the structure. A separate panel shall be fabricated by each application crew using the equipment for each mix design, and in each shooting position encountered.

The Contractor shall be responsible for the preparation and curing of all test panels. The Contractor shall core each test panel and the cores shall be delivered to the Laboratory for testing. Cores shall have a minimum diameter of 4 in. and a minimum length of 8 in. Each core will be tested in compression at 7, 14, and 28 days. Core strength correction will conform to T 24.

The cut surface of each specimen will be examined by the Engineer. Additional surfaces shall be exposed by sawing or breaking the panel when this is considered necessary to check soundness and uniformity of

the material. All cut or broken surfaces shall be dense and free from lamination and sand pockets.

423.03 CONSTRUCTION. The Contractor's proposed methods of protecting the public against injury and damage from demolition operations to remove deteriorated concrete shall be submitted to the Engineer and approved prior to beginning removal operations. Whenever protective shields are required, they shall conform to 405.03.01.

The Contractor shall provide safe access to all areas of the existing structure to be repaired. Prior to the start of any repair work, the Contractor, in the presence of the Engineer, shall conduct a full and thorough inspection of the areas to be repaired. The purpose of this inspection will be to identify the location and extent of each area of concrete deterioration and repair. The extent of removal and the determination of when sound concrete is encountered shall be as established by the Engineer.

Restrictions. The Contractor shall wait 72 hours minimum after completing repairs to a section of a stringer or pier before chipping on any section that has a common side or point.

If at any time an area is identified as having deteriorated concrete beyond the following limits, all work shall immediately stop, and the Engineer will notify the Office of Bridge Development. Work in these areas will not be permitted to resume until approval has been obtained from the Office of Bridge Development:

(a) A maximum depth of 6 in. behind the original finish surface.

(b) A maximum depth of 3 in. behind the reinforcement steel.

(c) A maximum depth of 1 in. under the bearing.

423.03.01 Equipment. All equipment shall be capable of thoroughly mixing all material used and shall be calibrated.

The mixer shall be self-cleaning and capable of discharging all mixed material without any carry over from one batch to the next. Mixing equipment shall be cleaned at least once a day.

The air compressor shall be of ample capacity to maintain a supply of clean, dry air adequate to provide the required nozzle velocity for all parts of the work, while simultaneously operating a blowpipe for cleaning away rebound.

The air and water pressure shall be constant and not pulsate.

423.03.02 Storage. Storage and handling of cement shall conform to 902.01. Sand shall be stored to prevent segregation or contamination of the material.

Regardless of the type of surface the bundles are to be stored upon, all bundles shall be stored at the site on suitable blocking or platforms at least 4 in. above the surface or vegetation. The reinforcement shall be kept free of dirt, oil, grease, paint, and other foreign matter.

423.03.03 Surface Preparation. The deteriorated areas of concrete shall be removed to sound concrete with a 30 lb maximum chipping hammer. Chipping shall continue to a minimum depth of 1 in. behind the reinforcement steel and until there are no sudden changes in the depth of the cavity. The perimeter of the cavity shall consist of a shoulder that is perpendicular to the surface of the structure for a minimum depth of 1 in.

After the Engineer has determined that the cavity surface is sound, it shall be abrasive blasted. Just prior to mortar application, all surfaces shall be thoroughly cleaned, followed by wetting and damp drying.

The Contractor shall contain all blast waste and loose concrete and promptly remove it to an approved disposal site. Blast waste and loose concrete shall be kept out of waterways.

423.03.04 Reinforcement. If sound concrete is encountered before the reinforcement steel is exposed, then sound concrete shall be removed to a depth of 1 in. behind the existing reinforcement steel. If sound concrete is found within 3-1/2 in. of the proposed finished surface, the removal shall stop and additional No. 4 reinforcement bars shall be dowelled and installed at 12 in. center to center horizontally and vertically, 2 in. clear of proposed finished surface. Dowelling shall conform to Section 406 except that the grout shall conform to any type specified in 902.11.

