



CENTRE FOR APPROPRIATE TECHNOLOGY

RAMMED ANTBED BASKETBALL AND TENNIS COURTS



CONSTRUCTION AND MAINTENANCE

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RAMMED ANTBED COURTS – CONSTRUCTION AND MAINTENANCE

Where have rammed antbed courts been constructed previously?

While there have been many rammed antbed tennis courts built over the years, a thorough search has brought to light only ONE rammed antbed tennis court which is presently in use. This tennis court is at the Wauchope Hotel, Stuart Highway, Wauchope, Northern Territory.

The legendary Pat Rafter spent considerable time during his formative years training on a rammed antbed tennis court^{1 2}. The surface was slippery and this prepared him well for playing on other, less difficult, surfaces. The exact location of this tennis court is not known, it was believed to be in a rural location in New South Wales.

Rammed antbed tennis courts were previously built at Caboolture Tennis Centre³, however these were replaced with courts made from a local clay, years ago⁴.

There is a rammed antbed floor at Westmoreland Station⁵, Hell's Gate, Mt Isa, Queensland. However this floor was constructed in the early 1800's and no information on construction details is available.

Lochington State School and Emu Creek Primary schools in Queensland historically had tennis courts constructed by community members from antbed materials⁶, however this was some time ago and no details of construction are available. Mudgeeraba Nerang and Districts' Cricket Club originally had an antbed pitch, in about 1888.⁷ The Bierbank Hotel in Quilpie, Queensland, was constructed of mulga plastered with antbed in the 1890s⁸. Mapleton school in Queensland constructed an antbed tennis court in the 1950's⁹.

How were these rammed antbed courts constructed?

The rammed antbed tennis court at Wauchope was constructed by the proprietor, Bob¹⁰. He took a ute out bush to collect some anthills. He transported them back to Wauchope, dropped them off the back of the ute to allow them to break (at the site of proposed tennis court), hit them with a hammer and then drove over them. After watering them to allow them to set like cement, the ute was driven over them again to flatten them. The entire process was very labour intensive.

Steve Patten, a former employee of the Centre for Appropriate Technology, had carried out some experiments of rammed antbed at Kintore many many years ago¹¹. The experiments involved a trial of rammed antbed/earth bricks. A hole was dug in the soil until a clay layer was reached. Crushed anthill soil was mixed with the clay and water was added. A tractor was run back and forth over the mixture to grind and

blend it. The mixture was put in moulds to see how hard it got. Steve notes that the material did not work as well as they had hoped, and that it may be necessary to add cement to the antbed soil when rammed antbed bricks are made.

What other uses have there been for antbed materials or termite soil?

Bruce Walker, director of the Centre for Appropriate Technology (CAT), has previously used rammed antbed to line water tanks in Arnhem Land¹². Steve Patten, a former CAT employee, has carried out trials making rammed antbed bricks at Kintore¹³. Antbeds have been used to make floors in the early days of CAT's work in the Northern Territory¹⁴.

Rammed antbed floors were used in the construction of a house at Arrillhijere (Locally known as "Olive's Place")¹⁵, built by staff of the Centre for Appropriate Technology. The antbed floors were not successful and did not wear well. The skin started to peel off the surface and after some time, the antbed floor was replaced with a concrete floor.

There is an antbed stone house at Georgetown¹⁶. Muckaty Station, north of Tennant Creek, has a house built of antbed bricks.¹⁷ There is a house at Timber Creek in the Northern Territory where the structural members are plastic pipes with termite mucus being used as the bonding agent. The house unfortunately suffers from noise problems caused by a frog infestation in the plastic pipes¹⁸.

Rammed antbed has been used for a footpath at Elliot, as well as being used for dust control at a women's centre¹⁹. Each day anthill soil was taken from a different area. This enabled the floor to be made in a number of different colours. Rammed antbed soil has also been used for constructing driveways²⁰.

The University of Warwick, UK, has carried out experimental work on rammed antbed tanks in Uganda.²¹ For a tank which was constructed at Mbarara they used an earth mixture consisting of 80% anthill soil, 16% coarse murrum and 4% cement. (Murrum is a type of hard soil containing small stones, found in East Africa and used for building roads²²).

Anthill soil has been used for plastering the exterior of "earthbag" houses²³, as a substitute for lime, sand and Portland cement. However it was found to be prone to cracking. It may be less likely to crack if it is mixed with sand.

Sun dried anthill bricks have been used for housing construction in Zimbabwe²⁴. However, Peter Morgan, a latrine designer, notes that they are only durable if they are protected from the weather by an overhanging thatched roof²⁵. Bricks which have been fired are more weather-resistant. A women's conference centre has been built in Turkana, Kenya, East Africa from sundried anthill soil bricks and a cement alternative (ash mixed with cow dung)²⁶.

