

SECTION 451 – CONCRETE SLAB STABILIZATION

451.01 DESCRIPTION

This Section describes the requirements for stabilizing concrete slabs by drilling injection holes and pumping a pozzolan grout or high-density polyurethane under the slab.

451.02 MATERIALS

451.02.01 Materials

Provide materials as specified:

Quick-Setting Patch Material, Type 1A	903.07
Pozzolan Grout	903.08.03.A
High-Density Polyurethane Grout	903.08.03.B

451.02.02 Equipment

Provide equipment as specified:

Grout Pumping Unit	1006.03
Mixer	1006.04
Injection Device	1006.05
Lift Monitoring Equipment	1006.06
Deflection Testing Equipment	1006.07
Grinding Machine	1006.08

451.03 CONSTRUCTION

451.03.01 Pozzolan Grout

- A. **Weather Limitation.** Do not perform slab stabilization when the pavement surface temperatures are below 32 °F or if the subgrade or base course is frozen. If proper slab stabilization cannot be achieved due to excessive temperatures or direct sunlight, perform work at night.
- B. **Drilling Holes.** Drill the hole pattern for grout injection as noted in the plans or as determined by the RE in consultation with the Contractor. Drill a minimum of 3 holes on either side of the transverse joint. Drill holes between 1 and 2 inches in diameter, vertically and round, to a depth sufficient to penetrate the concrete pavement. Ensure that the subbase penetration does not exceed 3 inches. Clean holes with air or water to create a small cavity or remove obstructions caused during drilling, allowing initial spread of grout.
- C. **Testing of Grout.** The RE will perform flow cone testing of the grout at the beginning of pumping and at random times throughout pumping. Ensure that the grout is mixed so that the flow cone test result is 9 to 16 seconds.

- D. **Void Filling.** Ensure that the movement of the concrete slab does not exceed 0.10 inch. If the pavement has been lifted in excess of the specified amount, the RE may require removal and replacement or grinding to the correct grade.

Pump grout into each hole until the maximum pressure is built up or material is observed flowing from hole to hole. Ensure that the maximum pressure is 58 pounds per square inch. Monitor the pressure using a gauge in the grout line. Protect the gauge from the grout slurry.

Ensure that mixed material is not held in the mixer or pump hopper for more than 1 hour after initial mixing. Dispose of material held longer than 1 hour as specified in [201.03.09](#). The RE may reduce this time if the grout becomes unsuitable for use in less than 1 hour.

Ensure that water displaced from the void structure by the grout is allowed to flow out freely. Excessive loss of the grout through cracks or joints or from back pressure in the hose or in the shoulder area will not be allowed.

If it is determined that continued grout injection at a specific location is no longer feasible due to major voids, the RE may direct the Contractor to cease grout injection at that location.

Upon completion of undersealing, fill drill holes full depth with a Type 1A quick-setting patch material. Ensure that the patch is flush with the surface of the pavement.

Do not allow traffic on the slabs for 1 hour after initial set.

- E. **Repairing Cracks.** If transverse cracks develop between adjacent injection holes, the RE may direct repair of the cracks using retrofit dowel bars, as specified in [454.03.01](#), or removal and replacement of the entire panel.

If radial cracks develop from the injecting holes, immediately cease work and correct the operation. The RE may require repair or replacement of the damaged panel.

451.03.02 High-Density Polyurethane Grout

- A. **Contractor's Experience.** At the preconstruction meeting, submit the name, experience, and material manufacturer's certification of a manufacturer's representative to the RE. Ensure that experience includes a minimum of 5 projects on which slab stabilization operations were successfully completed using high-density polyurethane. Ensure that the manufacturer's representative is at the work site during all high-density polyurethane slab stabilization. The Contractor may not begin the work until the RE approves the manufacturer's representative.
- B. **Weather Limitations.** Do not perform slab stabilization if the underlying material is frozen.
- C. **Drilling Holes.** Drill the hole pattern for grout injection as noted in the plans or as determined by the RE in consultation with the Contractor. Drill a minimum of 2 holes per side of transverse joint. Ensure that the minimum horizontal distance between holes is between 2 and 4 feet. Ensure that holes do not exceed 5/8 inch in diameter, drilled vertically and round, to a depth sufficient to penetrate below the concrete

pavement and into the voids, and subbase beneath the slabs. Ensure that base penetration does not exceed 3 inches. Clean holes to remove any obstructions caused during drilling to allow flow of high-density polyurethane.

- D. **Slab Stabilization.** During stabilization operations, ensure the upward movement of the pavement does not exceed 0.10 inch. If the pavement has been lifted in excess of the allowable amount, the RE may require removal and replacement or grinding to the correct grade.

After drilling the holes, inject high-density polyurethane under the slabs. As the polyurethane chemically reacts, it will expand and harden to create the necessary lifting forces. Using the pumping equipment, control the amount of rise by regulating the rate of injection of the material. When the nozzle is removed from the hole, remove any excessive material from the area, and seal the holes with high-density polyurethane.

Immediately clean up material extruded during the pumping operations as the work progresses.

Do not allow traffic on the slabs for 1 hour after initial set.

- E. **Slab Lifting.** When lifting concrete pavement to correct surface defects, such as faulted and settled concrete slabs, lift the concrete slab in increments of 0.25 inch until the pavement is raised to the required elevation.

- F. **Repairing Cracks.** If transverse cracks develop between adjacent injection holes, the RE may direct repair of the cracks using retrofit dowel bars, as specified in [454.03.01](#), or removal and replacement of the entire panel.

If radial cracks develop from the injecting holes, immediately cease work and correct the operation. The RE may require repair or replacement of the damaged panel.

451.03.03 Deflection Testing

Perform deflection testing of joints between midnight and 10 a.m. The RE may stop testing earlier if there is evidence of slab lockup due to thermal expansion of the slabs. The RE may allow testing to continue after the hour specified if the slabs are not interlocked or under compression.

Perform deflection testing after stabilization to determine the success of grouting. Use an applied load of between 7500 and 9500 pounds-force. Place the center of the loading plate within 9 inches of the slab corner. Ensure that the deflections are normalized to a 9000-pound nominal load. If joints and cracks have deflection values greater than 10 mils, regrout an additional time in an attempt to reduce the deflection to below 10 mils. The RE may require deflection testing before grouting.

451.04 MEASUREMENT AND PAYMENT

The Department will measure and make payment for Items as follows:

Item

Pay Unit

SLAB STABILIZATION, POZZOLAN GROUT
SLAB STABILIZATION, POLYURETHANE GROUT
SLAB STABILIZATION, DEFLECTION TESTING

BAG
POUND
UNIT

Additional Reference Material

[Item Number List](#)

Construction Details [CD-451-1](#)

The Department will measure the quantity of SLAB STABILIZATION, POZZOLAN GROUT by the number of 94-pound bags of cement used in the manufacture of grout.