SPECIAL SPECIFICATION

3229

Concrete Pavement Slab Stabilization, Lifting and Soil Densification with Polyurethane Material

1. **Description.** The densification of base and sub-base soils, filling voids, undersealing, or raising of concrete pavement slabs by furnishing and injecting polyurethane material under the pavement and into the base and sub-base soils at locations shown on the plans and as directed.

2. **Material.** Furnish a closed cell, hydro-insensitive, high density polyurethane system, such as URETEK 486 STAR or equivalent, with:
   - a minimum free rise density of 3.0 lbs./cubic ft. with a minimum compressive strength of 38.0 psi,
   - a maximum free rise density of 3.2 lbs./cubic ft.,
   - a water insoluble diluent, which permits the formation of polyurethanes in excess water and provides polyurethane foam with improved dimensional stability properties. This formula and these characteristics must be certified by the manufacturer.

3. **Equipment.** Provide at a minimum, the following equipment:
   A. **Truck-Mounted Pumping Unit.** Provide a truck-mounted pumping unit capable of injecting the high density polyurethane material beneath the pavement. The pumping unit will be capable of controlling the rate of flow of material as required to densify soils. The unit will be equipped with a manufacturer’s certified flow meter to measure the amount of high-density polyurethane injected at each location and will have a digital output in both pounds and gallons.
   B. **Pressure and Temperature Control Devices.** Provide pressure and temperature control devices capable of maintaining proper temperature and proportionate mixing of the polyurethane component materials.
   C. **Drills.** Provide pneumatic or electric drills capable of efficiently drilling 5/8” to 3/4” diameter injection holes through the pavement without damaging the structural integrity of the existing pavement.
   D. **Laser Levels or Dial Indicator Devices.** Provide laser levels or dial indicator devices capable of monitoring movement of the pavement to verify soil densification.
   E. **Cone Penetrometer.** Provide a portable dynamic cone penetrometer for on-site soils investigation to assist in the location of weak sub-base soils and to determine the injection pattern through tubes to densify the weak soils.
   F. **Miscellaneous.** Provide all necessary light towers, electric generators, compressors, heaters, hoses, containers, valves and gauges to efficiently conduct and control the work.
4. Construction.

A. Preparation. Provide a pavement profile from laser level measurements of each area to be raised to determine the extent of the pavement that requires adjustment. Ensure that the finished concrete slabs will conform to the grades and cross-sections of the slabs as shown in the plans or as directed. Determine the exact locations of the injection holes at 3 to 6 feet intervals for each treated area. Obtain approval for the final proposed grades and injection hole locations before beginning work.

B. Drilling and Injection. Inject polyurethane material through a series of 5/8” drilled holes until all known or encountered voids under the pavement are filled. The rate and amount of material injection will be determined by the Contractor.

For soil densification and compaction of unconsolidated base soils, a series of 5/8” – 3/4” holes (as required for tube placement) will be drilled at approximately 3-4 foot spaced intervals through the pavement above the area requiring soil remediation. Inject the polyurethane material through injection tubes inserted into the drilled holes to the proper depth or depths as determined by the on-site testing. The exact location, spacing, hole size and depth will be selected by the Contractor and approved by the Engineer. The rate and amount of material injected will be determined by the Contractor to obtain proper densification of the base and sub-base soils.

Pavement slabs and sleeper support slabs will have all drill holes fully sleeved by tubes into the sub-base soils to prevent any injection of material between the slabs.

Seal injection holes with an approved material and method after injection is completed.

C. Grade Control. Control the final elevations within 1/8 in. of the proposed profile elevations using continuous laser level or dial indicator micrometer readings monitored by the Contractor during injection to determine sufficient material usage and soils densification. Confirm that the pavement has been aligned properly to facilitate drainage.

D. Repairs. Repair any pavement blowouts, excessive pavement lifting or pavement damage that may occur as a result of the Contractor’s work as directed without any additional compensation.

E. Set-Time. Formulate the high density polyurethane to set and obtain 90% of its compressive strength within 15 minutes after injection. Attain manufacturer’s recommended compressive strength unless otherwise shown on the plans.

5. Measurement. This Item will be measured by the pound of high density polyurethane material injected and accepted.

6. Payment. The work performed and materials furnished in accordance with this Item and measured as provided under “Measurement” will be paid for at the unit price bid for “Concrete Pavement Slab Stabilization, Lifting and Soil Densification”. This price will be full compensation for furnishing and injecting material, all labor, materials, tools, and incidentals.