AIREY TAYLOR CONSULTING

VOLUME 1, ISSUE 2

CLAYLOCK

JULY 2006

INSIDE THIS ISSUE:

A SYSTEM EVEN TYPE H CLAYS CAN'T CRACK

The Innovative ClayLock System provides the best protection there is for housing and low rise Community developments on clay based soils.

This system is developed by leading award winning Australian Design Engineer Peter Airey of Airey Taylor Consulting, winner of the Engineering Excellence Awards for remediation work on clays. Peter is also an Australian Standard BD 25 (foundation design) committee member.

This exciting new technique was first trialed on a large scale at the Dalwallinu Council Offices that are on H-type (borderline "E") soils. Following construction there has definitely been no cracking after five full seasonal cycles have passed—see our story page 3. The method has been used at the new replacement Moora Hospital (below) on a Class H soil profile.

A patent, reviewed internationally, has been awarded for the innovation.

ClayLock continues ATC's proud tradition of design excellence and value engineering.

APPLICATIONS

ClayLock is suitable for new 1-2 storey Housing and Unit Developments, Nursing Homes, Hospitals, Council Offices and most low or one storey buildings, when constructed on Class S, M or H sites according to the definitions of AS 2870.

A Geotechnical report must indicate whether clays are uniform or non-uniform. Any activity (S, M, H) is acceptable providing the block is uniform.

ClayLock is NOT suitable for mixed soil/rock combinations or some residual soil patterns derived from igneous rock.

ClayLock MUST be specified by an Engineer Accredited by Airey Taylor Consulting.

DID YOU KNOW:

- **38% of 75,000 houses surveyed by Archicentre in 2005 have cracks?**
- **$300 million is invested in foundation stiffening in Australia per annum?**
- **30% engineering insurance loss claims are for foundations?**
- **If interested—read on!**

COST BENEFITS: UP-FRONT AND ONGOING...

ATC commissioned Ralph & Beattie Bosworth, Quantity Surveyors to independently compare ClayLock designs with stiffened raft approaches. The upshot: $40-90 /m² (20-40%) savings enabled by simpler footing requirements. A confirmed saving of $68/m² was made for the Dalwallinu Council Offices compared with original pile design concept. Construction simplicity is a key feature enhancing achievement of critical path timeframes. All projects to date have been on time or ahead of schedule. And of course—no ongoing maintenance from clay related cracking or the industry nightmare of litigation.

TYPICAL SAVINGS:

$40 –90 /m²

Commercial: $120—270,000

per 3000 m² low rise development

Housing: $9000

per average 227 m² house

Savings exclusive of design fees, GST and royalties

SO WHAT IS THE CLAY ISSUE?

Most Australians would be surprised to find out that their home could suffer serious damage if built with standard slab foundations on clay soils.

Why is this the case?

At a fundamental level, clay expands when wet and shrinks when dry—enough to move a building.

Australians spend an estimated $300 million per annum in additional reinforcement and stiffening of foundations in low rise buildings—a preventative cost impost of about 40%.

Even with the preferred "stiffened raft" approach failure can still occur and in most cases this is due to design difficulty.

In order for present approaches to succeed the soil profile must be investigated through a geotechnical survey from which design parameters can be identified. In practice this is quite difficult to achieve.

An under-estimate of cantilever length is critical and can lead to excessive edge deflection and superstructure damage.

For example, a corona estimate of 1.5 m (typical of an "A" or "S" type soil) when 2.5m should be used (e.g. an M or H type soil) results in stress levels within the cantilevering beam increasing 278% and deflection increasing by 462%.

An overestimate merely leads to needless cost increases.

"The root cause? Water penetrates the layers of clay acting like a molecular jack"

Peter Airey - presentation to the Meinhardt Group May 2006.

CLAYLOCK TECHNOLOGY

ClayLock uses natural forces to bring about lasting soil stability for each construction, thus avoiding the need for complex footing strategies.

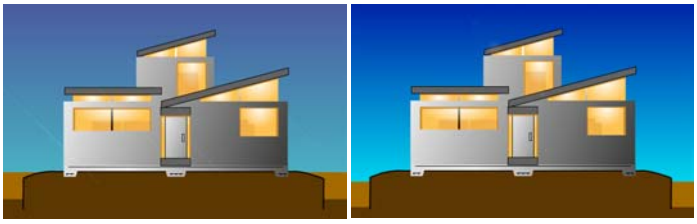
The technique involves artificially extending the footprint of a building to protect it from seasonal edge effects; and accelerating the soil condition to its final moisture content beneath and around the slab during the first stages of construction.

By doing this the clay mound usually encountered after years of moisture equilibration, becomes the stable state under workable timeframes. "Doming" is absent.

Below: ClayLock is Proprietary Technology recognized by a Patent.


Letters patent

Standard Patent



Wet (left) or dry (right) season, ClayLock assures stability

COMMERCIAL HOW-TO

Principals and builders need to hold a current Licence to build using ClayLock.

ClayLock is available to the Design community through an Accreditation scheme for Civil and Structural Consultancies inclusive of training. This involves a short course and examination, enabling engineers to signoff on drawings and site inspections.

