

# GroundED

FALL/WINTER 2022

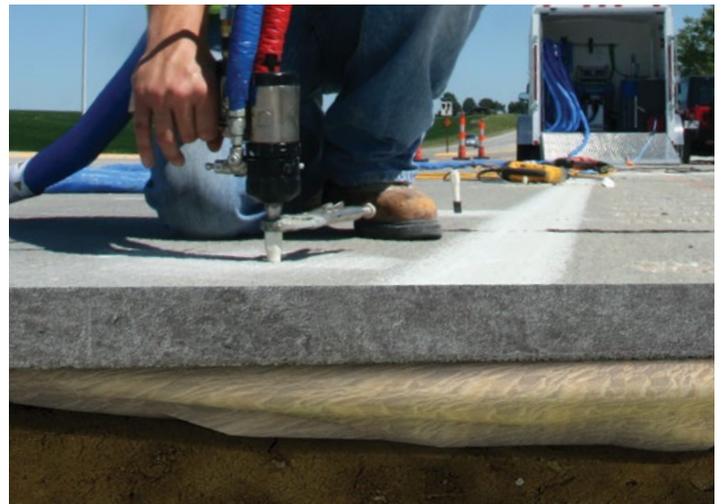
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## Benefits of PolyLevel® for Concrete Slab Support

The Foundation Supportworks PolyLevel product line consists of polyurethane foams and resins for use in a wide range of geotechnical and structural applications. The more commonly used products are two-part urethanes that, when mixed, expand into rigid foam to fill voids for stabilizing and lifting concrete slabs. These products are typically injected at the interface of the concrete slab and subgrade soil. Additives in the urethane can be used to vary the foam density and speed of reaction depending on the application requirements.

Polyurethane foam is not a new material, with the chemistry first patented in 1937 and patents for use beneath concrete slabs beginning in the 1980s. Polyurethane foam injection for slab settlement repair has proven to be a viable solution compared to traditional methods of mudjacking and concrete replacement. Some of the benefits of PolyLevel compared to these other methods include:

- **Lightweight** – PolyLevel density can be controlled, depending upon the application, to achieve typical in-place densities of approximately 2.4 to 4.1 pounds per cubic foot (pcf) when installed. This is significantly less than the density of mudjacking material, which may be 100 pcf or more. If there is already a slab settlement issue due to weak supporting soils, adding additional weight to the subgrade soil increases the possibility of future settlement. The low density of PolyLevel means there is almost no additional load added to the supporting soils.
- **High Capacity** – The lifting action is a result of the expansion of the polymer, allowing for much higher lift loads than typical mudjacking, which relies on hydraulic pressure being contained under a slab. Custom PolyLevel foam blends can also be formu-



*Rendering of PolyLevel foam injection beneath concrete pavement*

lated to meet specific performance specifications. For example, the PolyLevel mixture can be modified to have typical in-place compressive strengths up to 67 pounds per square inch (psi) which meets the 60-psi compressive strength performance specification set by AASHTO.

- **Accurate and Controlled Lift** – With PolyLevel, the lifting process results from a controlled chemical reaction below the slab using special injection equipment. This allows for an adjustable lift response and a more accurate lift. Mudjacking involves injecting flowable material under pressure, which is not easily controlled.

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With mudjacking, blowout often occurs where the mud escapes to the surface at slab joints and edges. When a blowout occurs, system pressure is lost, and further lifting cannot be performed. The PolyLevel injection process can be controlled to minimize the possibility of blowout.

- **Durability** – PolyLevel exhibits minimal long-term water absorption, will not wash out from under the slab, and is not damaged by freeze/thaw cycles. PolyLevel foam is a hydrophobic system capable of reacting in the presence of water, allowing it to be used to underseal slabs and mitigate a variety of water intrusion issues even when free water is present.
- **Non-Invasive** – PolyLevel installation equipment allows placement in tight and limited access areas. There is less mess than mudjacking and smaller holes required for installation. The PolyLevel components are delivered beneath the slab through drilled holes as small as 3/8-inch in diameter. PolyLevel restores concrete that may otherwise need to be removed and replaced.
- **Fast Cure Time** – PolyLevel foam cures quickly to allow immediate loading for most applications and can reach 90% of its full strength in about 30 minutes after injection. Mudjacking or slab repair involves longer wait times for loading to allow the material to cure.

PolyLevel is ideal for interstates and highways, but it is also very suitable for applications such as concrete parking lots, warehouse floors, office buildings, grain bins, playgrounds, factory floors, loading docks, schools, railroad crossings, airport runways, city pools, residential driveways, and sidewalks and many more applications.



