ITEM 361

FULL-DEPTH REPAIR OF EXISTING CONCRETE PAVEMENT

361.1. Description. This Item shall govern for full-depth repair of existing sections of portland cement concrete pavement in accordance with the existing roadway section and the details shown on the plans, and to the lines and grades established by the Engineer.


(1) Concrete. Concrete shall be Class "K" unless Class "K(Modified)" is indicated on the plans.

All materials shall conform to the pertinent requirements of Item 421, "Portland Cement Concrete", together with the following:

The coarse aggregate shall be either Grade 2 or 3. When specified on the plans, air entrainment will be required. An air entrained content of three (3) to six (6) percent, as directed by the Engineer, shall be provided. The fine aggregate shall be Grade 1 with a fineness modulus of 2.60 to 2.80. For Class "K(Modified)" concrete, the fineness modulus range may be increased to between 2.30 and 3.10 when noted on the plans. All admixtures used shall conform to the requirements of Item 437, "Concrete Admixtures", except that the addition of an ASTM Type C nonchloride set-accelerating admixture may be required at the job site when the temperature of the concrete is above 55 degrees F. Either transit-mix or central-mix concrete will be permitted. If the concrete fails to reach the required 24-hour strength, the Engineer may direct that the concrete be redesigned to meet these requirements.

(a) Class "K" concrete shall be designed to include seven (7) sacks of Type III cement. The maximum water cement ratio shall not exceed 5.5 gallons per sack. An ASTM Type A water-reducing admixture and an ASTM Type C nonchloride set-accelerating admixture shall be used to achieve the earliest possible concrete-setting times. The use of a set-retarding admixture will not be permitted with Class "K" concrete. The concrete will be designed to achieve a minimum flexural strength of 425 psi in 24 hours. Additional minimum flexural strength requirements for intermediate time intervals may be shown on the plans.

(b) Class "K(Modified)" concrete shall be designed to include seven (7) sacks of cement when Type I cement is used and six (6) sacks of cement when Type III cement is used. The maximum water cement ratio shall not exceed 6.0 gallons per sack. An ASTM Type D water-reducing, set-retarding admixture or an ASTM Type A water-reducing admixture will be used if directed by the Engineer. The concrete will be designed to achieve a minimum flexural strength of 300 psi in 24 hours.

(2) Reinforcing steel. Reinforcing steel and dowels shall be of the size and grade indicated on the plans and shall conform to the requirements of Item 440, "Reinforcing Steel".

(3) Stabilized base material. Stabilized base material shall conform to the material requirements of Item 276, 334, 340, 345, 350 or 421. The materials and material sources shall be approved by the Engineer. The quality-control tests required for these items may be waived by the Engineer and the material may be accepted by visual inspection.

(4) Epoxy. Epoxy shall conform to the requirements of Item 575, "Epoxy".

(5) Miscellaneous materials. All other materials shall conform to the pertinent requirements of Item 360, "Concrete Pavement".

361.3. Construction Methods. The areas to be repaired will be outlined on the slab by the Engineer. The square yardage shown on the plans to be repaired is for bidding purposes only. Actual dimensions of areas to be repaired will be determined during construction by the Engineer. Patches shall be a minimum of six (6) feet in length and the full lane in width. If the area to be repaired is covered with asphal tic concrete,
the asphaltic concrete shall be removed over an area sufficient to allow for proper repair of the concrete pavement. The asphaltic concrete removed shall remain the property of the Department and shall be stockpiled as directed by the Engineer.

A pressure relief groove approximately 2 inches deep shall be sawed transversely 6 inches (to the inside) from the patch ends. Full-depth saw cuts shall be made transversely along the patch ends. Unless otherwise shown on the plans, longitudinal saw cuts shall be full depth along the patch sides. If in the opinion of the Engineer, spalling occurs along the full-depth longitudinal saw cut, the longitudinal saw cutting shall then include a longitudinal 2-inch deep pressure relief groove and be performed in the same manner as the transverse saw cutting. Additional full-depth saw cuts may be made as needed to facilitate removal of the concrete within the limits of the required full-depth cuts. Concrete adjacent to the patch shall not be spalled or fractured by the removal procedure.

The concrete shall be removed, taking care not to disturb the underlying pavement support. The total lift-out method shall be used within the limits of the full-depth saw cuts.

All loose subbase material shall be removed and replaced with stabilized base material as specified in Article 361.2., and approved by the Engineer. If concrete is used to replace loose subbase material, a bond breaker such as a polyethylene sheet shall be used at the interface between the replaced subbase material and the new concrete pavement, or as directed by the Engineer.

