

Nature will thank you.



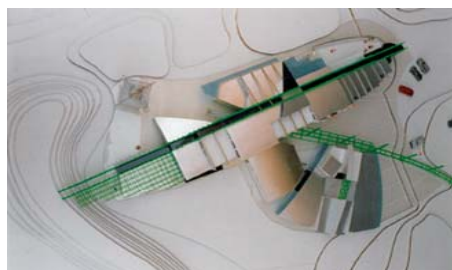
Environmentally Responsible Design

A journey of discovery

Palace of Diocletian

A preliminary indicator of thesis performance by an examiner is to note the number of spectators crowded into the back of the presentation. *Groupies* only latch onto success!

I recall such a crowded room in 1989 at the University of the Orange Free State when Wilhelm Louw presented his thesis 'Cheesecur' – a factory to make windsurf-boards, inspired by the form and technology of the product. The subject proved to be especially fascinating for a land-locked school!



Roelof Uytenbogaardt was the other external examiner. Suddenly he exploded, "Borromini is alive! Michelangelo is alive!" (I was conscious of people leaving the room) "You cannot just invent a new kind of architecture! Go to the Palace of Diocletian and see how....."

I only got there last October, 21 years later, to seek the answer.

The Palace was built by the divinised Emperor Diocletian at the end of the third century for his retirement and eventual place of eternal rest. The site was onto a deep, sheltered bay in his native land on the



Dalmatian coast. The virtually square, fortified plan consisted of servants' and guards' quarters on the two inland quadrants with a sumptuous palace and religious buildings on the seaward side. The Palace could be supplied directly from the sea into a huge basement below. This also enabled the importation of limestone and marble for the construction.

After the demise of the Roman Empire the Palace stood empty until the 7th century when invading barbarians caused nearby residents to seek shelter within its walls. Grand buildings were pulled down and the materials were recycled to eventually form a dense medieval

town with narrow streets. The Mausoleum of Diocletian was converted into the Cathedral of St Dominus of Split with a new soaring bell-tower dominating over the town.

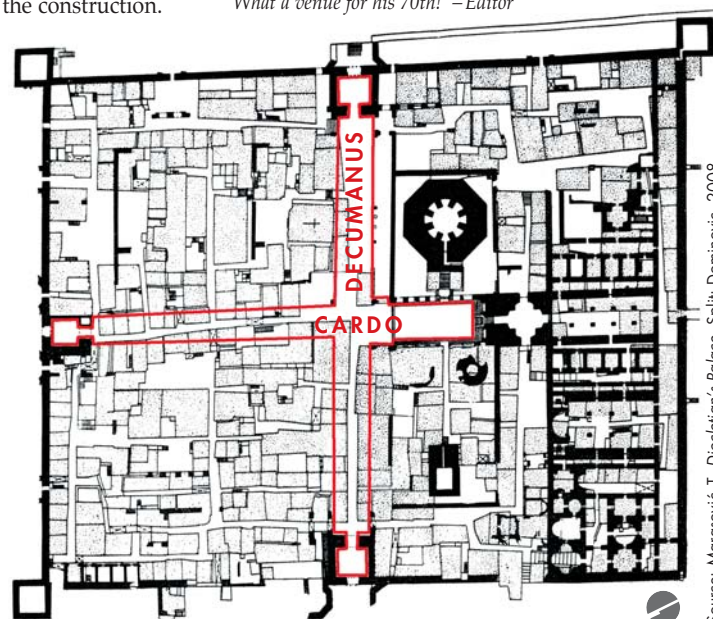
So what was Roelof getting at? Perhaps it was how a classical model will endure. Maybe it was the subtle use of levels to create thresholds between the Emperor, the populace and the stores. It could also be an example of how a robust concept is essential to

absorb inevitable change.

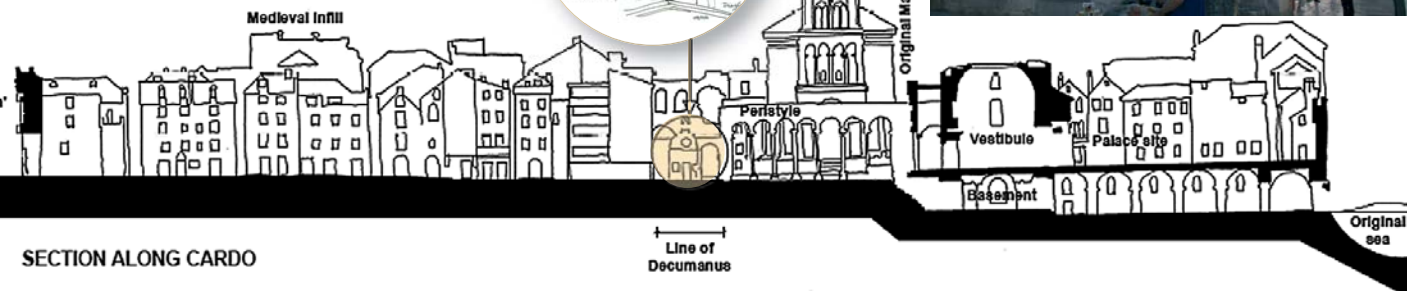
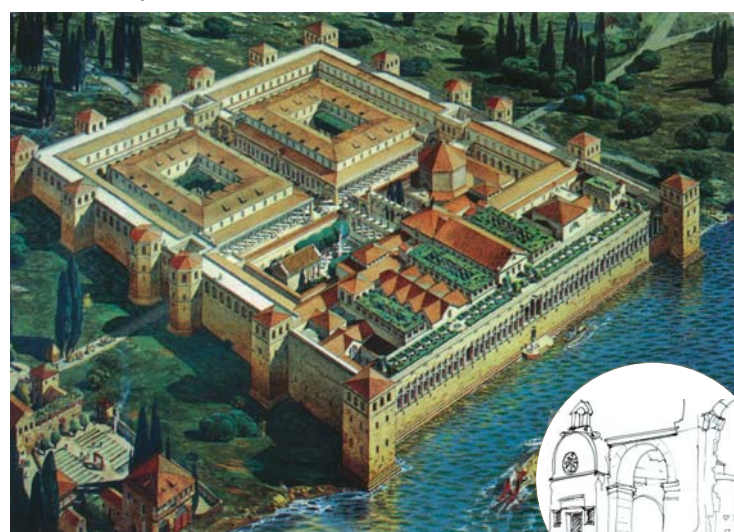
One point is certain however – the dense settlement, defined entrances, the clear, legible movement framework and splendid public spaces should serve as an excellent model for contemporary South African settlements!

Rodney Harber

What a venue for his 70th! – Editor



Source: Marasović, T. Diocletian's Palace, Split: Dominović, 2008



news



UKZN School of Architecture

On completing three successive triennial terms as Head of the School of Architecture, Planning & Housing, Prof Ambrose Adebayo has been granted two years' sabbatical leave. Dr Rosemary Awuorh-Hayangah, Senior Lecturer in Planning has been appointed Acting-Head of School while academic co-ordinator for the discipline of Architecture is Professor Ayse Gulcin Kucukkaya.

As the University has opted for a structure of Colleges with enlarged Schools in lieu of Faculties, it was proposed that the School of Architecture, Planning & Housing be accommodated in a new School of the Built Environment and Development.

