



Braemar Hospital Reception.

The building is designed for wellness and sustainability

Braemar Hospital

Client: Braemar Hospital Limited

Contractor: Mainzeal

Architect: Chow Hill Architects

Building Services: Beca

ESD Specialist: e-Cubed Building Workshop

Publication Date: November 2009

Region: Hamilton

Sector: Healthcare

Total Project Value: Construction Cost \$26.5m

Project Timescale: Construction - Nov 2007 to April 2009

Form of Contract: NZIA SCC1 with special conditions

GREEN HOSPITAL A HEALTHIER CHOICE

This Pathfinder Project reviews one of the first new green hospitals to be designed and built in New Zealand. A commitment to environmentally sustainable design (ESD) has resulted in a healthier hospital and the potential for significant operational and maintenance savings over the life of the building

Background

Braemar's service as a healthcare provider since 1926 for Waikato residents took another turn in their longstanding history, when they opened their doors to their new hospital earlier this year. In building a new hospital, Braemar was committed to key quality attributes: location, orientation, affordable green initiatives, planning, a high level of services, and quality finishes. The hospital had to meet the needs of surgeons, staff, patients and their visitors.

Successful Outcomes

Building Criteria set at start

In addition to the regular three imperatives of time, cost and quality, all closely monitored and critical to its success, sustainability objectives were also high on the client's agenda.

With no NZ Green Star rating tool available, David Fullbrook from e-Cubed Workshop was approached for guidance in developing suitable criteria for the building.

As sustainable design is a term open to interpretation, it was important to establish early on relevant measures to enable the team to meet performance targets. David worked closely with the team at Chow Hill Architects to ensure that the maximum benefits were achieved.

Braemar Hospital Front Entrance

This move was key, as by the time a design is completed, 80-90% of a project's life cycle economic and environmental costs are already inevitable. More importantly, when just 1% of the hospital's up-front costs are spent, up to 70% of its life cycle costs may already be committed.

By preparing a parametric 3D model of the whole building, e-Cubed provided options, each with a cost benefit analysis, to enable the client to make informed decisions on their path towards sustainability.



As services played such a crucial role, this was developed in close consultation with Mark Preston, Beca's building services design manager. Mark's early involvement ensured that the plant room requirements were defined and the appropriate space required for plant room was enlarged, upgraded and accommodated within the building envelope. The specific brief for the building services helped monitor the significant cost implications associated with the services required for a hospital.

Green initiatives bring payback

Not all green measures cost extra money, but items such as solar water heating, high efficiency lighting, optimal insulation, efficient chillers and boilers require additional investment up-front. Based on the 'Developed design cost benefit analysis' the additional cost investment in the sustainable design features selected was estimated as \$444,000 with a 6.5year payback. This offered potential to achieve considerable savings for the client, considering that hospitals are generally refurbished on a 20year basis.

By providing a range of options the client could make informed decisions on which sustainable pathway to follow and the implications that decision would have on the overall level of sustainability achieved. In addition, any additional outlay of cost could be weighed against an expected payback period.

Warm and friendly interiors



Key principles to help realise a sustainable building

- A clear brief set by the client and then developed by skilled project team
- Cost Benefit Analysis Spreadsheet reviewing sustainable features and their payback
- Sustainability always on the agenda – from design meetings through to PCG meetings
- Commissioning, completion and aftercare to verify project has been properly tested and commissioned to achieve ESD objectives. Educate Building Service Manager and provide manuals.

Forward planning saved money and materials

Significant forward planning from the design team helped realise the key objectives set by the client. *"Without a doubt the planning up front rather than planning on the run by our key consultants was most important"* Paul Bennett, CEO.

As the services were one of the biggest factors of this build much time and effort was invested up front and then reviewed by the construction team. The building was modelled to determine spaces required for services.

Key Client Actions

This project demonstrates a number of areas where the client directly and positively affected the outcome of the project **for all**, by adopting specific Collaborative Working practices, including:

- **Informed Client:** Client informed, and clearly knew what they wanted to achieve – 'Intelligent Client'. Relied on Project team and others to guide them through the process.
- **Strategic Development Plan:** Client-led strategic development plan clearly informs project objectives
- **Decision Making:** Client involved in all key decisions throughout the process. CEO acted as senior decision maker in addition to 4 members making up the Project Control Committee.
- **Proactive Client:** Client proactive in decision-making, able to make well-informed fast decisions, particularly when realise impact of decisions had to overall time. Client part of the project team
- **Leadership:** Client shows strong leadership balanced with willingness to seek expert guidance throughout process.
- **Client Advisor:** Independent consultant with construction knowledge chaired Project Control Group acting as 'Client Advisor'
- **Team Selection:** Selection of team members all had previous experience in hospital construction, which helped deliver complex building under tight timeframe
- **Communication:** Client gained greater understanding of building process and kept community informed of construction process, by providing a live 'web-cam' of the building site together with continually updating photos on a display screen in the foyer of old hospital that showed work in progress. Good for public relations as had additional information such as key dates and progress updates

