

## **CONCRETE SLAB STABILIZATION WITH HIGH DENSITY POLYURETHANE**

### **SCOPE OF WORK**

This work shall consist of stabilizing existing Concrete Pavement Slabs by injecting high density polyurethane beneath the concrete slab. The purpose of this operation is to fill voids beneath the slab; then lift and stabilize the slab to existing grade. This work shall include drilling injection holes, placing of material, testing and surveying to control the lift of the pavement, cleanup, and other related work. Contractor shall have a minimum of five (5) years' experience in roadway concrete slab stabilization.

### **MATERIALS**

The material shall be a high-density polyurethane material. The material shall be a polyurethane-forming mixture, having water insoluble diluents, which permit the formation of polyurethanes in excess water.

The presence of these water insoluble diluents provides polyurethane foam with improved dimensional stability properties. This formula and these characteristics must be certified by the manufacturer.

The material shall be a high density polyurethane system with the following physical characteristics and properties:

- Minimum free rise density of 3.0 lb./cubic foot as per ASTM D1622
- Minimum molded compressive strength of 80 psi as per ASTM D1621
- Minimum tensile strength of 100 psi per ASTM D1623
- Be able to achieve 90% compressive strength in 15 minutes such that traffic may be allowed back on the pavement within 30 minutes after the last injection.

### **EQUIPMENT**

- **Pump** – The pumping unit shall be capable of injecting high density polyurethane material, through a drilled hole, beneath the slab. The pump shall be capable of controlling the flow rate of the material as required to stabilize and lift the slab.
- **Control Devices** – Control Devices shall be capable of maintaining proper temperature and proportionate mixing of polyurethane material according to manufacturer's specifications.
- **Pneumatic or Electric Drills** – Pneumatically or Electrically operated drills shall be capable of cutting 5/8 to 3/4 inch diameter holes through the rigid pavement.

The equipment shall be operated in such a manner as to prevent unnecessary damage to the structural integrity of the existing slab.

- **Slab Deflection** – Laser Levels or Dial Indicator devices capable of detecting slab movement to the thousandth of an inch with instantaneous readout shall be required.

### **CONSTRUCTION REQUIREMENTS**

- Work to stabilize Portland cement pavement under this item shall not be performed when pavement surface temperatures are below 35° F or if the subgrade and/or base course material is frozen.
- A series of holes shall be drilled at three to eight foot intervals throughout the concrete slab. The 5/8" to 3/4" inch diameter holes shall be drilled in the concrete slab in the following manner:
  - These holes shall be drilled to a depth sufficient to penetrate the concrete pavement or deeper.
  - When drilling holes, the drills shall be held as nearly perpendicular as possible to the pavement surface.
  - No more holes shall be drilled during a day's operations than can be filled during the same day, unless specific approval is given by the Tennessee Department of Transportation (TDOT) Engineer.
  - The high-density polyurethane material shall then be injected under the slab.
  - The amount of rise shall be controlled by the pumping unit and injection gun, by measuring the rate of injection of the high-density polyurethane material.
  - Control the final elevations of the slab to within 0.125-inch of the proposed profile elevations to determine sufficient material usage and slab stabilization.
  - Confirm that the pavement has been aligned properly to facilitate drainage.
  - In the event the TDOT Engineer determines that continued material placement at any specific location is no longer economically feasible, he may direct the Contractor to cease at that location.
  - When the injection nozzle is removed from the hole, any excessive polyurethane material shall be removed from the area.