Corobrik Architectural Student of the Year

At the Awards function held at Wanderers' Club, Johannesburg, on Wednesday, 30th March, Stefan van Biljon of the University of Cape Town was announced winner of

this most prestigious title for 2010.

Stefan's thesis proposed a structure to reflect the movement of nature and the impact of climate change based in berth KL, Duncan Docks, Cape Town, hence the topic KL-

Metamatic: Ghost Ship. The jury consisting of SAIA-President Fanel Motsepe, Dean Jay of Durban and Sarah Colburn of Johannesburg singled out Ghost Ship from the submissions by the seven SACAP-

accredited universities for conferring professional degrees in Architecture because of its "level of intellect" and the "richness in the way the concept was thought through".

This is the 24th annual Award by

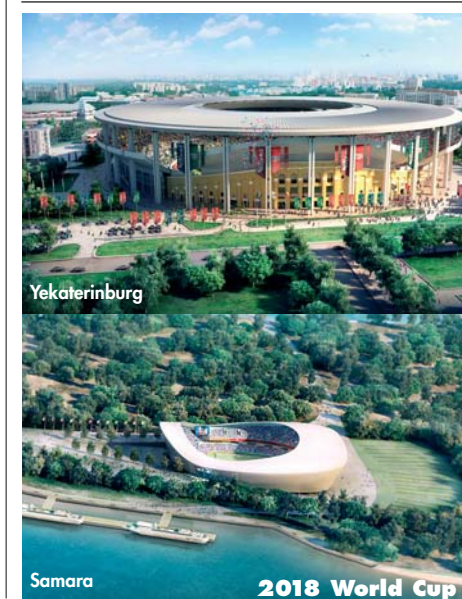
Corobrik and the prize now carries a R45 000 reward.

In Memoriam

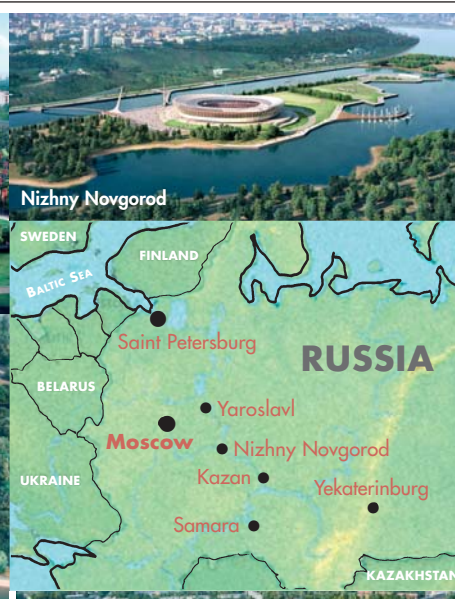
KZ-NIA Journal has learned with regret of the death of Mike Hartley (26.11.1926 – 4.3.2011).



The finalists of the 2010 Corobrik Architectural Student of the Year competition pictured on stage. On the left: Pierre de Lange (University of the Free State), Catherine de Souza (Wits) and Klippie du Toit (Tshwane University of Technology). The winner, Stefan van Biljon (University of Cape Town), is pictured on screen in a Skype link-up with Milan where he is undergoing his internship in the offices of Renzo Piano. On the right: Cazir Naroth (UKZN), Nikhil Tricam (Nelson Mandela Metropolitan University) and behind Calayde Davey (Pretoria) with Corobrik chairman Peter du Treu.



2018 World Cup



COVER SPREAD: Dalton Compound buildings—From left to right: Barn tower; Office; Reservoir house; Timber workshop; and Tack room. See pp8–11.

Photography by Angela Shaw.

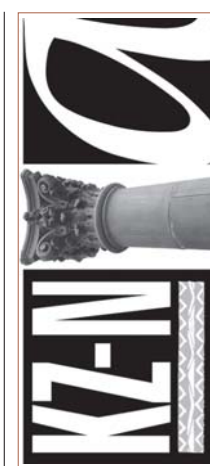
Following his role on the technical team for South Africa's 2010 World Cup stadiums, not only did Durban colleague Ruben Reddy become co-author of the FIFA manual *Football Stadiums – Technical Recommendations and Requirements* (Fifth edition, 2011), but he was also included in the 2018 Russian bid committee. With the



announcement of Russia's success in hosting the event, the five designs by Ruben Reddy Architects for the stadiums in Nizhny

Novgorod, Samara, Kazan, Yekaterinburg and Yaroslavl are now being developed for realization.

Wow! –Editor.



KZ-NIA JOURNAL • ISSUE 1/2011 • VOL 36 • ISSN 0379-9301
Editorial Board: Brian Johnson (Chair) • Patricia Emmett • Ivor Daniel • Kevin Lloyd • Mthuli Msimang
• Nina Saunders • Deborah Whelan • Editor Walter Peters • Assistant Janet Whelan • Design Maria Criticos
Published by the KwaZulu-Natal Institute for Architecture, 160 Bulwer Road, Glenwood, Durban 4001
Telephone: (031) 201-7590 • Fax: (031) 201-7586 • E-mail: kznia@telkomsa.net • Website: www.kznia.org.za
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This journal, now in its
36th year of publication,
has since inception been
sponsored by Corobrik.



KwaZulu-Natal Institute for Architecture— INAUGURATION OF KZ-NIA-PRESIDENT 2011-12



On Thursday evening, 12th May Nina Saunders was inaugurated as KZ-NIA-President for 2011-12, an opportunity which the Institute also took to honour individuals for their services to the profession. The event was given special significance with an exhibition of the works of the 1950s by Crofton & Benjamin and the concomitant attendance of Issy Benjamin, aged 85, who had arrived from London to present a reflection on the decade.

For the first time in its history of the Institute scrolls of honour were presented to non-architects. Michele Jacobs, Technical Librarian of the Barrie Biermann Architecture Library at the University of Natal/KwaZulu-Natal received a scroll "in recognition of her helpful assistance to members of the KZ-NIA, the initiatives in rearranging the library for optimal service delivery, and for the curatorship of historical architectural drawings of KwaZulu-Natal", and Derek Wang, retired associate professor, for the "intellectual input he made to architectural education at the

KZNIA-President Nina Saunders delivering her inaugural address *In Praise of Slowness*. Like fast food and its opposite, slow food, she punted for an architecture of reflection, one which understands the impact buildings have on people and on the planet, and reminded members that theirs was not a profession but a passion.



University of Natal/KwaZulu-Natal over three decades, for insisting on the distinction between design principles and details, and the indelible advice of first finding north".

A scroll of honour was awarded posthumously to Derek Crofton (1924-1981), partner in the practice Crofton & Benjamin, in recognition of the "enduring architectural legacy of the practice, 1952-64, an inspiration to generations of Durban architects" and Honorary Life Membership was bestowed on Isaac (Issy) Benjamin "for providing the Institute with its own architects' architect". The concomitant laudation summed up the achievement of the practice: "It is not often that architects can agree

on the merits of any particular building and seldom that within a single decade a practice could set an oeuvre so adventurous and yet so carefully thought out as to catch the eye and raise the spirit. Yet successive generations of Durban architects still refer to the works of Crofton & Benjamin as the examples for emulation".

In conclusion, a scroll of honour was presented to member Walter Peters "with profound respect [and] in recognition of his unstinting service to the profession over many years".

