RAPIDWALL
Building a better world
RAPID BUILDING SYSTEMS PTY LTD

Response to the Fire Devastation

Victoria 2009

Contact:
Peter Zwaans – Managing Director
Rapid Building Systems Pty Ltd
p.zwaans@rapidwall.com.au
+61 403 186 544

TABLE OF CONTENTS

RAPIDWALL

'Rapidwall' is a building product produced by Rapid Building Systems Pty Ltd (RBS) in Kilmore, Victoria. Right there at the fire front. It is ideally suited for rapid deployment in the reconstruction of houses destroyed by fire and where the ground concrete slabs remain intact. Currently in excess of 20 houses (external and internal wall panels) are in stock ready to be cut to design, distributed to site and installed.

It is possible to manufacture and cut panels for two houses per day thereafter to meet demand.

The reconstruction process is slowed generally by the need to rebuild from ground up. As 'Rapidwall' is a 12m long panel, it can span and distribute loads on existing slabs and footings. It can also be cut to existing size of slab and layouts.

Due to this, once the debris is cleared from the existing house slab, new panels can be installed within days (average house takes 1 day for wall panel installation), new trusses and roof installed with windows/doors and therefore a lock up weather proof structure can be in place within weeks and all to the layout of the old house.

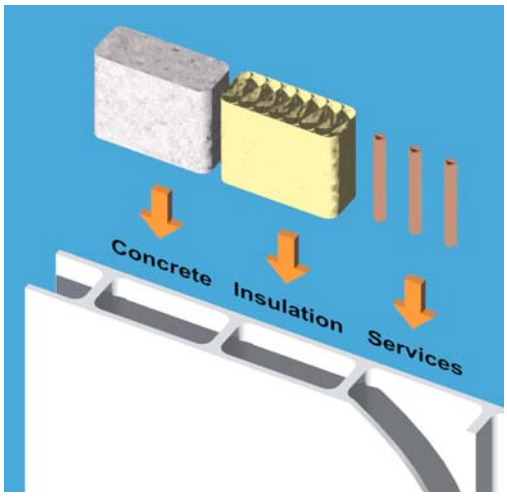
The team at RBS have also felt the impact of this devastation within its staff. This has energized everyone in the team to do all they can to help others in the rebuilding process. RBS is prepared to gear its processes and staff to this and assist wherever possible.

RBS can have a designer sit with residents and plan the rebuilding of their homes and lives and feed the requirements into the plant for production immediately. We can also help arrange other trades needed to get the homes rebuilt and occupied.

One of the added benefits to using 'Rapidwall' is that local people with fundamental carpentry skills can assist also in the installation of panels under the guidance of our experienced installers. Working onwards then with other local skilled people in the building industry will see the community reap the income to also rebuild their lives.

WHAT IS RAPIDWALL?

'Rapidwall' is a revolutionary, low cost, prefabricated, load bearing walling product. It is manufactured in an automated moulding process using glass fibre reinforced, water resistant gypsum plaster. After panels are removed from the casting table the flat, single sized panels are oven cured.



Typical Panel Section

Panel Installation

All panels are produced 12metres long x 3metres high. They are then cut and detailed to suit site requirements including door and window penetrations. Construction using 'Rapidwall' is very fast and eliminates the need for bricks, blocks, wall framing and wall board. As panels are a waterproof gypsum composite that only require texture finish externally and flushed internally ready for painting.

Panels are 125mm thick with wall thickness of 15mm and webs at 250mm centres. Due to this, the hollow cores can be filled with R2.5 insulation to give very good insulation and acoustic qualities. These panels have a 3 hour structural adequacy rating (FRL 180/120/60)

Panels can also be concrete filled with 32mPa concrete and will then give a 4 hour fire rating (FRL 240/240/240). This could be seen as very good aspect of the product for future security against fire and with careful design in other areas may give greater longevity compared to normal construction. When panels are filled they can be insulated externally using 'Isofoam' insulation and texture finished.

ADDITIONAL BENEFITS

Superior Finish – 'Rapidwall' is smoother and flatter than equivalent precast concrete, in situ concrete or rendered masonry wall

Water and Rot resistant – in a raw state and after full emersion in water for 24 hours, the moisture uptake of the panel is less than 5% (by weight)

Fire resistant – in its raw state has a 1 hour fire rating which can be increased to as great as 4hrs by the insertion of concrete within the cores

Termite resistant – as panels are made from gypsum plaster and fiberglass they are immune to attack by vermin and termites. Construction can be devoid of any timber products eliminating any risk of termite infestation.