There is no charge for Accreditation for engineers, or for a principal or builder to hold a Licence. A royalty per square meter of building footprint is payable at the first progress payment of each development.

A register of Licenced builders and Accredited Engineering Consultancies is held in each State.

Contact Airey Taylor Consulting to review the Licence Agreement or apply for Accreditation (see page 4).

DALWALLINU PIONEERS EXCELLENCE FROM THE GROUND UP

An interview with CEO Neville Hale, May 2006

Employing state of the art thinking has led to a fresh identity for Dalwallinu in the heart of the Western Australian "wheatbelt".

"PEOPLE PLACES"

Dalwallinu population is slowly growing, a trend CEO Neville Hale would like to see continue supported by a shire building and amenities strategy. "Our strategy coincides with "People Places" - best practice models currently in use in NSW and QLD" says Neville. "We do apply for state and federal funding, but whatever the cost, the community contribution is one third".

On invitation UWA architecture students leapt to the planning challenge with an incremental development proposal including Shire Offices, Civic Square/ Buildings and a fully fledged Environmental Centre of Excellence to showcase and research flora of the region.

Within a 100km radius of Dalwallinu, 186 species of acacia (wattle) alone thrive in this biodiverse habitat on the "wildflower way" as it is promoted by Tourism WA.

As first "cab off the rank", the Shire Offices were completed in 2000 including council chambers, an interim library and housing an office of the World Wide Fund for Nature, a small step towards the eco-tourism theme. The new building (below) replaces the former offices built in the 1920's which where damaged by clay soil movement.

CONQUERING CRAB-HOLES

"This is crabhole country" says Neville, indicating a 300 mm crater-like depression in the soil near the offices. "The underlying clay shrinks and expands so much that cracks and these holes appear – you think you've got compaction but this is going on underneath."

Neville explained that the builder (Geraldton Building Co.) sought world's best practice engineering design on their behalf. The result: WA engineering identity Peter Airey proposed the technique now patented that accelerates natural soil stability processes and mimics a larger building, so that the building is sitting safely on a permanently stabilised pad of clay.

Guy Mander Architect and the council were supportive of the initiative. "We were pleased to support the world-first prototype of a new technology ClayLock" says Neville. "Five years on we have no clay related damage, even with this sort of thing going on in the block next door."

RESOURCE COMPLEX UNDERWAY

"We plan to use ClayLock in the second development" said Neville rolling out the plans by DoepelMarsh Architects. The proposed Resource Centre interfaces

(Continued on page 4)

Neville Hale, CEO Dalwallinu Shire

"This is crabhole country...five years on we have no clay related damage, even with this sort of thing going on next door"

A "Crabhole" identified by Neville within 5 m of Dalwallinu Shire Office driveway

The old roads board office—"due for some tlc and windows overlooking new development".

Left: Proposal from DoepelMarsh to incorporate into Centre.

AIREY TAYLOR CONSULTING

23 Hamilton St
Subiaco
WA 6008
Phone: + 61 8 9381 7544
Fax: + 61 8 9381 7577
E-mail: anthea@atconsulting.com.au

We are on the web!

www.atconsulting.com.au

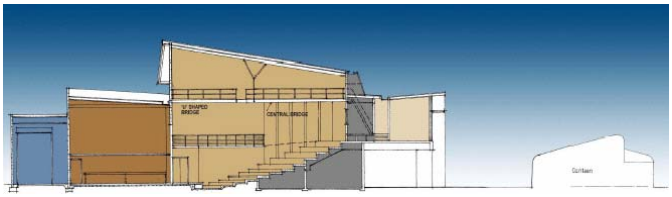
Breaking News

PERFORMING ARTS CENTRES

Airey Taylor Consulting were appointed to structurally design the new Performing Arts centre (right) in Northbridge, Perth by Kerry Hill Architects.

There have been few major additions to Perth's theatrical building heritage since Hobbs Winning Leighton Partners architects and Airey Ryan and Hill structural engineers designed the Perth Entertainment Center in the 1970s. Structural design challenges of the Northbridge facility include a "building within building" approach for sound insulation and a basement area permanently submerged beneath the high water table.

Buchan Group (architects) and Airey Taylor Consulting (structure) have recently designed the Lumen Christi College Performing Arts Centre structure in Gosnells. "Due to spiraling costs, savings from the ClayLock system over conventional methods have significantly contributed to bringing the building to budget. Installation is simple and the builder reported no difficulties" says Architect Peter Garvey. Derwent Constructions are presently building this 2-storey development that includes a 350 seat auditorium and associated teaching areas, practice & rehearsal rooms (left).



DALWALLINU STORY CONTINUED...

with the heritage Dalwallinu Road Board offices/town hall building via an amphitheatre-style stepped area – effectively a town square that could be used to support outdoor theatre and film. The facade thematically replicates the arches of the original council office, bringing shelter from the wind to this pleasant courtyard.

Facilities in the building include a "Telecentre" (internet facility), multi-use area for dance/aerobics and community activities, interim Environmental Offices, Tourist Information Centre and will ultimately be home for an expanded Library.

And on this northern wildflower capital supplanting a weekend "down south"? Neville says modestly "the world we live in is in constant change – a combination of vision and adaptability is the key".