On Friday at noon, Issy Benjamin presented the lecture *Intelligent Design* to a full audience at UKZN in which he reflected on many of his life's experiences and the works of the practice in Durban.



On a tour of buildings by Crofton & Benjamin, from left Leon Conradie, Nina Saunders, Issy Benjamin and Bharti Vithal, KZNIA-Vice-President, on the podium of Las Vegas. FAR LEFT: Nina Saunders with Derek Wang holding his scroll of honour. LEFT: Nina Saunders with Michele Jacobs and Walter Peters, recipients of Scrolls of Honour.

All photography by Roy Reed Photography



Front: Issy Benjamin and Jenny Bonsignor, daughter of the late Derek Crofton who accepted the scroll of honour in memory of her father. At back: Institute Past-Presidents Brian Johnson, Rodney Harber and Ivor Daniel, incumbent President Nina Saunders, Patricia Emmett and immediate Past-President, Miles Pennington. BELOW: In the foreground from left, Kevin Bingham, Peter Kidger, Corobrik Director of Sales, and Gary Short; in the background a part of the exhibition on the work of Crofton & Benjamin, researched by Leon Conradie and curated by Angela Shaw and Stefan Mostert with photographs by Dennis Guichard.



Jane and Peter du Trevou, Corobrik Chairman.



Editorial

Environmentally Responsible Design

Principles of sustainable design

Sustainable Building, Green Design, Eco Friendly, Zero Carbon, Net Zero are all terms synonymous with the principle of responsible environmental design, and yet the terms can mean so many different things to different people. To the purists, these terms do in fact mean very different things in terms of the World Green Building Council and are interpreted with degrees of local flavour in many countries.

One theory suggests that "we produce what we think about" and it saddens me that we see too little of the really well designed and obviously well informed projects in the mainstream. The industry is changing slowly, but that is the nature of the construction business.

To the purists in sustainable living, stemming from the 1970s revolutionary model, many good examples of sustainability have been showcased but they came with an unfortunate image of "hippies" and "gypsies". The movements such as the Kibbutz and The Global Ecovillage Network developed the idea of permaculture and living off the land, within the confines of the community. These developments involved only a limited number of people and the rest of the planet should be informed that we have overstepped the mark and are heading for problems as a direct result of overpopulation.

The history of architecture can also teach us some lessons in design terms where those long lasting public buildings and religious edifices were well planned and well built to last hundreds of years, as opposed to the modern movement of consumerism and the relatively short term life spans of many modern buildings. The first millennium was the era of religious thought, with the second the age of science and logic, and the third is thought to be the age of the person and the environment. They are inextricably linked because we have

On graduating at Natal in 1988, Bruce Clark gained experience with Stauch Vorster before embarking on his own practice in 1991 as Bruce Clark Associated Architects. His interest in energy efficient and sustainable design emerged during his term as KZNIA-President (2004-06) while representing SAIA at a conference in Rotterdam (see his article "Sustainability of All – or Nothing" in KZ-NIA Journal 2/2006).

used our knowledge of science by largely ignoring the religious order of the past, and promoted the idea of 'beating the force of nature'. We have almost succeeded and are seemingly still trying our best to win the fight. The environment is being challenged by our continued abuse of the systems around us and we will soon start paying the price. As architects and designers, we should be leading the way in creating a case for the "thinking" to change towards a mainstream educated fraternity to lead the way and convince clients, local authorities and investors that there is no alternative. We should be doing this in a way that we beat the new regulatory requirements convincingly and continually make improvements in what we produce, leaving a legacy of well built, long lasting buildings, that are flexible and require little in the way of resources to run. This is after all, what was achieved before we had electricity, over a hundred years ago. Some people say we have progressed.

In order to combat the reliance we now have on power, delivered resources such as water and waste disposal of sewers, storm water and solid waste, we have to become more aware of what we use, to manage a slow and determined change to *use less, re-use more* and *recycle* everything once the first two options have been exhausted. We can then start making sense of the resources we have until finally we can produce more valuable materials from the waste stream. The ability to achieve this is real and promoted through a book titled *Cradle to Cradle* by William McDonough and Michael Braungart.

Following are some quips from real experiences and how these were materialized and what can be done now to improve from here.

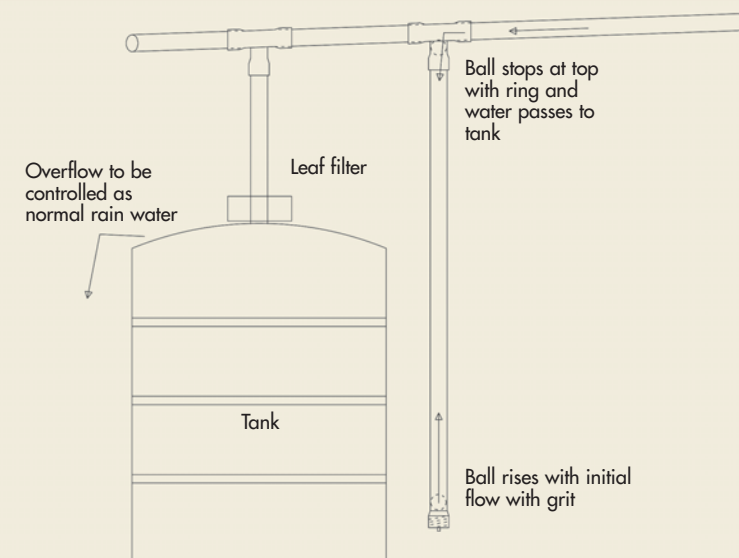
Water harvesting

In an area like Durban and many parts of the province of KwaZulu-Natal, we have a reasonably consistent rainfall pattern resulting in at least some rain each month. Rainfall of more than 1000mm falls in Durban over a 12 month period and this can convert into a fair amount of water for re-use. As a rule of thumb, up to 80% of the water can be collected and one can easily calculate that the quantity based on 1mm of rain falling on 1sqm of roof will result in 800ml of water. For a 100sqm roof in Durban, this will be 80 000 litres over the year, collected in tanks placed for maximum

retention in the heavy rainfall months, to be used in the drier winter months. With the cost of water rising and new sewer levies being imposed, water is costing nearly R15 for a 1000 litres. A worrying report by the engineering profession has rated our water supply in South Africa as being under risk and we should be looking at this resource more seriously. Pay back periods are relatively short for water harvesting and make sense from many points of view.

In creating storage for water, there are a few pitfalls to be addressed such as filtration of the initial waste off the collection surfaces into sacrificial pipes or by-pass systems to allow the initial flow to be re-directed to waste before entering the tank. (see illustration) In Australia there are devices which are sold and marketed as a 'First Flush' and some local shops have stocked these here in SA.

Grey water is created from waste water from washing clothes, dishes and washing hands in basins, but water from toilets and showers is considered to be black water while road surface water is considered something in between, because of fuel and other contaminants. Each requires a separate method of treatment depending on what the stored water will be used for. Grey water treatment can be done naturally in reed beds and using nature to cleanse and filter the water if you have the space, or you can use the technological advances to do this in confined spaces and urban areas, but you require power for the pumps and aerators. These pumps are small and can be justified based on the amount of power consumed purifying the municipal water delivered to you instead. This makes waterless urinals a good option where we *use less*, and water harvesting and grey water positive because we are *re-using* and if we utilize ultraviolet light filters, we can *recycle* the water to drinking quality again. This last point is what is meant in the book referred to earlier where the value of the goods are not always "down cycled" but rather improved.

