KANSAS DEPARTMENT OF TRANSPORTATION
SPECIAL PROVISION TO THE
STANDARD SPECIFICATIONS, EDITION 2015

Add a new SECTION to DIVISION 800.

SECTION 861

PCCP MUDJACKING

861.1 DESCRIPTION

Raise and support the existing portland cement concrete pavement (PCCP) by drilling injection holes and pumping a grout or polyurethane material under the pavement slab as shown in the Contract Documents.

BID ITEMS	**UNITS**
Cement (Mudjacking)	Ton
Fly Ash (Mudjacking)	Ton
Polyurethane (Mudjacking)	Lbs.

861.2 MATERIALS

Provide materials that comply with the applicable requirements.

Water ..... **DIVISION 2400**
Portland Cement (Type I or II) ..... **DIVISION 2000**
Fly Ash ..... **DIVISION 2000**
Admixtures ..... **DIVISION 1400**
Non-Expansive Cementitious Grout ..... **DIVISION 1700**
Polyurethane ..... **DIVISION 1700** (this specification)

a. Grout. Mix the water, portland cement (not less than 25% by volume of solids) and fly ash (75% by volume of solids) into a cement/fly ash grout complying with **TABLE 861-1**:

TABLE 861-1: GROUT FOR MUDJACKING

Property	Test Method	Value
Fluidity (efflux time)	ASTM C939	16 to 36 seconds
7-Day Compressive Strength	ASTM C942	600 psi minimum

Submit to the Engineer the results of tests conducted on the design mix by a certified testing laboratory. Provide test results for 1, 3, and 7-day strengths, fluidity, time of initial set (ASTM C266), and shrinkage and expansion observed (ASTM C940).

Use admixtures only with written approval from the Engineer.

The Engineer will accept the fly ash grout on the results of the compressive strength and visual inspection of the mixture placed on the project.

861.3 CONSTRUCTION REQUIREMENTS

a. Polyurethane Contractor Approval. The Polyurethane Contractor must be regularly engaged in work similar to this project in difficulty and/or scope, and document that the company has performed a minimum of the following work in the United States:

- Provided all supervision, labor, material, and equipment necessary to successfully complete 10 separate projects.

- Provide contact names and their telephone numbers as part of this submittal.

Submit the Polyurethane Contractor's qualifications to the Geotechnical Unit in the Bureau of Structures and Geotechnical Services for approval. The Geotechnical Unit will approve or deny the Polyurethane Contractor's qualifications.

b. Weather and Seasonal Limitations. Do not mudjack the PCCP if the pavement surface temperatures are below 35°F, if the subgrade or base course is frozen, or if the subgrade is saturated from recent rainfall, as evidenced by standing water on the pavement or in the joints or cracks.

Mudjacking operations may start when the pavement surface temperature is above 35ºF, the ambient air temperature is 35ºF and rising and is expected to exceed 40ºF. Discontinue paving when the ambient air temperature falls below 40ºF. Do not place when it is raining or snowing.

c. Drilling Holes. Submit a hole pattern and pumping sequence to the Engineer. Do not damage the existing reinforcing steel in the pavement. Before drilling the holes, determine the location of reinforcing steel.

Drill holes vertically and round to the maximum diameter shown **TABLE 861-2.** Drill to a depth sufficient to penetrate the base and into the subgrade material. Holes may be washed to create a small cavity, allowing initial spread of material. Drill the holes in a manner preventing breakout at the bottom of the pavement. Do not put downward force on the drill that exceeds 200 lbf.

TABLE 861-2: DRILL HOLE DIAMETER

Type of Work	Maximum Diameter
Fly Ash	1 to 1½ inches
Polyurethane	5/8 inches

d. Pavement Mudjacking.

(1) General. Use a string line or monitoring equipment to create a smooth profile. Raise PCCP by injecting grout or polyurethane material within ± ¼ inch of adjacent unjacked PCCP as shown in the Contract Documents. Replace all slabs raised more than ½ inch greater than adjacent PCCP. Grind all slabs raised more than ¼ inch and less than ½ inch. Grade tolerances are applicable to both transverse and longitudinal grades.

Begin the injection as soon as practicable after mixing the material. Do not use material held in the mixer or injection sump pump for more than 1 hour after mixing. Do not add water to the material after the initial mixing.

Inject the mudjacking material in the submitted pattern sequence, and in the quantity required to fill voids under the PCCP.

