



# Retro Clay

## FOUNDATION STABILISATION SYSTEM

### PERMANENTLY REPAIRED CLAY DAMAGE FOR LESS

#### WHAT'S THE CLAY ISSUE?



#### DID YOU KNOW:

- 38% of 75,000 houses surveyed in a report by Archicentre have cracks
- Approximately \$330 million is spent nationwide stiffening foundations per annum
- Despite this expenditure, approximately 30% of Australian civil engineering insurance loss claims are for foundational damage

#### THE ROOT CAUSE

- Clay swells and contracts with the seasons
- Swelling and shrinking clay acts like a molecular jack on the perimeter of structures
- Cracking from this clay movement occurs to structural walls and can repeat with the seasons

Retroclay® provides the best remediation possible for structures cracked by clay based soils. It uses natural forces to bring about lasting soil stability for each structure.

The technique extends the footprint of the structure with a tough polyethylene layer to simulate a larger building, then artificially raises the soil moisture beneath the new footprint to its maximum level via timed irrigation.

The polyethylene vapour barrier locks in the final state of moisture. As the perimeter walls and construction are seated on the enlarged stable area, ongoing seasonal stability is assured. Repairs can then be permanently conducted to the stabilised structure in workable timeframes.

Retroclay is suitable for Heritage Buildings, roads, 1–2 storey Housing or Unit Developments, Nursing Homes or Aged Care complexes, Hospitals, Offices, Schools and most low rise buildings when built on Class S, M, H1 or H2 sites according to AS 2870 2011.

*A Geotechnical report should be obtained to indicate whether clays are uniform or non-uniform. Special attention is required for mixed soil/rock combinations or residual soil patterns derived from igneous rock. Retroclay MUST be specified by an Advanced Substructures Engineer. Advanced Substructures requires involvement to ensure implementation conforms with the design intent.*



Retroclay® was used (above) to remediate this building in the Guildford area on “H” Class soils; the image on the left shows the internal damage prior to intervention; the same wall eight years later (on the right) is shown after Retroclay® treatment, permanently stabilised.



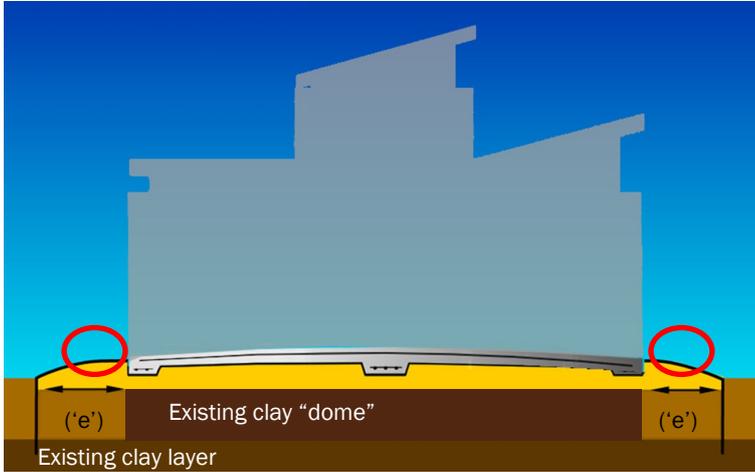
The central clay mound formed after many years of moisture equilibration is called “the dome”.

It forms from moisture trapped beneath the polyethylene vapour barrier placed between the concrete to prevent rising damp, that locks the column of expanded clay beneath.

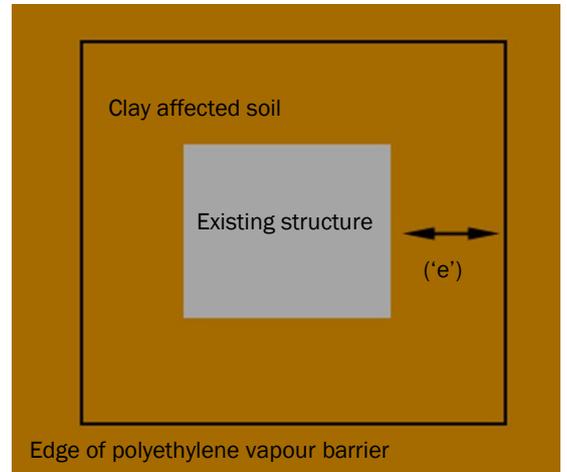
On the edges of the structure (circled in yellow on left), this clay mound shrinks and swells, causing the lifting and sinking of perimeter walls. This is the cause of cracking to structures.

