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Mr Mark Lees
2 Banister Mews,
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02 October 2017

Re: Swimming Pool Structure at 35 Templewood Avenue, London NW3 7UY

Dear Mark,

We refer to the property at 35 Templewood Avenue, which is located in Hampstead Heath, London. There is an existing glass domed building within the garden, which houses a sunken swimming pool. The swimming pool structure was constructed in 1968 following the construction of the adjacent Schreiber House. The swimming pool was originally linked to the Schreiber House, but is presently linked to the existing structure at the subject site, following a change in ownership.

We understand the existing swimming pool leaks when it is filled with water. This we understand, has rendered the pool unusable in its current condition. We outlined the potential causes of this in report No. 16.848-RP-01 issued at pre planning stage. This letter will address the conclusions of the subsequent investigation works carried out as recommended in the original report.

The current problems with the pool when in use are as follows:

1. There is a slight leak from the main drain from the pool which is likely caused by tree root activity from the nearby eucalyptus trees which we think is quite recent.

2. We understand the main pool when filled, leaks extensively into the garden and the main house lower floor, bubbling up through the floor tiles and overflowing into the plant room such that the pool cannot be filled and used as intended.

In order to determine the cause of the pool leaks we have reviewed the original construction drawings and carried out chemical testing on the concrete and comment as follows:

1. Chemical testing of the existing concrete has not found the presence of any high alumina cement or chlorides in the cement. The concrete also does not show any obvious signs of carbonation and alkali-silicate reactions. It is therefore unlikely that the pool leaking is caused by defective concrete mix design as originally thought.

2. We have sourced the original reinforcement concrete drawings for the pool produced by Felix J Samuely and Partners Consulting Engineers in April 1966. The pool structure appears to have been adequately detailed with a reinforcement design broadly in line with today's standards. The vertical and horizontal slab/wall joints have been detailed with water bars, splice bars and pliastic sealants. The reinforcement bar spacing has also been set to limit the design crack width to approximately 0.1mm. The rebar cover provided was shown as 38mm which is marginally less than the 45-50mm cover required for modern water retaining structures. However this cover when combined with the pool tiles and mortar is unlikely to result in extensive pool leaking.

3. The main drain leak is likely caused by tree root activity. The drain can be burst and re-line without excavation internally and an application to remove the trees to prevent further damage has been made. The internal drain will need to be exposed and replaced internally which can be done without causing any permanent damage to the structural slab.

The above points however, do not categorically prove the reason for the extensive pool leaking when filled.

The slab and walls joints between pours while detailed correctly on the drawings, may not have been constructed to way and may have leaked from the outset. If for example, the pliastic sealant was not installed correctly, water ingress through this joint would cause serious damage to the reinforcing steel which would worsen over the lifetime of the structure.

The swimming pool was designed as a ground bearing structure. The construction of the adjacent new house required deep excavations for the trench fill foundations. The excavation of these foundations may have caused some structural settlement cracks in the concrete that have leaked since this time and over the recent life of the building have increased - possibly again causing damage to the reinforcement.

It is not currently possible to inspect any potential settlement cracks. The internal finishes will need to be completely removed to expose the problems and expose the cracks both internally and externally. The damaged areas will need to be broken out, defective reinforcing steel replaced and made good with concrete repairs. If the pool foundations have been undermined, some form of underpinning may also be required. We may not be sure about the actual cause of the problems even after full exposure - although one problem might be more likely than the other or even that it may be a combination of these problems that are the root cause - one exacerbating the other. In any case, water is passing through the concrete structure which will cause significant damage to the reinforcing steel.

The Sicilian marble used in the pool and pool room lining appears to be defective. The current marble has become exposed to chemicals over the years and is friable - no longer having any structural cohesion and may need replacing. When the tiles are lifted they may crumble due to these issues. Design West have sourced a supplier in Italy (Edil Marmo in Petrasanta) who can replace the marble with an identical (as much as any natural material can be) replacement slabs. They have stated that this is not the most suitable marble for pools and that it needs to be sealed against pool water and cleaning additives.

Currently the pool cannot be used for its intended purpose and the design and location of the building do not lend themselves to other suitable uses. We have not been able to categorically determine the root cause of the leaking issues. Water is passing through the concrete structure which has very likely caused deterioration of the concrete and reinforcing steel.

In light of this, we anticipate that it will be very difficult to obtain a warranty from an engineering consultancy and a waterproofing/lining company to stand over the long term structural integrity and waterproofing design for this pool structure. As outlined above, the level of intervention required to ensure the pool structure is robust and fit for purpose with a 50 year design life will likely require that all existing finishes are removed as well some of the concrete structure. In consideration of this, it is anticipated that complete reconstruction of the pool concrete structure will be significantly more economical than forensic examination and repair of the existing concrete structure. The level of intervention on the pool external and internal tiled finishes will be the same regardless of the approach taken for the concrete frame repair or reconstruction.

Please do not hesitate to contact us should you have queries in relation to the above.

Yours sincerely,

Shane Linehan

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