All exposed existing reinforcement steel that will be incorporated in the new work shall be abrasive blasted to a near white finish to remove all rust, dirt, scale, and loose concrete. All deteriorated reinforcement bars that have lost 20 percent or more of their original dimension shall be cut out and new bars welded in their place. Dual bars of equivalent or greater section may be used. New reinforcement steel shall be welded to existing reinforcement steel as specified in the Contract Documents. The Engineer will establish if reinforcement steel is to be reused or replaced.

All areas to be repaired shall be reinforced with wire mesh in addition to the reinforcement steel.

For anchoring reinforcement to masonry surfaces, expansion bolts not less than 3/8 in. in diameter shall be set in drilled holes, or plain round

No. 4 bars shall be set in approved dry packed mortar tightly driven in drilled holes. Drilled holes shall not be less than 3 in. deep. All bolts or bars shall be set in solid masonry (not in mortar, joints, or cracks) and shall have heads or hooks on their outer ends. Where approved by the Engineer, wire mesh reinforcement may be wired to existing reinforcement without the use of expansion bolts.

Mesh shall be cut in sheets of proper size, and the separate sheets shall be bent over templates so as to follow closely the outlines of the member or surface to be covered. It shall be securely held in a uniform position by being tied with 14 gauge black annealed wire to the bolts or bars. Ties shall be spaced at 12 in. maximum.

Where adjacent sheets of mesh join, they shall overlap at least two squares of the mesh and be tied together at intervals not exceeding 18 in. with 14 gauge black annealed wire.

423.03.05 Guides. Sufficient guides shall be provided to obtain the full thickness of mortar specified to ensure uniform and straight lines.

423.03.06 Mixing and Screening. The cement and sand shall be uniformly dry mixed in a batch mixing machine. Mixed materials that are not applied as mortar within one hour after being mixed shall be discarded. After the materials are dry mixed and before being charged into the placing machine, the mixture shall be passed through a 3/8 in. screen.

423.03.07 Application. Each layer shall be built up by several passes of the nozzle over the working area. The mixture shall emerge from the nozzle in a steady, uninterrupted flow. Should the flow become intermittent for any cause, it shall be directed away from the work until it becomes constant. The distance of the nozzle from the work shall be as required to give best results for the conditions, and shall be held perpendicular to the application surface. When shooting through reinforcement, the nozzle shall be held at a slight angle from perpendicular to permit better encasement.

The application of the mixture to vertical surfaces shall begin at the bottom. The first layer shall at least completely embed the reinforcement.

Rebound shall not be worked back into the construction, or be salvaged and included in later batches.

Rebound and overspray shall not be allowed to fall into waterways and shall become the property of the Contractor, who shall dispose of this material in an approved disposal site at no additional cost to the Administration.

When a layer of pneumatically applied mortar is to be covered by a succeeding layer, it shall first be allowed to take its initial set. Then all laitance, loose material, and rebound shall be removed by brooming. Any laitance that has been allowed to take final set shall be removed by abrasive blasting and the surface cleaned with an air water jet. In addition, the surface will be sounded by the Engineer with a hammer for hollow sounding areas resulting from rebound pockets or lack of bond.

423.03.08 Curing and Cold Weather Protection. Curing and cold weather protection shall conform to Section 420. Mortar shall be kept continuously wet for at least seven days after application. The use of a liquid membrane forming compound will be permitted with prior approval of the Engineer.

423.03.09 Finishing. The area of repair on existing structures shall be finished to match the existing structure.

423.04 MEASUREMENT AND PAYMENT. Pneumatically Applied Mortar will be measured and paid for at the Contract unit price per cubic foot of mortar in place. The payment will be full compensation for inspections, removal of existing concrete, abrasive blasting, and furnishing all cement, sand, water, test panels, drilled holes, reinforcement bars and wire mesh, mortar, expansion bolts, cores, storage, and for all material, labor, equipment, tools, and incidentals necessary to complete the work.

SECTION 424 — RESERVED

SECTION 425 — LIGHTWEIGHT SUPERSTRUCTURE CONCRETE

425.01 DESCRIPTION. This work shall consist of constructing the lightweight concrete portions of the structure as specified in the Contract Documents.

425.02 MATERIALS. Materials shall conform to 420.02 except as modified herein.

Control testing for Compression Test and Unit Weight of Cured Concrete shall be two companion cylinders for each 100 yd^3, or fraction thereof, as specified in M 195.