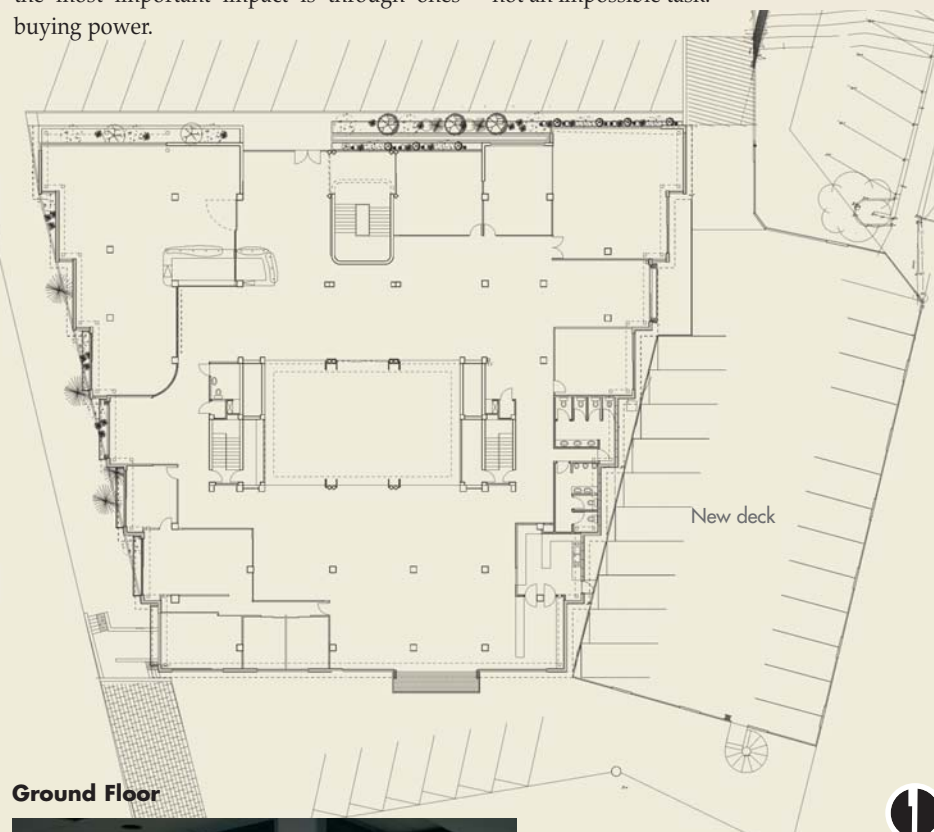


Environmentally Responsible Design

Retrofitting MBA, Westville

THE MASTER BUILDERS' Association (MBA) embarked on their project in response to the concerns expressed by members wanting to know more about the "Sustainability of Buildings" being featured in the media and on the minds of many developers and consultants. This was also at the time South Africa was suffering under Eskom's load shedding programme. The MBA was considering installing a generator and the CEO was of the impression that there may be a better way to combat the problems and also show the industry how to improve its operations in terms of energy use and production, waste recycling, water management and design aspects to name a few. People are often concerned that one individual's impact is futile but the changes show that this is not the case and each person can make a difference by changing habits. Small changes by one person can influence change in others and that is when it really shows. Collectively the most important impact is through ones buying power.

The project focus areas were the rejuvenation of the ground floor which had for many years served as a permanent exhibition of building products. The area was served only by upper level fanlights, many of which were blocked by the displays forcing the area to rely on artificial lighting and ventilation for the visitors and users. The old exhibits were to be gutted and where possible the materials recycled or donated for re-use. A new arrangement of offices and meetings spaces on the ground floor was deemed necessary to make services more accessible. To supplement these new venues, a new kitchen and additional ablutions facilities were required. Parking was also a problem and a new deck was to be planned. Planting in the building, shading devices and water harvesting were to be included and renewable energy was to be created for the staff of the MBA offices and the meeting venues. In the specifications, suppliers and local sustainable products were selected where possible, showing that this is not an impossible task.



Ground Floor



Most of the work was to be carried out in accordance with the South African Green Star programme for measuring green buildings in South Africa and all products used, services from suppliers, the documentation process and management of the project were all considered whereby scrutiny of the documents was seen as a benefit to people wanting to learn from the process.

Green Building Council of South Africa

A 'green' building is one that has achieved a Green Star rating from GBCSA. To achieve such a rating, a building must earn credits in the following nine environmental categories: management, indoor environmental quality, energy, water, transport, materials, emissions, land use and ecology and innovation. To get a Green Star rating, the building project must achieve an overall score of 45.

A meeting was held with the staff of all the tenants in the four storey building and everyone was taken through an induction on the aspects of greening an existing building from the management of waste to the types of cleaning materials to be used after completion. That process was interesting as many people provided input and most of the changes that were necessary were actually seen as a benefit.

Parking facilities at the MBA have been stretched to capacity for many years and when functions took place, many people had to park far from the building or run the risk of being fined by parking in unmarked bays on verges and pavements. A new deck was required and only part of the site could be covered, restricting the number of bays that were originally thought possible. This was realized during the plan approval process due to part of the site having been purchased a few years earlier, under differing conditions. Steel was selected as a material choice to enable eventual dismantling and recycling but proved to be too expensive and timing was thought to be a problem too. In the end, a concrete deck with 30 per cent less cement content in the design was seen as favorable and the reduced costs resulted in the client opting for this solution. While the deck provides more parking, it now covers the original bays at ground level and will therefore also cool the lower level of the complex on the east. Light wells were created by separating the deck from the existing building to prevent these areas from being left in the dark and without the necessary air flow to naturally ventilate the spaces. The deck is left as off-shutter concrete to save on unnecessary finishes.

Air-conditioning

An existing air-conditioning system on the ground floor necessitated power being used to run the system for the entire floor, even if one person was working there as the layout was enclosed for the exhibition spaces. Part of the greening process was carried out by installing smaller units for each of the meeting spaces and doing away with the need for the full ducted system. Large openings were created in the external precast concrete panels forming

the external envelope to create more daylight and create opportunities for naturally ventilating the entire level. Fortunately the building already had a central atrium and all that was needed was to remove the walls and create openable panels to get the air to flow. This required new doors on the ground level and industrial style "Turbo Vent" ventilators in the acrylic roof light. The upper levels to the atrium, where the office passages and ablutions are accessed from the main stairs, allowed the removal of the windows to these areas, thus creating direct access to the new plants in the planter boxes and the free flow of air in the atrium. Certain internal air conditioning units used to feed their exhaust air into that void and these were removed and replaced with a more energy efficient VRV system. The internal courtyard is now free of hot exhaust air and it is rewarding to see that windows are being opened to enjoy the fresh air.