The dedicated plant floor is well laid out and the selection of services was carefully considered from cost, robustness, quality and environmental performances. By spending the time upfront and carefully working out the duct area the service team was able to reduce the height of building by one block module – saving on materials, labour and money. The contractor was informed of the tight tolerances to achieve this. The forward planning paid off and the team was able to save \$300K.

Able to deliver

It was important that the contractor could deliver the level of quality and meet the sustainable targets demanded by the client. Initial selection was based on non-price attributes. From this, three contractors were shortlisted to tender for the project. Mainzeal was successful and as part of their bid they committed to the onsite waste management plan - a first for a large construction project in Hamilton.

Building maintenance key part of sustainable realisation

One of the requirements of the contract was the need to carry out a first year tune of the Building Maintenance and set up a commissioning regime that will continue throughout the life of the building.

This will include producing O&M manuals and e-Cubed providing independent commissioning advice and education for the building operator/manager to optimise efficiencies within the building.

A key aspect of obtaining optimal use of services selected is learning how to operate the building. Mainzeal are regularly on site monitoring the services. When issues have arisen they attend to them immediately. Maintaining key construction members throughout the life of the project, particularly at the tail end, has ensured a strong focus on finishing and making a good job better.

Complex projects use prototypes

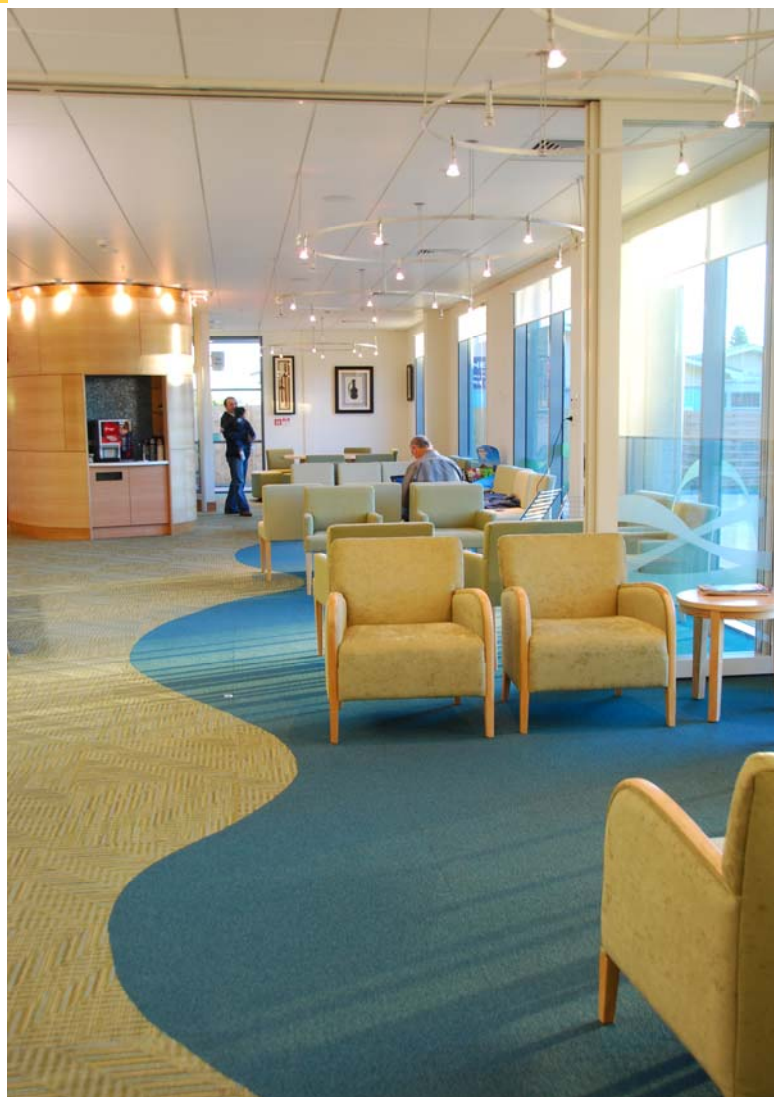
During construction a deluxe bedroom suite and an operating theatre were mocked up to help both the client and the team understand the complex arrangements, services and scale of the spaces. All team members found this to be a worthwhile exercise and would recommend it for future projects of this complexity.

