CITY OF COLUMBUS
PUBLIC SERVICE DEPARTMENT
TRANSPORTATION DIVISION

SUPPLEMENTAL SPECIFICATION 1521
RAISING AND UNDERSEALING CONCRETE WITH HIGH DENSITY POLYURETHANE

AUGUST 1, 2001

RAISING AND UNDERSEALING CONCRETE WITH HIGH DENSITY POLYURETHANE

1521.01 Description

This work shall consist of drilling holes in the existing portland cement concrete pavement and injecting high density polyurethane (HDP) through the holes to raise and/or underseal the pavement and seal the holes with a non-expansive grout.

1521.02 Material

The HDP used for raising and undersealing the concrete slabs shall be a water blown formulation of high density polyurethane. The HDP shall exhibit the following physical characteristics and properties:

A. Properties

Material Density	4.0 lbs/ft^3
Tensile Strength	100 psi
Elongation	5.1%
Compression Strength (at yield point)	90 psi

B. Applicable Documents, ASTM Test Methods

Type Test	ASTM Designation	Title
Compressive Strength	D 1621	Test Method for Compressive Properties of Rigid Cellular Plastics
Water Absorption	D 2842	Test Method for Water Absorption of Rigid Cellular Plastics
Density	D 1622	Test Method for Apparent Density of Rigid Cellular Plastics
Dimensional Stability	D 2126	Test Method for Response of Rigid Cellular Plastic to Thermal and Humid Aging
Flexural Strength	D 790	Test Method for Flexural Properties of Unreinforced and Reinforced Plastics

Fungus Resistance	G 21	Recommended Practice for Determining Resistance
Coefficient of Expansion	D 696	Test Method for Coefficient of Linear Thermal Expansion of Plastics
Shear Strength	C 273	Test Method for Shear Properties in Flatwise Plane of Flat Sandwich Construction of Sandwich Cores
Solvent Resistance	D 543	Test Method for Resistance of Plastics to Chemical Reagents

1521.03 Equipment

An inventory of all lifting and undersealing equipment shall be submitted to the Engineer for review. The minimum list of equipment required shall be:

A pneumatic drill capable of drilling 5/8-inch diameter holes.

A truck mounted pumping unit capable of injecting the HDP formulation between the concrete pavement and the subbase. The pumping unit must be capable of controlling the rate of rise of the pavement.

A laser leveling unit used to assure that the concrete is raised to an even plane and to the required elevations.

1521.04 Construction Methods and Preparations

PRELIMINARY
Prepare a profile of the roadway to determine where the concrete pavement needs to be raised or the composite pavement needs to be undersealed.

DRILLING
A series of 5/8-inch holes shall be drilled at approximately six to eight foot intervals through the concrete. The location and spacing of the holes shall be determined by the Contractor.

INJECTING
The HDP formulation is then injected under the slab. As the HDP chemically reacts, it expands and hardens, exerting the necessary lifting forces. The amount of rise shall be controlled, using the pumping unit, by regulating the rate of injection of the HDP material. When the nozzle is removed from the holes, any excessive polyurethane material shall be removed from the area and the holes sealed with a non-expansive cement based grout.

Final elevations shall be within ¼-inch of the elevations proposed by profile. A tight string line may be used to monitor and verify elevations for section lengths of 50-foot or less. For longer sections, a laser level will be used to monitor and verify elevations. Elevations can also be verified by flooding the area to confirm that the pavement has been realigned properly.

The Contractor shall be responsible for any pavement blowouts, excessive lifting, or uneven pavement that causes ponding, which is the result of the raising of the pavement and shall repair or fix the damaged area to the satisfaction of the Engineer, without additional cost.

The HDP formulation used shall set and obtain 90 percent of its ultimate compressive strength within 15 minutes from injection.

MAINTENANCE OF TRAFFIC

Unless otherwise specified, all cost for Maintenance of Traffic shall be included in the unit price for this item. All signs, barricades, drums, cones, etc. necessary for a proper maintenance of traffic set-up per the Ohio Manual shall be included.

1521.05 Warranty

The high density polyurethane material that is used shall be warranted that it will not shrink or deteriorate for a period of ten (10) years from the date of injection. During the warranty period, any material that fails to perform as specified will be replaced by injection. This warranty supersedes any other warranties.

1521.06 Method of Measurement

The quantity for measurement will be the number of pounds of High Density Polyurethane material injected into the pavement, completed and accepted.

1521.07 Basis of Payment

Payment for this work, complete in place, shall include all materials, equipment, tools and labor necessary for the preparation, raising, undersealing and filling holes in the existing pavement.

Item	Description	Unit
1521	Raising and Undersealing Concrete With High Density Polyurethane	Pound