Interiors

Ceilings on the ground floor had been installed when the building was built and a consideration of having these refurbished by being painted with a low Volatile Organic Compound (VOC) paint and reused, proved difficult as these had become brittle and unfortunately as much as 70 per cent had to be replaced, by a supplier with at least an ISO 14001 accreditation. The original floor had been finished in all sorts of products having been used as part of the displays with the main passages in old encaustic tiles. All loose tiles were removed, screeds leveled and a new epoxy finish was applied over most of the area creating a very easy cleaning regime similar to that of a supermarket, using no chemicals. All offices and meeting rooms received sisal carpets (claimed 15 year life) from a local source and the exhibition space was fitted with solid bamboo flooring in the high traffic zone, for both interest and longevity. Boundaries to the offices and the central areas were mostly made up of full height glass and aluminium screens with louvers at the top, to allow light through to the main central areas and still allow ventilation to pass through. Exhibits of

the building systems, the energy being produced and used, weather conditions, "green" product suppliers, a restaurant and shop will all co-exist on the ground floor to provide information to visitors and members of the MBA.

Roof

Greening the roof with planting was an interesting process as we found a supplier who had been carrying out an experiment with the eThekweni Municipality using a very shallow recycled plastic container system. The shallow trays allow a more standard loading criteria to be used to create a green roof as opposed to the normal heavy load of a 300mm depth or more. An alternative standard wooden box arrangement was set adjacent to this and the two will be monitored over time while they provide food for the restaurant and shade to the concrete podium below, further reducing the need for artificial cooling of the building. Other planting in and around the building will soon be seen as it grows and this is in order to have the planted areas increased and rendered more accessible. Cleaner air will result and the plants will be maintained on a more regular basis.

Electricity

Creating electricity from the sun and the wind has been done before but not on this scale in Durban. An array of 12x230 watt photovoltaic panels were installed on the sloping glass section on the façade and a pair of 1kW wind turbines were erected on the roof set at 6 metres above the top of the building. These have been spinning away generating power to charge the batteries that are then used to power a series of 4 inverters to convert the 24 volts to 220 volts at 50 hertz, the normal power supply in South Africa. This electricity is planned to run all the computers in the MBA offices (40-50 computers), emergency LED lights in the passages and ablutions, with the data projectors in the meeting rooms, each day of the week. A small gas turbine will keep all the batteries charged and run small air conditioning units in the meetings rooms which are guaranteed to not be affected during power outages. The power output is 12kWh from the inverters and a day and a half back-up in the event of a power failure.



Rainwater harvesting has been carried out in an attempt to cut the water usage by a third, supplying 20 000 litres of rain water supplemented by 700 litres of grey water each day served from the basins and sinks in the building. All toilets were fitted with dual flush units retrofitted without having to replace the cisterns, waterless urinals fitted and the necessary plumbing reticulation altered. We have had teething problems and adding filters and having to carefully monitor the water quality all contribute to the maintenance of the building. The roof required some modification to create better falls and to raise full bores to encourage water to flow to collection points. A filtering system was required to flush the pipes and prevent dirt entering the system. Rain water harvesting is not a straight forward task and getting help from someone with experience in this is essential.

Bruce Clark

Client: Master Builders Association KwaZulu Natal (CEO Brandon Abdinor)

Architects: Bruce Clark Associate Architects cc. (Bruce Clark, Senzo Shangase)

Structural Engineers: ARUP (Adhir Imrith)

Quantity Surveyors: Leigh-Hunt Louis Wanless (William Connie)

Electrical Engineers: Iboya Consulting Engineers (Duncan Hill)

Land Surveyor: Richard Logan

Contractor: LVE Construction (Bruce Luyt)

Air conditioning: Cool Comfort; Landscaping: Green Roof

Design; Solar hot water: Solar Beam; Renewable energy:

Divovatt; Grey water system: Clear Edge; Gas systems: D.G.

Gas; Shopfitting: Lloyds Living; Bamboo Floors Terragrini;

Carpets: Sisal by Rebtex, fitted by Leicester Floors; Epoxy

floors: Flowcrete installed by Seal Con; Plumbers: Plumbman;

Electrical: KZN Electrical

Readers are referred to NPJA Journal 4-1985 in which the newly built MBA was first published. - Editor





Environmentally Responsible Design

The Dalton Compound

DALTON PRIVATE RESERVE is in rural KwaZulu-Natal, 10km south-west of Wagondrift Dam, in the Estcourt area. In 2003 the Reserve's owner, Australian born Ian Gowrie-Smith, purchased a neglected cattle farm as a private trout fishing retreat and the Dalton Trust was founded. The Trust quickly broadened its vision to create what is now a 3000-hectare reserve that has been restored to indigenous flora and fauna and is integral to the well-being of neighbouring communities.

Background

Over the years six neighbouring cattle farms were purchased and their internal fences removed and external perimeters upgraded. The first property purchased, Dalton farm, was deserted and used for grazing and building materials by neighbours. Buildings were

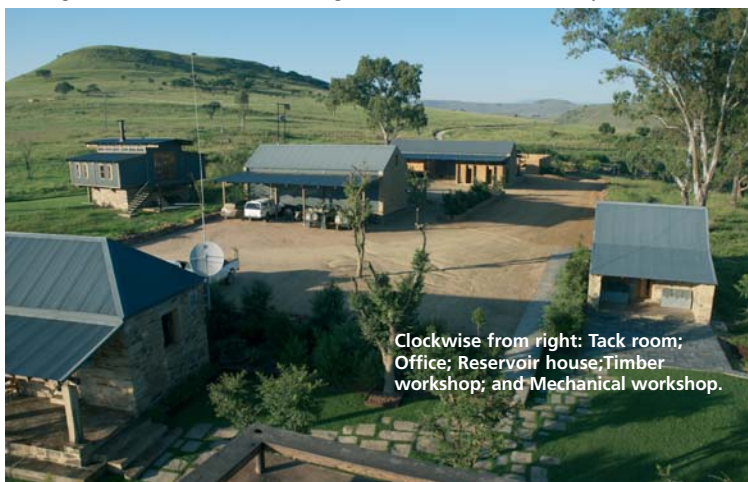
dilapidated, and the excessive grazing and poorly planned road and drainage systems had resulted in severe erosion.

Early interventions by the Trust were infrastructural and stabilised this degenerating landscape. Roads were re-aligned, angles of repose smoothed and vegetated to minimise erosion and the impact of bare surface on the environment. Watercourses were defined and stabilised. Buildings were made habitable by

re-roofing old stone structures. Once a basic level of function had been achieved for administrative amenity and basic staff accommodation, more strategic initiatives were undertaken.

Flora and fauna

A programme to remove alien vegetation included training a team and buying the machinery to clear wattle, poplar and gum plantations from grasslands and river courses. This timber is dried in a solar kiln built by the Trust and used for architectural components required on the property. A carpentry team was trained to make furniture, the sales of which sustain their employment. Dalton propagates endemic trees, shrubs and grasses and uses them in the rehabilitation of land cleared of alien invader vegetation.



Clockwise from right: Tack room; Office; Reservoir house; Timber workshop; and Mechanical workshop.

Food security

An objective of the Trust is to re-introduce subsistence and sustainable food-production to the property and encourage employees to do the same within their communities. An extensive vegetable garden and orchard has been established in the Compound and pigs, ducks, chicken and geese are raised to feed staff and paying guests. All game meat that is culled or dies naturally is processed for eating.

People

The demands of full environmental rehabilitation at this scale required a significant human resource which was supplied by the neighbouring communities of Ezindikini, Mhubheni and Dalton Bridge.