Cease injection when material appears at any joint, crack or adjacent hole, or when monitoring devices indicate slab movement.

Prevent grout or polyurethane material from being injected into any drainage facility or other open structure.

Prevent excessive loss of material through cracks, joints, other drilled holes or back pressure. KDOT will not pay for wasted material.

Replace slabs in which cracks emanate radially from the injection holes and in slabs where cracks develop between adjacent injection holes at no additional cost to KDOT. The Engineer may approve tie bar insertion (cross-stitching) of the cracks if the cracking is minor. Perform tie bar insertion according to **15-08003, latest revision** at no additional cost to KDOT.

(2) Grout. Connect an expanding rubber packer, or other approved device, to the end of the grout plant discharge hose. Place the expanding rubber packer in the injection hole, being careful not to extend the discharge end of the rubber packer below the lower surface of the PCCP.

Produce grout slurry to a 12 second flow cone time. Pump the grout into the holes using an injection pump with a pressure capability of 250 to 300 psi when pumping grout slurry mixed to a 12 second flow cone time.

Cease injection at a hole when grout flow does not occur after 7 seconds of sustained 150 psi gauge pressure, and there is no indication of slab movement.

Prior to grout drying on the drilled holes, fill the holes with a fast-setting sand/cement mixture or other patching material approved by the Engineer.

(3) Polyurethane. Submit a plan to verify the amount of material being injected, equipment, test methods, and procedures.

Demonstrate to the Engineer, using established industry practices, that the material is hydro-insensitive.

During the first day's production, perform a product density test by injecting the polyurethane into a known volume cylinder (6-inch x 12-inch) or other, suitable container. The density shall be in accordance with **DIVISION 1700** this specification. Provide a ½ pint sample for each component. The Engineer will submit samples to Materials and Research Center for testing.

Pump the polyurethane into the holes using an injection pump with volumetric controls and pressure appropriate for the material. Equip the pumping unit with means to measure the material usage. Inject the polyurethane material according to the manufacture's recommendations.

Remove excess polyurethane from the injection holes and fill the holes with a non-expansive cementitious grout or material approved by the Engineer

861.4 MEASUREMENT AND PAYMENT

The Engineer will measure cement and fly ash mudjacking by the ton and polyurethane mudjacking by the pound.

Monitoring for pavement lift and injection holes are subsidiary to the bid items mudjacking.

Payment for "Cement (Mudjacking)", "Fly Ash (Mudjacking)" and "Polyurethane (Mudjacking)" at the contract unit prices is full compensation for the specified work. No adjustment in contract unit prices will be made regardless of the amount of underruns or overruns.

Add a new SECTION in DIVISION 1700.

SECTION 1735

POLYURETHANE

1735.1 DESCRIPTION

This specification covers polyurethane material used for mudjacking.

1735.2 REQUIREMENTS

a. Provide a high density, closed cell, hydro-insensitive polyurethane material complies with the following:

TABLE 1735-1: POLYURETHANE PROPERTIES

Property	Test Method	Requirement
Compressive Strength (min)	ASTM D1621	45 psi
Tensile Strength (min)	ASTM D1623	80 psi
Elongation (max.)	ASTM D1623	5%
Density (min)	ASTM D1622	4.0+/-0.5 pcf

1735.3 TEST METHODS

Test as specified in **subsection 1735.2**.

1735.4 PREQUALIFICATION

a. Manufacturers interested in prequalifying material under **subsection 1735.2a**. must submit the following to the Bureau of Construction and Materials:

(1) A complete description, literature, and set of instructions and recommendations,

(2) A copy of test results performed in accordance with the tests stated in **subsection 1735.2a.**,

(3) Certificate stating results comply with **subsection 1735.2a.**, and

(4) Safety Data Sheets (SDS).
(5) ½ pint sample of each component
(6) An infra-red spectrum of the Polyurethane which was used in the laboratory tests.

b. The Bureau of Construction and Materials will maintain a list of qualified materials. Products will remain on the list as long as field performance is satisfactory.

1735.5 BASIS OF ACCEPTANCE

a. Prequalification as specified in **subsection 1735.4**.

b. Receipt and approval of a Type C certification as specified in **DIVISION 2600**.

c. Visual inspection by the Field Engineer.

04-20-21 C&M (SB)
Aug-2021 Letting