For the construction of pit latrines, anthill soil has been used as a substitute for cement in the construction of floors²⁷. However, if this material is used as a cement substitute, it has been found that the surface needs to be renewed more frequently.

Anthill soil has been used for making fuel saving brick stoves in Mozambique, mixed with grass and river sand²⁸. Anthill soil, river sand and ash have been used to construct similar fuel-saving stoves in Zambia also²⁹. These stoves were designed by an employee of World Vision and are now being promoted by the Ministry of Agriculture.

Mixing powdered soil with water, antbed soil has been used to repair wooden boats in Belize³⁰. This is reputed to be more watertight and stronger than the original wood. Anthill soil from termite mounds can be used as a waterproof liner for ponds and dams³¹, as well as being used as an alternative to soap in India, for personal hygiene³² and also as a shaving cream³³. Traditional healers in India have used sieved anthill soil as a mudpack to reduce swelling and pain from injuries, as well as a cleanser. In Africa, disused termite mounds have been used as ovens by travellers³⁴.

Australian Indigenous people have traditionally used limonite oxide, obtained from termites' mounds, as an ochre pigment for painting³⁵. Termite mound soil has also been traditionally ingested as a medicinal aid in cases of diarrhoea^{36 37}, as well as being used to control bleeding and infection. The practice of eating termite mounds has even been observed among mountain gorillas in Rwanda who were found to also suffer from gastrointestinal disturbances³⁸.

Anthill soil is used throughout Zimbabwe as a soil amendment^{39 40 41 42 43}, and it has been found to be good for sandy soils and those with a high sodium content.⁴⁴ Termite soil is believed to contain micro-organisms which suppress or inhibit the growth of fungi which cause plant diseases⁴⁵.

Antbed soil has been used for constructing traps for coyotes in Kentucky, USA.⁴⁶ It has also been used to reduce losses in stored yams in Nigeria⁴⁷. The geochemistry of anthill soils has been used for gold exploration in Africa^{48 49} and for diamond exploration in the Kimberley⁵⁰.

What is the best antbed material?

It is best to collect antbed material from older disused mounds rather than mounds which still have termites living in them. Termite mounds which are full of holes have been abandoned and are no longer in use⁵¹. New anthills are completely sealed with no gaps or holes⁵². Apart from the environmental value of maintaining the termite ecosystem, another reason for collection anthill soil from older termite mounds is that older termite mounds in South Africa have been found to have a higher clay content than newer mounds⁵³. If you do decide to ignore the advice in this leaflet and use mounds which still contain live termites, then it will necessary to remove the termites first by poisoning⁵⁴ or smoking (using fire)⁵⁵.

What difference does it make whether you use live termite mounds or older disused ones? Termites are a vitally important part of arid and tropical ecosystems⁵⁶. Their role is to decompose plant materials, releasing nutrients and making them available to

the soil, to allow plants to grow (they are as important as earthworms and fungi which are found in wetter environments). Life in tropical and arid ecosystems depends on this 'nutrient cycling' carried out by fungi. Termites are also an important part of the food chain, providing a food source for ants, spiders and lizards.

The outer clay casing of termite mounds is believed to be more suitable for construction than the inner nest material⁵⁷.

What are the benefits of rammed antbed construction?

Antbed soil basketball and tennis courts are much cheaper than cement courts. The use of antbed soil to replace cement leads to enormous savings⁵⁸. Antbed soil usually has a high clay content^{59 60} often in the range 30-80%⁶¹, this makes it suitable for the construction of tennis courts and basketball courts.

Where antbed soil has been used for boat repair in Belize, it has been found to be stronger and more watertight than the wood itself⁶². Soils which contain material from termite mounds are reputed to be highly resistant to the effects of rain⁶³.

What are the problems associated with rammed antbed?

GATE-GTZ's Building Advisory Service and Information Network has found that the quality of anthill soil can vary considerably from one region to another⁶⁴. Larger and older anthills often contain a range of different types of soil, they are not uniform in composition. There are often small stones on the outside of termite mounds and some contain plants' roots as well, which make it difficult to extract usable soil for construction. Sometimes stones in the mounds are very difficult to detect and remove because they are so small and there are so many of them. They may contain lime which can cause cracking if the anthill soil is used to make fired bricks.

Anthill soil has been found to be likely to crack, when used for plastering the external walls of houses⁶⁵. Materials made from anthill soil may not be as durable⁶⁶ or hard wearing as those made from other materials⁶⁷. Sometimes cement is added to anthill soil to improve its properties.⁶⁸ Sand may also be added to prevent cracking⁶⁹. Where anthill soil has been used as a substitute for cement floors in Zimbabwe, it has been found that the surface needs to be replaced more often⁷⁰. CAT also found that a rammed antbed floor used in a demonstration house at Arrillhjere started to suffer from surface peeling and did not have as long a life as was expected⁷¹.