Ease of work – essentially only carpentry and plastering tools are required for installation and finishing of panels. Maintenance is similarly undertaken

Services – all plumbing and electrical services are also installed within wall cores, no need for chasing or surface wiring etc.

Environmental benefits – panels are manufactured from plaster which is manufactured from gypsum which is an inert naturally occurring material and available in vast quantities all over the world. It is also a by product of other industrial process. The production, transportation and installation of one square meter of clay brickwork emits over 70kg of carbon dioxide compared with 7kg for the equivalent 'Rapidwall' panel. 'Rapidwall' is also 100% recyclable.

For further information refer: www.rapidwall.com.au

EXAMPLES OF RAPIDWALL INSTALLATIONS

Traditional styling

Contemporary styling

Modern styling

Large family home

Upmarket housing

First home owner

IDEAS TOWARD FIRE RESISTANT HOUSING

The latest fires in Victoria have again raised the very issue of protecting our lives against fires as well as our homes. The aspect of flying embers preceding the fires brought on by high winds and the firestorms that can follow have shown what needs to be addressed.

Opinions expressed here are those of the team at RBS. These opinions need to be collated with the appropriate professionals and all other relevant parties in order to compile a comprehensive response and guidelines for the future.

Current guidelines for protecting property have been seen to work for slow moving fires where an element of time is available. The recent fires have moved so rapidly that current guidelines are inadequate and we have to deal with the actual structures to overcome the issues.

The intensity of the heat has caused failures in many products and traditional building methods. For example both brickwork and blockwork have failed due to joint collapse. We need to look to the more advanced or jointless products for walling and these products need to be integral to the structural integrity of the structure not just a plant on.

External openings in walls are another area of great failure allowing the fire to penetrate quickly inside the structure and burn from the inside out and at times literally explode. One of the added reasons why external cladding should be part of the integral structure, is if the fire does get inside the structural support of the house cannot be compromised.

The roof also poses many problems. In many instances ember penetration into roof cavities ignites various things causing the roof to become the source of trouble and aids greatly the spread of fire. Also needs a solution to prevent the problem occurring.

Resolving these issues also need solutions which are aesthetically pleasing whilst viable and practical. We should avoid using commercial type structures or materials to solve a domestic construction scenario if possible.

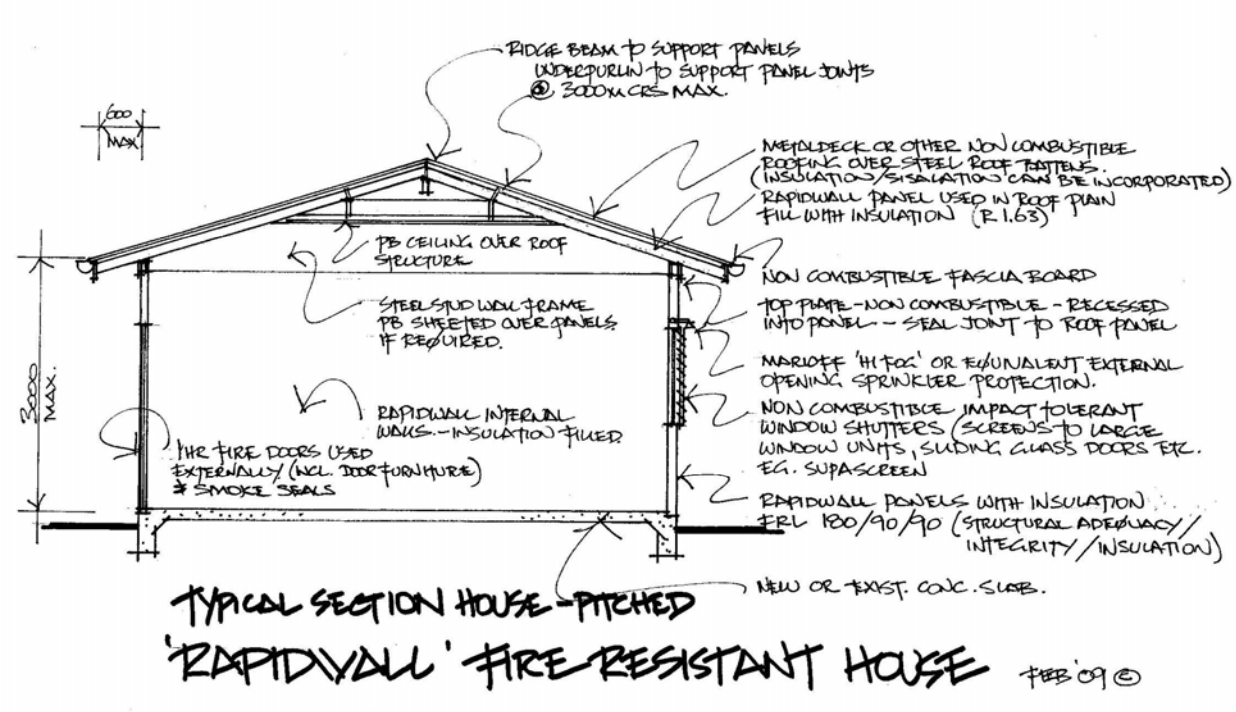
Without dismissing other products as being unsuitable, we would like to focus on why ‘Rapidwall’ in our opinion, is suitable to resolve the aforementioned issues in conjunction with other ideas.

