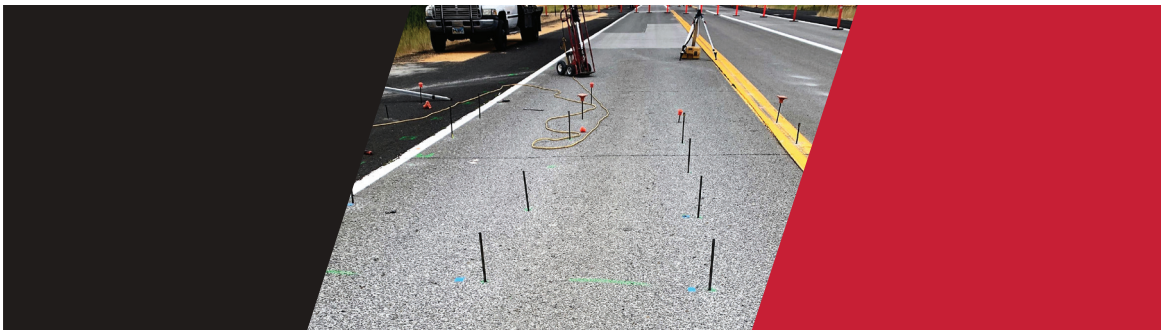
IGGA
International Grooving & Grinding Association
Your Pavement Preservation Resource® since 1972

pavement base and subgrade repair

Fill Subsurface Voids and Reduce Pavement Deflection

Pavement Base and Subgrade Repairs are a Vital Tool in the Concrete Pavement Preservation Toolbox.



Decades of heavy traffic loading can place undue pressure on concrete slabs, creating slab deflection and potentially causing erosion or consolidation of underlying materials. Voids can then form beneath the slab and/or subbase, reducing support for the pavement. Poor load transfer efficiency at the joint, excess free water and erodible materials in the road base or subbase can contribute to the problem. While current design criteria and the use of improved base materials minimize the need for subsurface repair on modern-day concrete pavement, there are numerous 40- to 50-year-old in-service pavements located across the United States, some of which are in need of a base course tune-up.

Slab deflection is most extreme near transverse joints and working cracks; therefore faulting, corner breaks and other pavement distress are most likely to occur along the joints and cracks or along the pavement edge.

» Concrete pavements experience slower deterioration rates than do asphalt surfaces. Even so, regular maintenance is important. If a concrete pavement is left to deteriorate unchecked for decades, more invasive and expensive repairs will be required. **Subsurface restoration** is one of several cost-effective tools for concrete pavement preservation.

» SUBSURFACE RESTORATION

Subgrade repair comes in several forms, including slab stabilization (aka undersealing and subsealing), slab jacking, and medium and deep injection grouting. Each process injects flowable material into existing voids beneath a concrete slab. The material restores support to the pavement as well as displaces free water and mitigates further water infiltration damage. These nondestructive processes provide both short- and long-term reductions in pavement deflection and are most effective on pavements with minimal structural damage.

Not to be confused with slab jacking (wherein the pumped material is intended to lift the slab to a uniform profile), slab stabilization corrects small voids ranging in size from approximately 0.125 to 6.350 mm (0.005 to 0.250 in) deep. The procedure involves pumping the flowable material, using self-contained mobile equipment, through holes drilled in the slab. Holes should be located just within the boundary line that is farthest from the existing joint or crack (taking care not to drill areas that do not suffer from the void). During pumping, fill should flow from the hole toward the joint or crack.

FILL MATERIALS

A variety of materials can be used to fill under-pavement voids, but the most common are pozzolan-cement grout and polyurethane. Both materials demonstrate strength as well as the ability to flow into (or expand to fill) small voids. Both have the important properties of remaining insoluble, incompressible, and nonerodable after installation. Overly stiff materials may not fully fill the void, whereas materials that aren't viscous enough may not develop sufficient strength to support the slab—or they may shrink and provide inadequate support. Pozzolan-cement

grouts are easily available in the geographic range of most projects. They are also economical. Polyurethane grout has the advantage of having superior durability and a fast cure time.

WHEN TO PERFORM SUBSURFACE RESTORATION

The best time to perform subsurface restoration is soon after loss of support is detected. In addition to visual inspection, several tools are available for identifying voids under pavement:

- **Deflection measurement** captures vertical movement at joints or cracks. It can be performed using a variety of devices that measure slab movement.
- **Ground penetrating radar (GPR)** and **pulsed electromagnetic waves (PEW)** emit pulses of electromagnetic energy into a pavement. Transmitter/receivers read and compare reflected signals, enabling them to identify areas with voids.
- **Epoxy/core tests** are too invasive to be used as a widespread approach to void detection, but they can confirm the presence and extent of voids where those voids are already suspected. The technique involves drilling small holes into the pavement and filling them with dyed epoxy. Once the epoxy has hardened, a core sample can be taken and inspected to examine evidence of the void area.

Twenty-four to forty-eight hours after injection, post-testing should be performed on the stabilized slabs using a deflection testing method.

SUBSURFACE RESTORATION AS PART OF CPP

Slab stabilization should be used in conjunction with other concrete pavement preservation (CPP) techniques. For example, joint resealing is an excellent way to limit the entry of surface water into the pavement. Full and partial depth repair can restore structural integrity to a pavement and diamond grinding can improve ride quality. Dowel bar retrofit at joints or cracks can also reduce slab deflection under loading. Combined, CPP measures can reduce impact loads, in turn reducing slab deflection.

For complete information on CPP, visit **igga.net.**

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ABOUT IGGA
The International Grooving & Grinding Association (IGGA) is a non-profit trade association founded in 1972 by a group of dedicated industry professionals committed to the development of the diamond grinding and grooving process for surfaces constructed with Portland cement concrete and asphalt. In 1995, the IGGA joined in affiliation with the American Concrete Pavement Association (ACPA) to form what is now referred to as the Concrete Pavement Preservation Partnership (IGGA/ACPA CP3). The IGGA/ACPA CP3 now serves as the lead industry representative and technical resource in the development and marketing of optimized pavement surfaces, concrete pavement restoration and pavement preservation around the world.