At the peak of infrastructural development and building 200 people from the region were employed by the Trust. Most were unskilled, and skills development programmes and the mentorship of those who excelled were undertaken. As the development phase is tailing off the Trust has redirected its efforts towards community upliftment with the Dalton Education Trust, investing in infrastructure and training of community members for Early Childhood Development.

Architectural performance

Architectural development was focussed on areas previously inhabited on the farms, minimising the need for infrastructural expansion. Two areas were identified – the Compound and Clipstone.

The Compound is the operational centre of the Reserve and is built on the site of the original homestead and ancillary buildings of Dalton farm.

The staff and management accommodation were established on Clipstone farm using the foundations of existing buildings and constructing new amenities where required. In both areas new buildings were sited to enforce an urban form and enhance the functional space.

The ongoing refinement of methodology, openness to, and scrutiny of, ideas is a testimony to the Dalton management team in the development years. Plans evolved as more was learned. Decisions were made to allow for change, rather than being prohibitive and ultimately wasteful or unsustainable.

Buildings are flexible and part of a holistic system as opposed to being singular and definitive in their use. For example, a small stone shed of 24sqm, built in 1905 and re-roofed was the first tool and machine storage room. As carpentry and steel fabrication machinery was purchased it became the workshop. A lean-to was erected to shelter the outdoor work area and the space was used to make and repair furniture, property gates, braais or for parking tractors.



Barn with tower.

Since then it has become a horse tack room, the lean-to removed and slate laid on the floor. Plans are to develop it into a wildlife information centre for visitors, part of the public interface and educational programme now evolving on the Reserve.

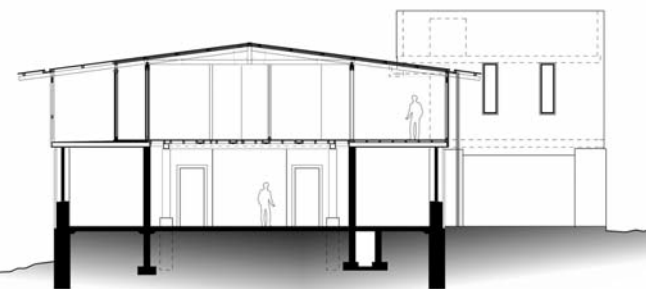
Paying guests staying in the luxury accommodation contribute to income generated and reinvested in the sustainability of the project. The compound needs to deliver on the demands of Reserve operations and those of high-end hospitality visitors. The standards expected by the owner, a listed *Fortune 500* businessman, and the paying guests are six star. Buildings must be highly functional and utilitarian, while also accommodating guests in luxury and exclusivity.

The Compound

The Compound consists of:

- two work sheds, one for carpentry and the other for welding, mechanical repairs and tool storage;
- a central administrative block with three management offices;
- the Reservoir House, management accommodation;
- the Horse Tack room, described above;
- the Barn, utilitarian ground floor for meetings, stores, laundry services and industrial kitchen, and upper floor luxury accommodation for the owner and paying guests; and
- the garden.

Over and above the need to design habitable environments with a spatial hierarchy that responds to the climate and environment, the brief for architectural design in the Compound was made up of five criteria:

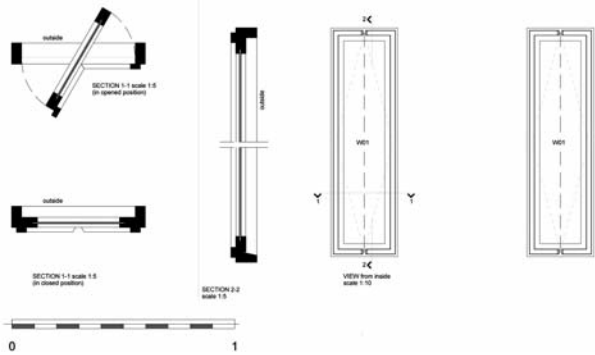


First Floor



Ground Floor





Custom-designed joinery: Top—Pivot window. Below—Bay window

Right, Barn interior—
Top to bottom:
Kitchen; Master
bedroom; Hearth.



- wherever possible building materials to be resourced from the property;
- and the buildings to be delivered by employees of the Trust. "Design it so we can build it" was our motto;
- stick to conventional built form;
- use previously inhabited sites; and
- only build once. The construction method should not require finishing by follow-on trades. This promotes a structural and material honesty and ensures the vision for the development is kept within a small team.

Placemaking

Locating the Compound on the site of the old homestead was logical due to existing access and services routes plus the value of remaining structures. On further appraisal it was interesting (but unsurprising) to discover that the location of the old homestead best suited local climatic conditions. Limiting building footprints to existing foundations and platforms became a generator of the urban plan.

The Compound accommodates functions necessary for the management and operation of a large wilderness reserve. There is also a manager's flat and luxurious accommodation for the owner and paying guests to the Reserve. Overlapping the function of operations and hospitality required a defined spatial structure, an almost urban multifunctional approach in a rural context; a village. Where additional accommodation was required, new buildings were erected to enforce the urban plan.

The compound is divided into two functional zones:

- Reserve management with workshops, vehicle and machine stores, staff ablutions, muster points etc; and
- Accommodation for paying guests or the owner (Barn upper level) and a small management flat (Reservoir House).

Administrative areas are the buffer between the two conflicting functions. The office block and horse tack room provide a spatial barrier and the solid lower level of the barn houses day toilets, laundry, bulk kitchen and hospitality stores.

The barn tower, elevated and solid provides a landmark to the main public area/square. The main access road winds through the Compound, revealing a series of spaces defined by the buildings opening onto them. Building works started in 2004 and the Barn, the final building established in the Compound, was delivered in July 2008.

Landscape is designed to define the Compound from the wilderness of the Reserve. There is a subtle domestication and formalisation of nature.

Conventional built form

The building design was intentionally conventional allowing those on the construction team to understand what they were working towards. The "architecture" does not overwhelm the project in order to be the contrived hero in the equation but rather fits appro-

priately into the whole.

In terms of architectural language, inspiration was drawn from pioneering settler architecture. Wattle and daub houses and prefabricated imported housing kits were used by early farmers in rural KwaZulu-Natal. Masonry structures (brick and stone) are conventional and effective building forms that were utilised to provide solid structure, permanence, identity and thermal performance.

In the Compound architecture the combination of stone and brick masonry with light-weight timber frames gives a sense of solidity and permanence. Both accommodation facilities are raised on stone plinths, providing privacy and elevated views away from the active common spaces. Security is subtle and integral to the solid design, as were the urban palaces of the Renaissance, with rusticated fortified bases and lighter, private spaces above.



Mechanical workshop and roof detail inset.



Reservoir house and joiery detail inset.

Methodology

The endeavour to build outside of the established construction industry catalysed innovation on many levels. Construction methodology relied, rather, on a structural timber & steel frame system designed by Koop and evolved in the project.

Design it so we can make it. The structural system developed on this project is easy to construct and assemble, and can just as easily be repeated and implemented in other projects, in other places, using the same materials sourced there. The system is a definitive aspect of the experience of the architecture and is fundamental to the aesthetic.

The system was designed using steel gusset plate connectors, bolts and timber. Structures were intentionally slender, minimising the amount of timber used. The steel gusset plates (L-Web Brackets) braced the structure and allowed spans to increase. The result is gracious, slender timber structures. Limited skill meant that a simple, repetitive and flexible system with few elements was favoured over complex joinery. The reward to the builder is almost immediate and engenders a culture of fine craftsmanship.