## HOW RETROCLAY WORKS

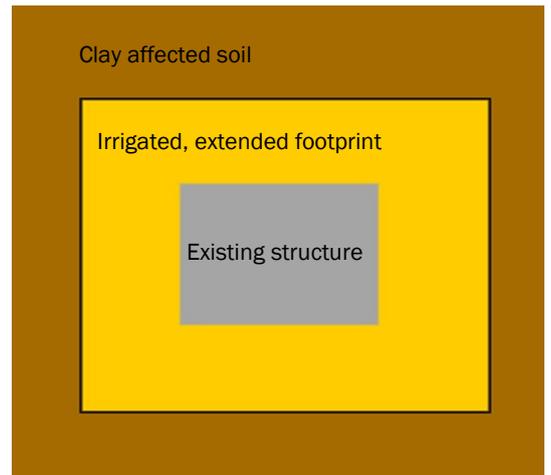
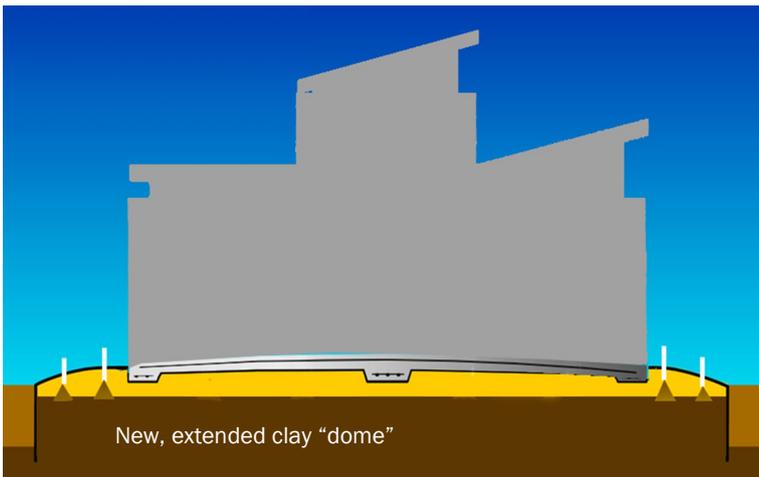
Side View



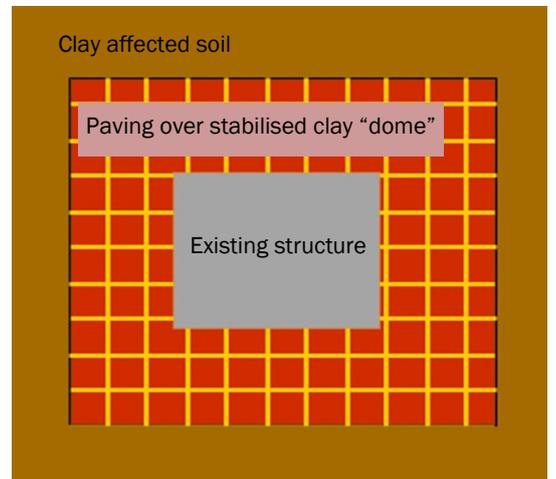
Top Down View



Retroclay simulates a larger building footprint by extending a tough polyethylene vapour barrier (circled in red) some distance ('e') from the existing structure and down to the clay layer



The extended footprint is then irrigated to the maximum level of the clay swell over a period of 3 –4 weeks. The tough polyethylene vapour barrier locks in the clay swelling beyond the building perimeter, preventing seasonal edge effects.



Repairs can then take place to the permanently stabilised structure. We recommend to pave above and permanently seal the polyethylene in order to protect the vapour barrier encasing the clay mound.

## SELECTED PROJECTS

### EASTERN GOLDFIELDS REGIONAL PRISON

**Collaborators :** John Holland, AMP Capital, Department of Corrections

The initial build of this State Government facility completed in July 2016 – but the 350 prisoner facility at Boulder in the Eastern Goldfields had experienced substantial cracking within the course of its first year of operation. This was due to being sited on Class “H” soils (under AS2870) and large degrees of seasonal swelling/writhing of the clays on which its foundations were placed.



Using Retroclay®, the 35 buildings were inexpensively treated and permanently remediated from cracking.



### THE OLD FARMHOUSE, STRAWBERRY HILL, ALBANY



**Collaborators :** The National Trust of WA

Named “The Old Farm” in 1890, this Albany property is recognised as the oldest farm in WA and is the jewel in the crown of the National Trust’s portfolio of Western Australian properties.

