

Understanding Residential Underpinning Techniques

Underpinning Techniques

Toronto, Sep 6, 2020 ([IssueWire.com](https://www.issuewire.com)) - Underpinning is a process used to repair, strengthen, or increase the depth of an existing foundation by lowering the footing to allow it to rest on more supportive soil. Further, Underpinning is a method used to increase foundation depth or repairing faulty foundations. This might be the case if you plan to add stories to an existing structure or when the foundation has been damaged.

Steven Gamsby of Provincial Site Services a firm that specializes in concrete remediation notes that "underpinning is not a DIY project, you need to engage the professionals in your area."

One visible sign that your building needs underpinning is when cracks are visible. A building needs underpinning its foundation when cracks are wider than 1/4 inch and there are some signs of a faulty foundation, especially diagonal cracks. Foundation failures could also be considered as heaved foundations, cracked or buckled walls and cracked concrete floors.

While oftentimes underpinning is associated with the remediation of deficient or failing foundations, it is also used in cases where the use of a building has changed, floors are being added to upper stories, or additional depth is desired in subsurface spaces, such as basements or cellars. In dense urban locations, such as New York City, underpinning is also a common practice during the construction of adjoining, adjacent, or nearby structures that require the removal or excavation of the soil supporting the neighboring properties.

The process of underpinning begins by removing or excavating the soil from beneath an existing foundation.

To avoid the risk of undermining the foundation, which may lead to structural failure, the removal of the soil is performed controlled stages, called 'pins', of limited length. The depth of the excavation is determined by a geotechnical engineer, who assesses the soil composition to identify the strata that is suitable to bear the weight of the building. The excavated soil is replaced with new material, typically concrete, which forms a new foundation beneath the existing one. Once one of the 'pins' is complete, and the concrete is cured, the process is repeated on the next section of the foundation until the entire length of the wall is reinforced.

The most used method of underpinning is mass pour method. This process requires excavating sections in sequence to a pre-established depth below the footing and place concrete on each pit. Repeat the method until the entire affected area has been underpinned. There are other methods and techniques to underpinning which are described in the following sections.

There are multiple methods of underpinning including:

Mass Pour

Beam and Base

and Mini-Piled

The mass pour method is the most common due to its low cost and ability to resist heavy foundation

loads. In this method, a solid, continuous concrete foundation is poured beneath the existing foundation in sections. While this method uses a great deal of material, it is the simplest method to engineer, does not require heavy machinery, and can allow for continuity of use during construction.

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A more technically advanced method is the beam and base method, where a reinforced concrete beam is constructed below the entire foundation to replace the existing footing. In this method, the new beam transfers the load to a mass concrete base which spreads the load evenly across the soil. While more advanced in its design, the feasibility of these methods largely depends on the structural configuration of the building above the foundation.

Where ground conditions are variable or access around the area of the foundation is limited, the mini-piled method of underpinning may be used. In this method, 'piles' or deep vertical structural elements are driven into the ground in drilled holes deep enough to allow the piles to rest on stable soil. The piles typically extend at least 15' below ground, but depending on the soil condition, are capable to depths of over 50'. While this method can overcome even the most adverse soil conditions, the engineering is more involved, and the process can prove to be quite expensive due to the technical expertise and specialty equipment required.

If you are planning on performing structural work on your existing property – either elective or as part of a remediation program – Steven Gamsby notes "it is important to hire a firm with extensive experience working closely with structural engineers, geotechnical engineers, and your local building department."

Steven Gamsby is the President and Operating Manager of Provincial Site Services www.provincialsiteservices.com a waterproofing and concrete remediation firm based in Toronto Ontario Canada, serving Southern Ontario.

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