This system was used across buildings with differing appearances and functions within the Compound but facilitated a consistent design language across the range. Dalton's decision to

establish their own construction team, avoided the dogma of the construction industry and its tendency to intensive site activity at maximum impact to the environment. Although subcontractors were required for wet trade and services they were compelled to fit into the culture of this team.

Resourcing materials from the property

A limited material palette was chosen. Timber planking took place where the trees were felled. A maximum section of 200 x 200mm was achievable, creating slender components. Sections of 30mm, 40mm and 60mm were cut, stacked and air-dried. A design for a solar kiln was sourced on the Internet and this proved to be highly effective in drying gum. The timber returns to ambient temperature at night allowing gradual drying, cellular stability of the material and planks that are less prone to cracking and twisting.

Recycled stone and raw plastered brickwork sealed with linseed oil form the other structural components. Steel connecting elements were often fabricated on site.

Build it once. The points of connection in the structural system intentionally expose timber framing and provide the aesthetic of the architecture. Pre-painted panels clad the interior walls while colour-bonded steel sheeting is the external cladding. Both finishes

eliminate the tendency of follow-on trades to cover up ill-considered work.

Specialist design. While the majority of the structures needed to be simple and repeatable there were aspects of the finishing that were highly customised. The project required the full scope of Koop's capabilities, a holistic consideration of architectural design and building systems, plus high-end furniture and interior design.

The Barn luxury accommodation perfectly dovetails the robust structural system with the specialist one-off furnishing required by this client. The master bed is a solid walnut installation, from floor panelling that butts against the red gum floor, laid by the Dalton

construction team, through to the headboard wall accommodating tables, lighting, and mosquito curtain that draws outside of the bedside tables. All items including bed linen were designed and produced by Koop to deliver hospitality interiors that are high quality, avoid wastage and ensure sustainability and commercial viability. Other custom items include steel fireplaces, sofas and armchairs, all beds, dining tables, cabinets, wall storage, terrace furniture, the upstairs kitchen furniture etc. Similarly, technical components such as doors and windows were designed in Saligna with lapped joints and laminating to eliminate the tendency of the material to twist and crack.

The team trained to convert planks into building components in the carpentry workshop later assembled these kits in the buildings. The demands of accuracy were high and the strict rules of consistency and discipline in carpentry were learned. As the demands of construction grew in terms of finish and complexity, so did their skill. They are now manufacturing fine furniture from the same planks in the same workshop. They have completed various commissioned furniture projects recently and produce an ongoing standard range of chairs and tables, designed and marketed by Koop.

Richard Stretton

Client *The Dalton Trust*
Architect: *Koop Design (Richard Stretton)*
Landscape Design: *Sonja Swanepoel*
Structural Engineering Adviser: *Louis van Loon*

Dalton Compound won the Afrisam-SAIA Award for Sustainable Architecture in 2010 –Editor

Environmentally Responsible Design

Green Hub, uMngeni River Estuary



Photo: Tony Smith Photography



central veranda makes more of the two small enclosed spaces (office on the west and WC on the east), and enables all-weather children's theatre and demonstrations of sustainable-living gadgets, many of which are built into the Hub. We'd love to see the addition of a coffee bar within the veranda space!

Passive architectural design informed the elongated north-facing plan with narrow room widths improving cross-ventilation and daylighting. The unifying roof harvests rainwater in tanks at both ends for watering the surrounding landscaping (species endemic to coastal and riverine eThekweni conditions). Materials were selected, as far as possible, for their low embodied energy. Fittings within the office space were designed by Koop

THE BRIEF FOR THE GREEN HUB came in February 2010 from the eThekweni Municipality's Environmental Planning & Climate Protection Department (EPCPD) who wanted space for eco-tourism bookings, birding and nature tour guides, river rangers and their canoes, dispensing brochures on local flora and fauna, environmental displays, children's theatre, and facilities for four staff. Simultaneously, the Parks Department requested a new permanent public ablutions block in the area. In line with the building's principal function, the architecture had to demonstrate environmentally-friendly construction and operations as advocated by the EPCPD Green Guides.¹ Handover was expected five months later!

The building responds to harsh contextual factors atypically, remaining unfenced, and merging with the park and its users. The

Design and manufactured from cleared alien red gum trees by the Dalton Trust.

The Green Hub generates its own power from 12x224w solar modules, a 3000w inverter and charge controller, and energy stored in 15x125Ah batteries which are visible within the Hub. This on-site solar plant provides an estimated 16kwh of energy per day needed for the building but at a whopping R180 000, its roll-out beyond a demonstration function, has questionable affordability at this stage. (For comparison, in a domestic context, a two plate electric stove would use 6-8kwh, and a 200litre electric water heater 12-4kwh per day.) The plant is backed up by a 60A single phase mains power supply.

LED light sources were used to reduce the operating load with 7w LED lamps lighting the veranda and 15w LED lamps in the Hub office. The internal LED fittings are controlled by



occupancy sensors (users jump around to turn on the lights) and the external LED light fittings are on photo-electric cells. All power points, including those for desktop computers are powered off the solar power plant.

The building's success is in wearing its photovoltaic panel, LEDs and water tanks with all the hope and vulnerability of a young cyclist's training wheels, and in articulating the change its function desires within society.

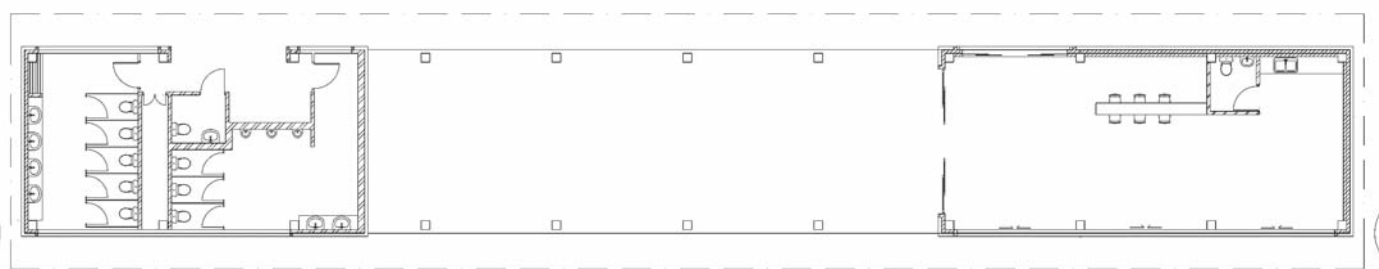
The Green Hub is currently managed by the Municipality's Green Corridor² project and is open to the public every day during working hours.

