

## R+R Ground Surgery Techniques

Structural Subsidence has many causes, but is typically treated in two different ways:

### ‘Underpinning’ or ‘Ground Improvement’

Underpinning is a process that involves mechanically engaging a building’s foundation to a new, generally larger/stronger structure and anchoring it to deeper competent ground, if present, or relying on the skin-friction on the surface of the pin against the surrounding ground, to support the structure. Often laborious, messy, time consuming and expensive. This process was the only option for underpinning a building until construction science and chemical innovation came together, designing a technology that modernised underpinning as we know it.

Ground Improvement is the process of densifying the ground immediately under, or within a zone of influence of, the foundations of a structure. This compaction can be achieved in a few ways, but ultimately results in an overall improvement of the supporting strata.

The most modern and effective version of ground improvement is the injection of expanding, structural resins through tiny penetrations in the ground or footings of a building – think keyhole surgery – to place layers of extremely hard chemical grouts called ‘lenses’. These lenses can be placed in varying depths and locations as needed and provide the perfect means to: a) penetrate, consolidate and compact the ground to such an extent that it generates long-term support of the structure; and b) generate uplift on the slab or structure – releveling it to health.

To perform this *structural laparoscopy*, R+R has developed a proprietary resin called Deep Lift FX – fast expansion. Design for short, precise expansions – achieving an homogenous stratum perfectly suited for static loads.

Releveling slabs typically requires another technique called Slab Lifting. The performance characteristics of the resin used in this is distinct from the Deep Lift resin as it typically has a greater surface area to engage (slab, not footing) and often needs to be able to sustain dynamic loading (vehicular movements).



In the application R+R utilises another proprietary resin called Slab Lift LX (long expansion). Much denser, with a longer gelation period for greater penetration and significantly higher compressive strength. In this case resin injection is targeted directly under the slab to bond mechanically and chemically to the underside of the concrete – providing long term support and if required, the raising of the slab to its original position.

These two ground 'surgery' methods are often combined to achieve an optimum outcome: desired result + durability.

Different ground types require different approaches – clay soils are cohesive and typically react best with top-down grouting techniques. Whereas sandy soils are difficult to compact and generally perform better using bottom-up injections. Furthermore; seasonal, geological and structural factors all play an important role in the outcome of resin injection works.

Injection resin and equipment vary somewhat, but ultimately perform the same function. The most important contributing factor which dictates the success or failure of the injection project is the experience of the operator that physically injects the resin. With instantaneously setting resins there aren't any second chances, and at R+R we truly believe that the cornerstone of safe and effective relevelling is primarily dictated by the person injecting the resin. Who use their experience, equipment and skillset to perform this precision *surgery*. And that's why we call our relevellers Ground Surgeons. We like to use the analogy of surgery; you wouldn't go to a general practitioner to have surgery – you would go to a specialist. R+R are the specialists in raising and revelling structures.

Our undertaking to our clients is to have the most experienced operators, coupled with the best resins and a true customer-first approach – which makes us the first choice in Australia for resin injection.