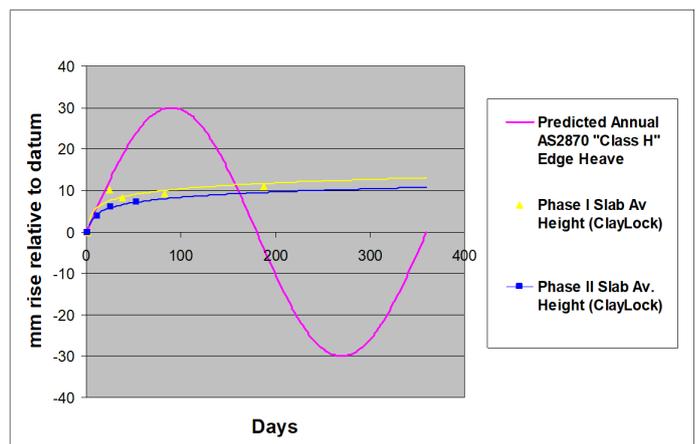
It was suffering from cracking due to seasonal clay movement requiring repeated repairs. Retroclay® was used as part of a suite of Heritage engineering measures to preserve this building for future generation, and permanently resolved the clay issue.

## OTHER PROJECTS :

Fairholme Hostel, Guildford; St Mary’s Anglican Rectory, Guildford; Kondinon Hospital, Kondinin; Kununoppin Hospital, Kununoppin; Mukinbudin Nursing Post, Mukinbudin; Toodyay Post Office; dozens more private residences around Western Australia

## LONG-TERM STUDY RESULTS

The WA State Government commissioned a report into the effectiveness of the technique for the new 2006 Moora Hospital development on Class H soils found that it was significantly effective in the long-term. The first year of monitoring results are shown below with the actual stability of the slabs poured versus the Annual edge heave of 60mm. The study proved consistency over a three year period.



## FREQUENTLY ASKED QUESTIONS

### Q. Does the method meet Australian Standards?

A. The method falls under the provisions of individual design by an expert provided by the Building Code of Australia. It has been registered with Australian Standards. The original deployment of the system won a National Engineering Award from Engineers Australia in 2006, when used for the remediation of the Lukeis Residence in Maddington. It has since been used around a hundred times in Western Australia, including throughout the Goldfields, Wheatbelt and South-West.

### Q. Is it expensive? Are there maintenance costs?

A. Retroclay® is the most cost-effective method of permanent remediation on the market. By utilizing and locking in the natural swell of clays at their highest point, it only needs to be applied once to the property before final repairs can be conducted.

### Q. Do you apply it yourself, or can I do it?

A. Advanced Substructures are an Engineering firm who will create the Retroclay® design for your affected property. We have a preferred supplier in Western Australia who can then expertly and efficiently apply it, and we can arrange this for you. If you have an existing building team, we can also work alongside them to achieve a permanent resolution to your clay issue.

### Q. Is puncturing the polyethylene vapour barrier a risk?

A. We have sourced an American polyethylene product (Stego®) which is extensively Quality Controlled and Assured, for use throughout Australia. While there is a slight price premium for the use of this product, it provides in the order of 50 times the durability of both puncture proofing and vapour permeability protection over standard polyethylene. It is highly recommended to use this product to mitigate risks. We post a sign on completed projects requesting contact of Advanced Substructures prior to any excavations at the site. We recommend paving above the polyethylene layer to further protect the barrier.

### Q. Does it work for civil structures like road and rail as well as housing and buildings?

A. Definitely. The same principles apply for the stability of all man-made structures built upon reactive soils.

### Q. What classification of soils can you use it on?

A. We would recommend its use on Class S, M, H1 or H2 sites according to AS 2870 2011. Class E sites may require further treatment or alternate measures. We would always suggest a geotechnical report is obtained prior to commencement.

### Q. How do I get the process started?

A. It is a good idea to take photographs of any damage to send them to our team, or contact us directly and describe the situation, so we can establish if Retroclay® is an appropriate solution for you.



## CONTACT

Phil Airey  
 Director (Sales)  
 phone : (08) 9265 0400 or 0455 060 384  
 email : phil@advancedsubstructures.com  
 Web : www.advancedsubstructures.com  
 12/18 Harvest Terrace  
 WEST PERTH WA 6005

