

# Case Study

# Geofabrics

Project: Gabion Rock-Stores (Various Australian Examples)  
 Date: 2004 - 2010  
 Client: Various  
 Location: Australia



## Gabion Rock-Stores / Thermal Mazes

A Rock-Store is designed to assist the ventilation system in providing cool air during the summer months and warm air during the winter months.

Active energy storage is where controls are used to regulate the flow of heat energy into and out of a building. This can be anything from penny-flap dampers controlled by occupants to complex mechanical ventilation systems that use air to charge and discharge the structure with heat energy.

An innovative example of how this can be applied is the system designed in the late 1990's by Ove Arup and Partners consulting engineers and architect Pearce Partnership for the Harare International School in Zimbabwe. Here, the active energy storage system is based on cages of loose rock that act as 'thermal batteries'. The system reduces operational energy by providing supplementary air tempering by passive or effective active means to reduce the heating/cooling load.

Supply air to the school's classrooms is pumped through steel cages (Gabions) containing locally sourced granite pitching stone (a test bed determined that this was the most effective fill material), after which the tempered supply air enters the classrooms through low-level grilles.

During summer nights, cool air is blown through the building via the rock stores, which are cooled by the cold night air. The ventilation system purges the rocks of heat to 20°C, providing 4-5°C 'pre-cool' the next morning. The system also functions efficiently during the winter months, especially where chilly mornings followed by pleasantly warm afternoons are experienced. By operating the low energy fans during daytime hours only, afternoon heat is stored in the rocks, subsequently producing several degrees of preheating to the early morning supply air. In summer, the classrooms are consistently 3-5°C cooler than the external temperatures.

Woven mesh Gabions are an ideal method of creating Rock-Stores due to their inherent strength, long term durability, ease of construction and cost effectiveness. In Australia, a number of Gabion Rock-Store projects have been successfully completed using Maccaferri woven mesh Gabions.



John Monash Science School, VIC

2009



John Monash Science School, VIC

2009



Australand Melbourne CBD, VIC

2008

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Roberts McCubbin Primary School, VIC

2008



Rowville Police Station, VIC

2004



Ballarat And Claredon College, VIC

2008



Peppermint Grove Library, WA

2010

## Australian Projects Incorporating Woven Mesh Gabion Rock-Stores

**John Monash Science School** – A 1.5m high x 1.5m wide Gabion Rock-Store structure was constructed below floor level to assist the building heating/cooling system

**Australand Melbourne CBD** – A series of Gabion Rock-Stores were constructed in the building basement using recycled concrete as the fill material

**Roberts McCubbin Primary School** – Rock-Stores were created under the classrooms to trap and hold cold energy to be used as a passive air-conditioning system during summer

**Rowville Police Station** – The station was Victoria's first "green" police station. The ecologically sustainable design includes amongst other initiatives, a Gabion Rock-Store to assist in stabilising air temperature. The new Rowville Police Station sets a benchmark for the way police stations will be built for the future

**Ballarat and Claredon College** – Gabion Rock-Stores were constructed underneath the Auditorium. The Gabions were filled with approx. 200mm Ø basalt to create a void ratio of approx. 30% to allow air flow between the rocks

**Peppermint Grove Library** – A series of 5.6m long x 2m high x 0.7m wide free standing Gabions were constructed in the basement to create a thermal maze. The projects innovative environmentally sustainable design (ESD) features include renewable energy generation, low energy heating and cooling, natural lighting and ventilation

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