For a given patch, the Contractor shall schedule his work so that the concrete placement will follow the full-depth saw cut by no more than seven (7) days unless otherwise shown on the plans or permitted by the Engineer.

Unless otherwise shown on the plans, dowel bars and reinforcing bars shall be replaced with new bars of the same size, grade and spacing. Dowel bars will be required as shown on the plans.

New reinforcing bars shall be placed and firmly supported by approved bar chairs.

For all concrete pavement, the following procedure of reinforcement shall apply:

The longitudinal tiebars shall be reinforcing steel as detailed on the plans. The depth of reinforcing steel into the patch area shall be 30 bar diameters. The depth of reinforcing steel into the existing concrete shall be based on the pull-out test for bond strength but no less than 12 inches. The longitudinal tiebars shall be epoxy grouted into the existing concrete.

Transverse tiebars shall be No. 4 (unless otherwise shown on the plans) X 24 inches reinforcing steel and shall be epoxy grouted, with the same grout as used for the longitudinal tiebars, into the existing concrete pavement to a depth of 12 inches. Tiebar spacing shall be as shown on the plans. Other reinforcing steel for the repair shall match the existing reinforcing steel unless otherwise shown on the plans.

The Contractor must demonstrate, through simulated job conditions, that the bond strength of the longitudinal and transverse tiebars (for continuity of the reinforcing steel) shall withstand a tensile load in the field of 3/4 of the yield strength of the tiebar by using a tension test required by ASTM E 488. This test shall be conducted within 18 hours after grouting of the tiebar into existing concrete. The Contractor shall demonstrate this test before patching work can begin.

Concrete placement shall not begin in a given patch until the tiebar and dowel-bar grout has attained sufficient strength to preclude displacement of the tiebars by the concrete, as determined by the Engineer. Grout retention disks shall be used when required on the plans.

The edge of any patch that abuts a shoulder shall conform with the edge and to the alignment and grade of the existing pavement. The Contractor will be permitted to remove enough shoulder base and surfacing to provide room for the forms. All shoulder material removed shall be replaced with asphaltic concrete material conforming to the material requirements of Items 330, 334 or 340. Testing of asphaltic
concrete is waived, unless otherwise directed by the Engineer.

The requirements of Item 420, "Concrete Structures", shall govern the mixing and placing of the concrete. Immediately prior to placing the concrete, the subbase and each face of existing concrete shall be wetted. Approved hand manipulated mechanical vibrators shall be used to insure the proper consolidation of the concrete. The concrete shall be screeded to the elevation of the adjacent concrete pavement and checked with a straightedge to insure that the riding surface will be satisfactory. The concrete shall be given a broom finish as directed by the Engineer, unless otherwise shown on the plans.

If the repaired area had been covered with asphaltic concrete, the repaired area shall be overlaid with asphaltic concrete material conforming to the material requirements of Item 330, 332, 334 or 340, unless otherwise shown on the plans. The asphaltic concrete overlay shall not be placed until the repaired area has attained the required flexural strength for opening to traffic. Testing asphaltic concrete is waived, unless otherwise directed by the Engineer.

The concrete shall be cured in accordance with Article 360.11.(1), (3) and (4). Membrane or asphalt curing shall be used for the curing of the repaired area. The curing period shall extend only until the repaired area is opened to traffic.

The repaired area may be opened to traffic when the concrete has attained a flexural strength of 255 psi. All test specimens representing tests for opening to traffic shall be cured using the same methods and under the same conditions as the repaired area.

Modifications to the specified construction methods which are requested by the Contractor, must be submitted to the Engineer in writing for his approval.

361.4. Measurement. This Item will be measured by the square yard of surface area, except for areas that require repair which were damaged by the negligence of the Contractor.

361.5. Payment. The work performed and the materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Repairing Existing Concrete Pavement", of the nominal depth specified. This price shall be full compensation for sawing and breaking the existing pavement structure; for the removal, loading, hauling and disposal of the broken concrete or loose subbase; for furnishing all materials; for all reinforcing steel; for all curing; for all asphaltic concrete for restoring shoulders and overlaying the repaired area; for subbase patching material; and for all manipulations, labor, equipment, tools and incidentals necessary to complete the work.

Monolithic curbing will not be measured and paid for separately, but will be considered as part of the area measured and paid for under this Item.

The asphaltic concrete necessary for the completion of this work will not be paid for directly, but will be considered subsidiary to this Item.