

Problems with Swimming Pools

Summary

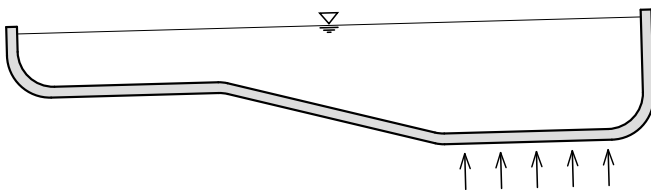
Domestic pools are being built to more ambitious designs and in less suitable situations than historically. Design standards have not kept pace, giving rise to problems of movement and distress. A pool and its surrounds may fail to meet consumer expectations but comply with the BCA. Remedial works are typically difficult and expensive.

Introduction

Traditional Australian domestic in ground pools were simple below ground reinforced concrete structures surrounded by lawn and often rustic loose laid pavement. They were robust and typically trouble free. In recent decades the standards of presentation and sophistication of pools and their surrounds have changed dramatically leading to problems encountered in disputes. This article touches on some of these issues and why they have become more common.

Heave

There is a correlation between foundation characteristics and property value the world over. Typically heavy clay sites are of lower value. This was traditionally the case in the Melbourne metropolitan region to the extent that most residential properties on heavy clay sites were unlikely to have pools. Now land almost anywhere is sufficiently valuable for quality housing and amenity including in ground pools. This means pools are being built where recently sheep ran. When a pool is excavated deep into reactive clay, it opens up a dry foundation. Water ingress is inevitable, pools do not seal their excavations. Clay expands as it gains moisture causing heave. Typically heave is worst at the deep end producing lifting and tilting of the pool which can be



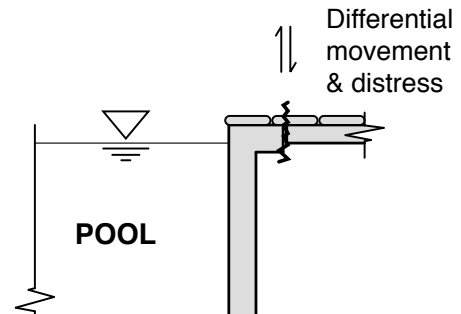
Differential Heave

seen at the water level, particularly if there are tile lines to sight, or in distress to adjacent pavements. This issue may not be defective, depending upon severity, and it may not require remedial works. If it does you can be sure they will be expensive and difficult.

Edge Distress

The single most common problem I see is simply distress at edges, usually at pavement junctions. Usually the damage is

minor but the owners' anguish may not be when they have paid good money for what they perceive as high quality works. Pools and surrounding pavements are very different structures based at



Edge Distress

different foundation depths. They need to be isolated from each other or joined in an articulated manner. Attempts at seamless finishes are fraught with defects that are most difficult to rectify.

Floating

The worst nightmare for pool owners is for a pool to lift out of the ground by floating in ground water. This is a very real mechanism, the mass of a reinforced concrete pool shell is almost always less than its buoyancy, so floating will occur if the ground is saturated and the pool empty and sealed. All in ground pools have a pressure relief value at their deepest point to avoid floating. The dirty water you see in the bottom of empty pools, is often ground water making its way back through that value.

A pressure relief value is a simple device and should be reliable but sub base drainage is not always so reliable. The pool you see below floated during construction, raising nearly 200mm at its deep end. Note the difference in water level.



Floatation is invariably fatal, the pool will not reseat in the ground and demolition is inevitable.

Cracking

Most pool engineering standards do not distinguish between the crack control needs of below ground and above ground structures. Greater crack control is required above ground. Providing internal pool finishes can cope, a below ground reinforced concrete pool can tolerate fine cracking with minimal implications such as minor leaks. Not so if it is above ground and visible. The pool shown below has extensive minor cracking to its walls. The leaks have leached and become highly visible on the above ground side.



The structure was fully compliant with the relevant engineering standards. Was it was but fit for purpose? Perhaps not.

This problem of leaking is even more dramatic with indoor pools such as those of multi unit developments where leaks can have serious consequences such as leaching into carpark and damaging expensive machinery.

Leaks & Leak Detection

All pools loose water through evaporation, so it can be difficult to tell if water loss is due to leaks. Water loss can be separated from leakage by damming a small area of the pool and comparing the water levels inside and outside the dam. If loss is identified, leaks to services can be further ruled in or out by gas detection. If water loss is identified but there are no leaks to services, the pool must be leaking. Australia has an extensive pool industry and there are specialists available to investigate pool leaks and report.

Adjacent Structures

Pools commonly meet other structures such as, decks, planter boxes and water features. Each have their own potential problems and design standards rarely embrace issues at the interface such as differential movement cracking. Ideally the structural design should detail all such structures but this is often not the case.

Non Structural Issues

The above has touched only upon the structural issues. There are myriad other problems such as water quality, filtration, tile debonding ect. Issues related to the finish or integrity of the pool shell are likely to have a structural cause of component.

Assessment of Defects

In addition to examining physical imperfections, expert assessment of pools often requires a careful review of the standards and contractual documents. Where standards are inadequate or not applicable, consideration needs to be given as to whether the construction is fit for purpose. In the case of high quality landscaping projects, it may be reasonable to expect a high standard, perhaps even including the absence of minor cracking.

About the Author

Patrick Irwin is a forensic structural engineer with extensive experience in the building dispute field.