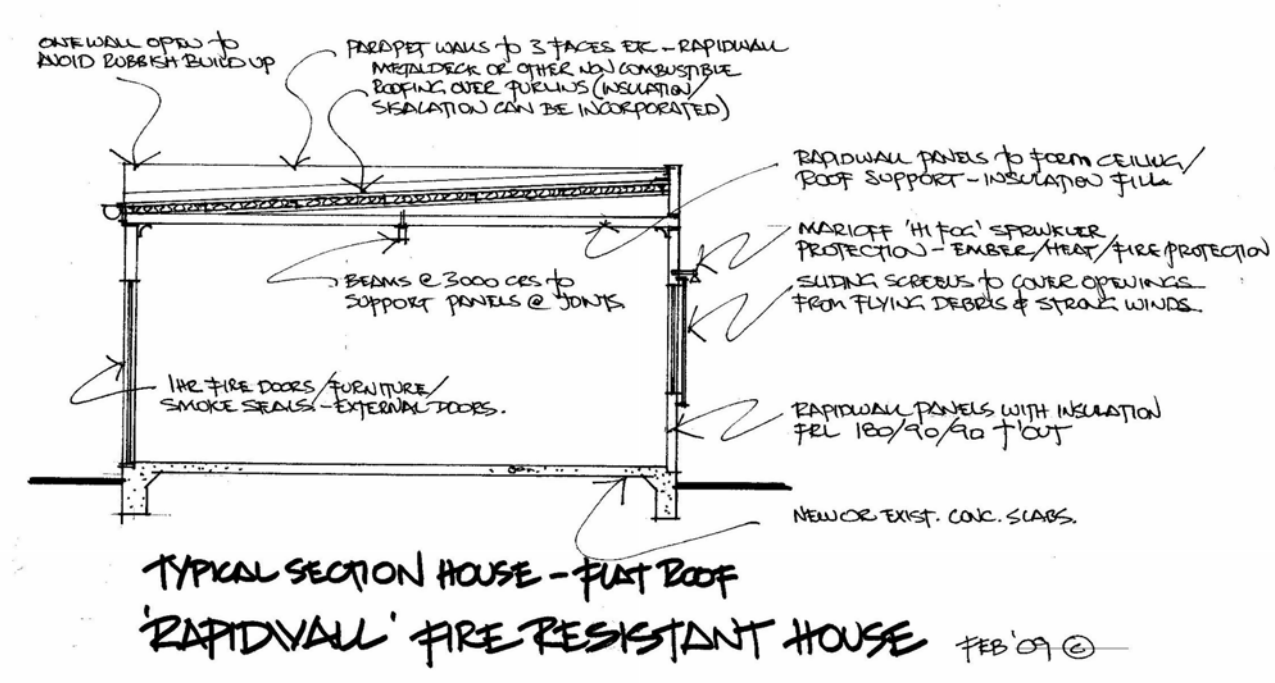
WHY ‘RAPIDWALL’?

