

Terefil® Used to Pre-Fill Pile Forms on High Rise Building Site



INDUSTRY

Commercial

STRUCTURE

Apartment complex

PROBLEM

Fill pile forms

LOCATION

Surry Hills, NSW, Australia

DURATION / YEAR

1 day/2020

TECHNOLOGY

Terefil®

BUSINESS UNIT

Mainmark Australia

Summary

A multi-storey building with a basement carpark was demolished and replaced with a new multi-level below ground carpark and high-rise apartment building in the heart of Sydney's CBD. Prior to demolishing the existing building, new pile cap forms adjacent to the perimeter footings were put in place from the ground level to preserve the area between the ground level and original basement level during construction. These new pile cap forms allowed for a piling platform to be created at the ground level that made for a simple start for the new piles from the ground level through the basement levels.

The pile cap forms adjacent to perimeter footings were created to form a working platform for the piling rig, providing a clean medium from which to drill the pile start holes. A total of 19 pile cap forms were prepared as a series of formwork boxes around the perimeter of the building on the proposed pile alignment.

The remainder of the basement was then temporarily filled with rubble to the same level as the top of the pile forms from the demolished building, completing the platform for the piling rig, allowing for the placement of new piles.

After all the piles had been installed below the depth of the new multi-level underground carpark, the temporary rubble backfill was then removed and ground excavation undertaken to complete the carpark formation.

It was critically important that the pile forms could be drilled in order to start the piling process. Standard concrete was considered too high strength and cost prohibitive for void filling purposes. Alternative foam fill products were considered, however, they lacked the required structural properties. Stabilised sand was also considered, but found to be too difficult to place, not suitable for drilling and not cost competitive.

Terefil® Used to Pre-Fill Pile Forms on High Rise Building Site continued

Mainmark's Terefil® lightweight cementitious grout offered the most workable solution as it wouldn't compromise the desired strength and offered significant cost savings in terms of labour, plant and material. Despite Terefil being the ideal solution for this project, it was the first time the product had ever been used for pre-piling drillable fill.

Objectives

The client sought a lower strength, drillable void fill solution that would preserve the zone between the original basement and ground level at the new piling locations during demolition, and could later be used to create a formwork platform for new piling construction. The solution's compressive strength could be no more than 2MPa to enable drilling. It was also important that the solution did not shrink once cured.

Furthermore, the chosen solution was required to be easy and efficient to place, helping to ensure construction timelines were not impacted.

Solution

Mainmark recommended using its Terefil lightweight cementitious fill at 1MPa compressive strength for the piles. Terefil's highly flowable consistency is easy to place, cures quickly and offered the required structural stability while ensuring there would be negligible bleed and minimal shrinkage.

The Mainmark team used Terefil to fill 19 pile forms, each measuring 1200mm x 1200mm in plan size, which was undertaken in a continuous single-day operation. Terefil also provided a flexible solution that allowed the team to tailor the product placement very quickly without impacting on the solution's structural integrity or its ability to be easily drilled during the next phase of works.

The effortless way in which Terefil was applied on site was due to Mainmark's self-contained operations rig that uses an integrated pump and foam generator. The rig is able to be operated by just one Mainmark team member, making the process extremely efficient.

This critical works project was the first time that Terefil had been used as a pile form fill application. The solution is typically used to fill large holes, voids, sinkholes, abandoned pipes and mineshafts, repair landslips and backfill retaining walls. This project gave Mainmark an opportunity to showcase a new and unique application for Terefil by using it to stabilise a large building site within a tight workspace.

The site location in a busy CBD laneway was difficult to access, however Terefil's easy application process was achieved due to the small worksite footprint the solution requires in order to place the grout.

The project also needed to adhere to very strict deadlines and therefore close collaboration with both the client and crew was key to successfully completing the work on time and within budget. The job was undertaken in a single day, despite inclement weather that resulted in the team working around issues caused by heavy rain which had washed out portions of the sand that was sealing the base of the form.

The client was not only impressed with the unique application of Terefil, but also the planning, onboarding, safety measures, quality of works and commitment by the Mainmark team to complete the job, particularly given the rainy conditions.



Terefil® being poured to pre-fill pile form