PROJECT PROFILE
N16B224

mainmark

Unique permeable Terefil® backfills a retaining wall

INDUSTRY
Residential

STRUCTURE
Retaining wall backfill

PROBLEM
Collapsed wall

LOCATION
Parramatta, NSW, Australia

DURATION / YEAR
2 days / September 2016

TECHNOLOGY
Terefil®

BUSINESS UNIT
Mainmark Australia

Summary

Following the collapse of a retaining wall between a residential property and adjacent public park in Parramatta, NSW, it was necessary to build a new retaining wall that was better supported.

The public park was situated at the bottom of a steep slope, with a residential home at the top of the slope. The retaining wall was especially high, and originally sat directly on the boundary line. It collapsed soon after construction, and needed to be replaced as quickly as possible to prevent damage to either the residence or the park.

The new wall was to be built just short of the park's boundary line on council land and could not touch the actual boundary, although it was determined that the home's driveway could overhang the wall. The reinforced concrete wall itself was to be 16m long, 1.75m high and 300mm wide, with a 1200mm wide and 600mm high reinforced concrete footing.

The project required backfilling of approximately 40m^3 behind the new retaining wall. The wall's location made access difficult and a traditional concrete solution would have been unfeasible due to the heavy load it would place against the wall itself, compromising its integrity.

With these requirements in mind, Mainmark's Terefil® cementitious fill was specified as the backfill by Adrian Lewis of Lewis Consulting Engineers. The Terefil® formulation specified for the backfill is fully permeable, allowing water to drain, and lightweight even when wet, which reduced pressure on the retaining wall during construction.

The pumpability of Terefil® allows it to fill even the narrowest areas behind the retaining wall. As a result, the retaining wall was adequately supported according to the engineer's designs and will likely last for many years.

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Before and after Terefil® being applied

Objectives

Due to the wall's design, the backfill needed to be completely permeable to allow full water drainage. Without this, the hydrostatic pressure build-up would have likely compromised the wall's integrity over time.

Additionally, it was important to reduce pressure against the retaining wall during construction. Using a traditional concrete or crushed rock solution would have extended the project timeframe, as the concrete would have to be poured to a certain depth then left to cure before the next layer could be poured. Therefore, they required a substance that was light enough, even when wet, to avoid adding an untenable structural load to the wall.

The backfill also needed to remain monolithic, so using a substance like crushed rock was not an option as the fragmented nature of such a material would potentially compromise the wall's stability. Therefore, the backfill needed to be a single mass to reduce the overload on the retaining wall. And, the backfill needed to eliminate any voids behind the wall, which could also create instability.

To ensure construction and long term loadings to the new retaining wall were kept to a minimum, Mainmark used its versatile, lightweight proprietary Terefil® cementitious fill.

Solution

Mainmark placed the permeable Terefil® backfill material in 900mm layers behind the newly-constructed retaining wall. Once cured, it has a permeability in the range of 0.63cm to 0.082cm per second and a compressive strength of 0.5MPa.

Mainmark conducted sampling and compression testing according to ASTM C495 Standard Test Method for Compressive Strength of Lightweight Insulating Concrete to confirm the installed product would meet the project specifications.

As Terefil® is highly-flowable, it could be applied in just two days rather than the anticipated three-day project timeline. It delivered a void-free, permeable, fully-draining backfill that will adequately support the wall for many years.

The lightweight and permeable properties of the Terefil® mix used for the project also minimised loads on the retaining wall during construction and in service, providing efficiencies in design and savings in construction.