- The contractor shall be responsible for any pavement blowouts, excessive pavement lifting or pavement damage that may occur as a result of the contractor's work.
- The contractor shall be responsible for any excessive or uneven pavement movement and shall replace or repair any damaged areas as directed by the TDOT Engineer.
- The contractor shall exercise caution during all operations to insure that slabs are not broken or cracked.
- Slabs that may become locked and will not lift shall be released by making a full-depth transverse saw cut as directed by the Engineer.
- The contractor shall repair any subject areas to the satisfaction of the TDOT engineer at the contractor's expense.
- The contractor shall patch injection holes with a non-shrinking, sand-cement grout or approved quick setting patching material after injection is completed.
- The contractor shall use such approved measures as are necessary to keep all pavement surfaces adjacent to the actual operation in progress reasonably clean at all times.
- The pavement, including adjacent shoulders, shall be cleaned to the satisfaction of the TDOT Engineer prior to the placement of traffic on the work area.
- All drill tailings, excess polyurethane material and other debris shall be cleaned up at the end of each working day or before the lane is opened to traffic.
- The Polyurethane material shall be removed from the pavement surface before any residue is blown by traffic action or wind.
- When adjacent lanes are open to traffic, provisions shall be made to prevent material from encroaching onto the open lane or squirting onto passing vehicles.
- The contractor shall supply suitable means to restrict the infiltration of the residue into a closed drainage system.
- All removed material shall be disposed of in an environmentally acceptable manner in accordance with all federal, state and local regulations.
- No traffic shall be allowed on the pavement until 30 minutes after the last injection is made.

The Tennessee Department of Transportation Regional Environmental Coordinator shall be responsible for securing all environmental permits needed prior to any work being done.

Contractor shall respond on-site within 48 hours of notification from the Department of Transportation Monday thru Friday. Response time shall be defined as a vendor representative at the job site. Response made by telephone or email will not satisfy this requirement. Contractor shall continue work uninterrupted during normal working hours, until project is completed, unless prevented from doing so by matters recognizable by the state as being beyond the control of the contractor. Work shall be conducted between the hours of 9:00 p.m. and 5:00 a.m. local time unless otherwise directed by the TDOT engineer.

**Traffic Control** All traffic control shall be provided by TDOT for lane closures and detours. Contractor shall be responsible to coordinate with the TDOT engineer to schedule traffic control.

**Invoice information:**

All work orders and invoices are to be submitted for payment to the Regional office in which the work was completed. Send payment information to:

TDOT Region 1  
P O Box 58  
Knoxville, TN 37901  
Attn: Ben Price, Regional Operations Engineer

TDOT Region 2  
P O Box 22368  
Chattanooga, TN 37422  
Attn: Gwen Whittaker, Regional Operations Engineer

TDOT Region 3  
6601 Centennial Blvd.  
Nashville, TN 37243  
Attn: Shay Deason, Regional Operations Engineer

TDOT Region 4  
300 Benchmark Place  
Jackson, TN 38301  
Attn: Mike Welch, Regional Operations Engineer

**Compaction Grouting**

All compaction grouting shall be done in compliance with Tennessee Department of Transportation Special Provision SP204CG (Revised 08-22-11). See attached provision.

The Tennessee Department of Transportation shall be responsible for all required, excavating, paving/patching, placement of riprap or other stone as needed and traffic control.

The Tennessee Department of Transportation Regional Environmental Coordinator shall be responsible for securing all environmental permits prior to any work being done.

Contractor shall respond on-site within 48 hours of notification from the Department of Transportation Monday thru Friday. Response time shall be defined as a vendor representative at the job site. Response made by telephone or email will not satisfy this requirement. Contractor shall continue work uninterrupted during normal working hours, until project is completed, unless prevented from doing so by matters recognizable by the state as being beyond the control of the contractor.

**Mobilization**

One mobilization charge is allowed per purchase order.

**Traffic Control** All traffic control shall be provided by TDOT for lane closures and detours. Contractor shall be responsible to coordinate with the TDOT engineer to schedule traffic control.

**Invoice information:**

All work orders and invoices are to be submitted for payment to the Regional office in which the work was completed. Send payment information to:

TDOT Region 1  
P O Box 58  
Knoxville, TN 37901  
Attn: Ben Price, Regional Operations Engineer

TDOT Region 2  
P O Box 22368  
Chattanooga, TN 37422  
Attn: Gwen Whittaker, Regional Operations Engineer

TDOT Region 3  
6601 Centennial Blvd.  
Nashville, TN 37243  
Attn: Shay Deason, Regional Operations Engineer

TDOT Region 4  
300 Benchmark Place  
Jackson, TN 38301  
Attn: Mike Welch, Regional Operations Engineer