*PolyLevel injection to stabilize and lift at train track crossing.*



*PolyLevel installation at a roadway, allowing vehicle flow to continue*

DON DEARDORFF, SENIOR APPLICATION ENGINEER

## Webinar Opportunities Available Upon Request

- An Introduction to Helical Foundation Systems
- An Introduction to Polyurethane Foam Injection
- An Introduction to Hydraulically Driven Push Pier Systems

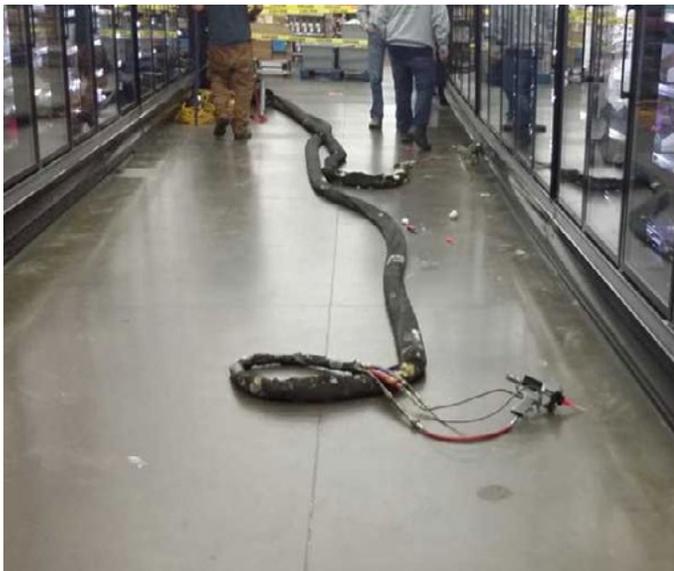
**Project: Retail Store Slab Settlement**  
**Location: Canton, MI**  
**Installer: Ayers Commercial Group**

**Challenge:** Located in Canton Michigan, a major retail store was experiencing as much as 3 inches of floor slab settlement in the grocery department. The extent of the settlement was over an area of about 2,250 square feet and included the slab beneath several cold storage units. A geotechnical investigation was performed that indicated the slab was constructed on debris fill, mainly consisting of large pieces of concrete. Small diameter holes were also drilled into the slab at various locations to estimate the void depth below the slabs. Based on this analysis, void depths as much as 6 inches were observed. The settlement had become a safety hazard for customers and the store owner was looking for an immediate slab leveling solution rather than removal and replacement of the floor slab. To address the settlement in the cold storage area, the units would need to be removed and relocated to allow access for mitigation. During the slab repair operations, customer access to the rest of the grocery department was required and the work could only be performed between the hours of 10:00 p.m. to 3:00 a.m.

**Solution:** Slab reconstruction was not a preferred option and slab underpinning was not feasible without predrilling due to the debris fill below the slab. PolyLevel polyurethane injection was selected as the preferred option based on the cost effectiveness, speed of repair

and the ability to use the facility immediately after placement of the material. PolyLevel is a two-part urethane that expands into a rigid foam used to fill voids, stabilize slabs, and lift concrete. PolyLevel can be injected below the concrete slab through 3/8-inch diameter drilled holes. Once the two parts are mixed, a chemical reaction converts the liquid urethane components into a strong, rapidly setting foam material. In its foam state, PolyLevel is extremely light, with different formulations weighing between 2 to 4 pounds per cubic foot (pcf). Other void-filling or lifting materials can weigh upwards of 120 pcf, adding significant weight to supporting soils or base materials and potentially contributing to further settlement.

With a typical compressive strength of 60 to 70 pounds per square inch and an in-place density of about 4 pcf, PolyLevel 400 was selected to relevel and support the concrete slabs. The work was performed with the operating equipment located outside the store by using 300-foot-long hoses to access the work area. The PolyLevel injection process filled voids and lifted the slabs back to level. A total of 3,175 pounds of PolyLevel 400 was injected below the concrete slabs. The cold storage units were able to be re-installed immediately after the slabs were leveled. The PolyLevel project took four days to complete.



*PolyLevel injection equipment with 300-foot hose*



*Work area with cold storage units removed*



*Holes drilled in slab prior to PolyLevel injection*



*Injecting PolyLevel below the floor slab*

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# What's Inside

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## Benefits of PolyLevel® for Concrete Slab Support

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### FEATURED CASE STUDY:

 **Retail Store Slab Settlement**  
**Canton, MI**  
Ayers Commercial Group

DISTRIBUTION  
CHECKLIST

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