In its produced state as a panel of 12metres x 3meters it has a FRL 180/120/60 (structural adequacy/integrity/insulation). What does this mean – under the Building Code of Australia products have to be tested to conform with an Australian Standard test in this case when exposed to fire. ‘Rapidwall’ results show it maintains its structural strength for 180 minutes (3 hours) when exposed to fire, the product maintains its integrity for 120 minutes and prevents intense heat being transferred to the internal face for 60 minutes.

Due to other design reasons it is appropriate to fill the voids in the panel with insulation so the panel has maximum thermal insulation. When this is done, the rating changes to an efficient FRL 180/90/90. As the main problem we are addressing here is embers and firestorms which are surface effect or short duration intense heat, we believe ‘Rapidwall’ more than answers the criteria.

Shown below are two sections showing the detailing of ‘Rapidwall’ to solve two of the criteria, the walls and roof. Through this detailing, ‘Rapidwall’ is able to create a fire barrier to other supportive structures whilst being an integral part of the structure as it is a load bearing wall itself.





Roof sheeting can be installed on steel battens or purlins and have another layer of sisalation/insulation (non flammable) giving increase thermal protection. The roof is sacrificial compared to the body of the house.

It is also pertinent to note that these structures using 'Rapidwall' could be built onto existing slabs where the houses have been burnt out. After engineers' certification for reuse, the existing house layout could be duplicated and replaced.

Architectural finishes and materials can be added outside the 'Rapidwall' walls to give individuality and character. These can be fixed or tied to the structural 'Rapidwall' panels.

OTHER RAISED ISSUES

Windows are another concern. There is an obvious response and that is to incorporate fire shutters which are a commercial solution. They have no aesthetical appeal due to the size of drum and enclosure although severely practical.

The protection of window openings suggested in the drawing sections is a two part protection system.

The main protection is a system developed by a company called 'Marioff' of Finland. They have a system called 'Hi Fog' which is a water based fire suppression and prevention system. It uses the principal of high volume of small water droplets and the right density to dissipate heat and douse a fire by taking away the oxygen supply. Although not available in Australia and is principally used in large boat and engineering applications, its principal should be utilized. We are able to source this product given it being accepted as a method suitable for this application.

This system can be thermal responsive or electronically activated on site or remotely by phone or fire brigade.

For this system to be utilized, an underground storage tank of say 10,000 litres needs to be installed with a back up generator for pump operation. Such a system can operate for hours and longer to protect the windows.

Provision of a generator for this will be extra to the need also of the house. As power supply is one of the first casualties of fires. If it is contemplated to stay, then temporary power is essential to the house and this concept. This generator also needs to be in a ventilated fire proof enclosure which should be sizable enough also for the water pumps, gas cylinders, hot water units and the like.

This room should be sprinkled to prevent any fires in the room. Drainage is imperative to avoid flooding.

Fire suppression is not enough. Windows also need protection from flying debris and strong winds. A window shutter system that is fire retardant and impact resistant needs to be also encompassed on openings. This could be shutters, blinds, sliding screens or other external devise to protect the openings from impact. The water washing over this and the window will prevent ember caused fire and protect against firestorms and general fire.

Windows need to be also upgraded to ensure smoke exclusion and glass used that is heat resistant and will not crack under these extreme circumstances. It could be a solution to upgrade glass usage to being laminate glass throughout and screens/security blinds that satisfy cyclonic conditions. Laminate glass does also help thermatically.

External doors also need to be addressed. One hour fire rated door frames, doors and door furniture are readily available for commercial applications. These could be introduced residentially including smoke stops.

An added benefit to using 'Rapidwall' for all walls in the house is its' natural prevention to the spread of fire if one occurs internally through electrical fault, carelessness or other reasons. Each wall naturally acts as a fire wall if they connect to the 'Rapidwall' ceiling/roof panel.

IN SUMMARY

'Rapidwall' in conjunction with other systems and opening protection can provide a fire resistant structure for periods in excess of 1 hour up to loss of structural adequacy at 3 hours if continued exposure. The impact of a firestorm comes quickly but moves on at the same speed. If the surrounding areas to the house is cleared, as per current requirements, then the house will be minimally impacted.

A safe environment for families to shelter from the fire will have been created. Provision of emergency air supply, maybe to a room or masks (like airliners) within the house may need to be also encompassed as firestorms are known to suck all oxygen from the atmosphere as it passes.

This report is compiled to provide a preliminary introduction to a product that can be considered a part of a larger solution to create fire resistant houses.