As anthill soil has a high clay content, tennis or basketball courts made from this material may be slippery, in comparison with those made from other materials⁷². This is an important health and safety consideration.

What do we know about rammed earth, that may be applicable to rammed antbed?

Experience with rammed earth construction reveals that shrinkage can be avoided by using a low water ratio. Rammed earth walls use a combination of compaction and binding of clay particles to ensure strength⁷³. This suggests that a rammed antbed

basketball or tennis court should be compacted as firmly as possible to increase its life, and that the termite material should not be too wet when it is being compacted.

When rammed earth is used for walls, coating or rendering the surface tends to increase its life and avoid fretting of the surface⁷⁴. It is not known whether any surface coatings have been trialled for rammed antbed tennis or basketball courts. This is an area which is worthy of further investigation.

Rammed earth has been used for building at many locations throughout Australia, particularly at Margaret River, where it has been enthusiastically received by the local Shire and the State Government⁷⁵. It has also been used for housing and a shop at Noonkanbah, and a motel in the Northern Territory. Where rammed earth buildings have been constructed, there are likely to be local business who have expertise in this form of construction, which could be readily applied to the construction of rammed antbed sporting facilities.

As an alternative or improvement to ordinary rammed earth, stabilised earth has been trialled for housing construction. During the second world war, stabilised earth or “non-plastic soil cement” was used for road and airstrip construction. In third world countries it has been primarily used in the form of blocks for housing construction⁷⁶.

Stabilised earth is similar to rammed earth, however a small quantity of Portland cement (6 to 8%) is added, and the sand and aggregate content of the mixture is increased. The mixture is approximately 9% water to increase the effectiveness of the cement and obtain maximum strength. There is a low content of fine material in the mixture also, to avoid shrinkage. The small quantity of cement used in the mixture greatly improves the wear resistance of stabilised earth, as compared with ordinary rammed earth⁷⁷. No surface coating or rendering is needed if stabilised earth is used instead of rammed earth.

Instead of using Portland cement, lime is sometimes added to laterite soils to stabilise them and improve their resistance to moisture⁷⁸. For example the Latorex company mix 17% hydrated lime with laterite soils to use them for block making. No documented experiences with mixing rammed antbed soil with lime have come to light as yet, however.

The increased performance of stabilised earth, compared with ordinary rammed earth, suggests that the life of a rammed antbed tennis or basketball court can be greatly improved by the addition of up to 8% of Portland cement to the antbed and water mixture. Practical trials are needed, however, to confirm that this extra life is achieved in practice, and to identify any difficulties in mixing antbed material with cement.

What is needed to maintain an antbed court?

Maintenance for antbed tennis courts is very similar to that for clay tennis courts. Every time the tennis court is used, the court must be rerolled, otherwise the surface becomes very uneven and it starts to crack or break up. Either a hand roller or a mechanical ride-on roller may be used for this.

A typical ride-on roller for clay and antbed tennis courts (Price ~\$6000 USD) is illustrated below, together with a hand roller:



Reference for this photograph:
<http://www accuratetennis.com/softcourroller.html>



Reference for this photograph:
<http://surfsc.com/hbj/claycourtmaintpg3.htm>

Lutes and scarifiers for removing leaves from the court and preparing it for patching holes in the surface are also commonly used for clay courts and may be useful for rammed antbed also⁷⁹.

Footmarks etc. must be removed from the court every time it is used, by a process known as bagging. This is also done following heavy rain, which would otherwise cause the surface to set unevenly. For the bagging process a piece of carpet, artificial grass or hessian bag (used flour/potato sack) is attached to a heavy piece of wood with some rope. This bag or carpet etc. is dragged across the surface of the clay or antbed tennis court to reflaten it. The chunk of wood must be heavy enough to pull across the tennis court but not so heavy as to cause injury to the person who has to lift and drag it.

Rammed antbed courts will need to be completely resurfaced every few years, as for clay courts. Apart from resurfacing, antbed tennis or basketball courts will require lines to be marked with lime (chalk). It is possible to purchase plastic strips which can be nailed to the edges of the court but these are undesirable for tennis courts as if the ball hits one of these plastic strips it could bounce unpredictably in any direction.

If a rammed antbed court receives regular maintenance, it should last for several years before the surface requires replacement.

Who can I contact for more information?

The information contained in this leaflet has been compiled from a review of the literature and telephone conversations with the following people:

Wauchope Hotel, Stuart Highway, Wauchope, NT. Tel: (08) 8964 1963

Caboolture Tennis Centre, Morayfield Road, Caboolture, QLD. Tel: (07) 5495 8172

Steve Patten, Gap Road, Alice Springs, NT 0870. Tel: (08) 8953 3933

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