Success due to leadership and seeking advice

Key towards the success of the project was the clients' willingness to seek advice throughout each step of the process. *"One of the best things we did was to have our own independent consultant on the Project Control Group who reported exclusively to us. He had vast construction knowledge and ended up chairing the PCG meetings"* Paul Bennett, CEO.

This role is a well established one in the UK – the 'Client Advisor' - and brings many benefits to one-off and occasional clients. The client showed strong leadership, and clearly articulated their vision and needs early on. This helped the project team meet their objectives which in turn provided clarity to the cost, bringing certainty to the team.

The client also carefully selected their key project team who all had experience in designing or building hospitals, vital in light of the tight timeframe to deliver.



Soft welcoming spaces with plenty of natural daylight

Health and Safety

The Contractor practiced excellent health and safety procedures and operated under a 'Site Safe' site.

Cost

Braemar's sole shareholder is a charitable trust. It was therefore vital that agreed budgets were met. Regular cost reviews were done at each design stage to ensure design met budget expectations. The team constantly projected cost to complete and monitored cost variations.

Summary of Benefits

- A proactive and involved client helped to speed decision making, essential in a fast track process.
- Last Planner™ smoothed the planning process and formed a collaborative team based on trust.
- Upfront workshops involving the whole team including the client enabled everyone to understand how their part fitted within the process, gave ownership and built trust
- Partnering with the council early on enabled the complex resource consent process to go smoothly.
- The fast track process enabled integrated design and construction

Time

Time was critical as the new hospital had to be opened within a specific timeframe as the client was moving one hospital to another without closing down. With patients to care for, the hospital needed to remain operational.

Construction commenced in late November 2007 and finished in April 2009. Part of the hospital was opened at the end of the Easter break, the initially agreed finishing time.

The intense time pressure to complete the building meant that during construction, the handover was agreed to be staged. In addition, the elaborate fit-out, top end services and finishes made the construction process extremely demanding.



One of the patient rooms using healthy carpets and paint.

Lessons learned

Key lessons to take forward from this project are:

- **Waste management during construction:** This generally worked well, but required diligence from construction team and ongoing persistence and commitment to shift behaviours. Part of process is to educate the whole team. The process helped people think more about their processes and how they can do things better.
- **Retaining Team:** Retaining key members of the construction team during the maintenance period

Conclusion

This case study really brings home the benefits of going green. The benefits are clear, 'going green' not only enhances the spatial qualities within a building, making it a healthier place to occupy, but it also has the potential to offer significant savings for the clients in the operational and maintenance life of the building.

It always feels good when a decision such as this not only goes towards saving the environment but also brings substantial benefit to the client and building users.

Green Features

Usage Targets

- Established desirable energy use and water use targets
- Optimise wall and roof insulation by energy modelling
- Optimise the window/wall ratios
- Provide high performance glazing and shading systems to glazed areas in key designated areas
- Mechanical services – provide variable volume capability for piped heating and cooling systems
- Use of high efficiency pumps, drives and motors for plant
- Use 1 no Heat Recovery Chiller and 1 No Conventional Air Cooled Chiller with Condensing Boilers
- Main electrical metering and selective sub metering linked to BMS
- Provide energy efficient lighting by selecting appropriate lighting design criteria
- Central water metering linked to BMS
- Provide solar water heating with heat pump preheating
- Use low water use plumbing fittings

Planning and Commissioning

- Environmental Management Plan for construction phase
- Independent commissioning of all services including full end-to-end point testing of BMS
- Implemented first year fine tune/continuous commissioning

Exteriors

- Use of indigenous plants in landscaping
- Provide secure covered bike stands for staff

Daylight

- Courtyard form to maximise daylighting potential
- Provide additional roof lights to maximise daylight over internal work areas/circulation areas to reduce reliance on artificial lighting
- Provide external views from daytime work areas including operating theatres

Form and Function

- Building designed to achieve a design quality which satisfies functional requirements whilst de-institutionalising interior spaces and surroundings
- Provide generous circulation stairs to discourage dependence on lifts
- Provide sufficient space for building services to permit energy efficient distribution and access for servicing

Sustainable Usage

- Carpet tiles manufactured from recycled material
- Sustainably sourced finishing timbers and veneers
- Client had input into waste management at the design stage which appears to be working well



Chow Hill

For further information on NZ Pathfinder projects visit www.constructing.co.nz



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