Laura Hunt

Architects: eThekweni Municipality Architecture Department [Laura Hunt, Sandy Naiker and Craig Hardman (landscaping)]

References

1. The Green Guides are online at <http://www.durban.gov.za/durban/services/epcpd/documents> [accessed March 2011] or available in hardcopy from the Green Hub.
2. Details of the Durban Green Corridor Project aims to connect the Blue Lagoon with Inanda Dam and Shongweni Dam, creating over 100km of running and cycling trails, and eco-tourism opportunities for local communities, and ultimately connect to the source of the uMngeni River – More info online at <http://www.durbangreencorridor.co.za/>



Environmentally Responsible Design

Water Management Strategies

Social Facilities for Response! Housing Association at Shayamoya, Kokstad

Background

THE PROJECT HOUSES A variety of NGOs that offer a range of social services to both Shayamoya and broader Kokstad including:

- A small clinical facility for ARV roll out and general health care. It is anticipated that the facility will see between 75 and 100 patients a day.
- A 'Drop in Centre' for the aged. This is a day facility and is intended to provide social engagement opportunities for the older people of Shayamoya who are otherwise isolated by poverty, migrancy and the loss of a generation to HIV/AIDS.
- A pre-school for approximately 100 children between three and five years old.
- A Roman Catholic church for a general congregation of 250 and a 'Good Friday' congregation of 500.
- A Skills Development Centre that will train carpenters, bricklayers, plumbers and electricians in groups of 8 students per trade. Courses are typically 3-6 months in

duration.

- A commercial kitchen that can, a) cater for church and school based functions (weddings, funerals etc), b) store, prepare and package food from a variety of sources for distribution to local families in need, c) train future chefs and nutritionists, and d) provide general 'kitchen services' to the centre.
- Administration including offices, meeting rooms, training spaces, storage and ablutions.
- Community food production and vegetable gardening.

Water Strategy

Research that we had done during work on the nearby Seven Fountains Primary School (see KZ-NIA Journal 2/2006) introduced us to some of the issues prevailing in Shayamoya.

Our approach was to reduce, as far as possible within budgetary constraints, the burden of the cost of utilities for the end users by:

- Orienting buildings toward north and reducing the depth of most spaces to maximise natural light during working hours and hence reduce reliance on electric lighting.

- Insulating cavity walls with 50mm Isoboard (closed cell foam) and ceilings with 100mm Thermguard (shredded newspaper) to achieve better thermal performance and hence reduce reliance on electric or other heating devices.

- Implementing a comprehensive water conservation programme that harvests rainwater firstly from roofs for toilet flushing, cleansing and gardening and secondly from surface paved areas for use on vegetable gardens.

Able advised by Craig Laing and Jack Emerton of ARUP, we opted for a centralised layout of water harvesting and storage rather than the more typical dispersed local tanks on separate buildings. We investigated using a large underground storage cistern but settled for a 'tank farm' instead – essentially a number of interconnected JoJo tanks, partially above ground, fenced, but visible. All roof water is piped to the first tank farm comprising 20x5500 litre tanks (110KI). Water is pumped from here to 3x5000 litre elevated tanks using locally available



electric pumps and pressure switches. These header tanks gravity feed all toilets, garden standpipes and selected outlets around the scheme and outlets are clearly labelled as 'non-potable'. A fourth header tank is connected to the municipal mains supply and secures at least one week's supply of water for drinking and cooking. Surface run-off water from paved roadways, courtyards and general garden areas is piped to a second 'tank farm' comprising 11x5500 litre tanks (82KI) for use directly on vegetable gardens on adjacent municipal owned land.

Proposals were made to utilise patent first-flush devices on all rainwater down-pipes to reduce silt build up in storage tanks, but these proved prohibitively expensive being largely imported. We opted instead for a central silt trap just before delivery to the tank farm.

The facilities are currently being occupied (March 2011) and Jack Emerton has undertaken to do regular testing of water as part of funded research – the results of which will inform future strategies.

Derek van Heerden – East Coast Architects





Architects a decade into independent practice

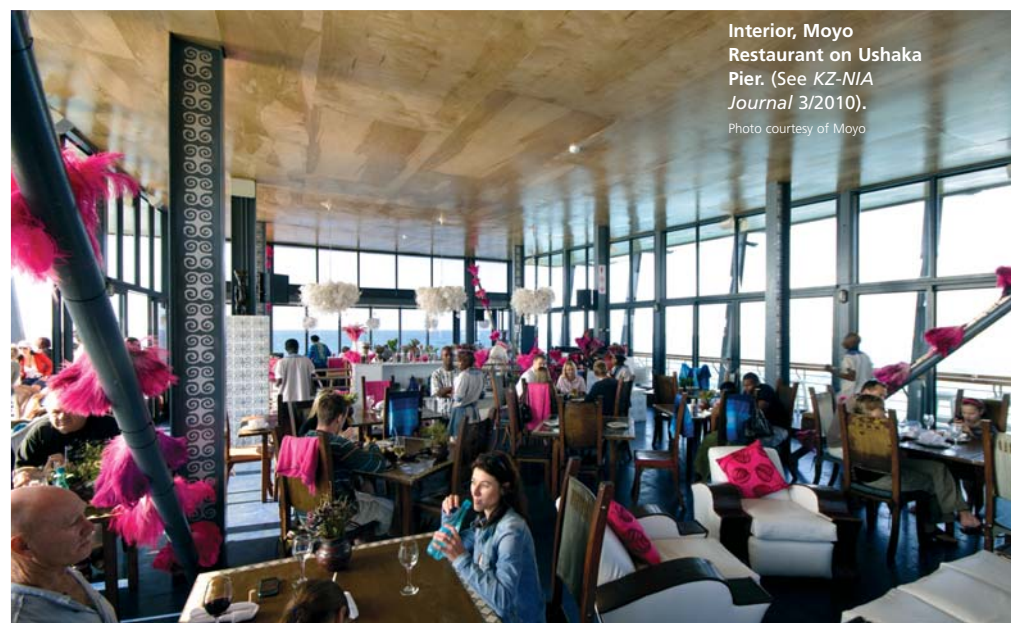
KOOP DESIGN

AFTER GRADUATING from Natal in 1993, I took a gap of two years in Australia and S.E. Asia. This time was not spent practising design. I realized that my interest in design was broader than architecture and felt that there was economic advantage in owning designs that could be sold, so the pursuit of product design followed.



On my return to South Africa I went in search of a project I could be involved in as opposed to a job. This led to a developer who had won a tender in partnership with the Manzengwenya community to build a lodge (above) on the shores of Lake Sibayi, see *KZ-NIA Journal* 2/1997. To kickstart the project it was decided to revamp an existing camp and get a feel of the place. After spending 18 months living on the shores of the lake, building with a community team and completing two small camps I returned to Durban. I was not asked to design the final lodge – maybe I went too bushy.

That project did, however, get me a lead to design a new Lodge at Lake St Lucia. Makakatana Bay Lodge (below) was designed



Interior, Moyo Restaurant on Ushaka Pier. (See *KZ-NIA Journal* 3/2010).
Photo courtesy of Moyo

and built at Charters Creek in 1998. At that stage I was doing small design-build projects including Crash Nightclub on Durban Station. There was a small design office, a slowly expanding workshop (in my mother's garage) and a small range of furniture products. The design of Makakatana was resolved using technology that was being employed in furniture design. Most of the building components were prefabricated in workshops in Durban and assembled on site – an interlocking prefabricated system. The design also flew in the face of the prevalent thatched lodges and had a butterfly roof, lots of glass and a contemporary aesthetic. It is still a successful lodge attracting mostly international guests.

In 1997 I identified the new KZ-NSA building, 166 Bulwer Rd, as a generator for the rejuvenation of Davenport and purchased a house opposite in Ferguson Road as a platform from which to engage with the marketplace. In 2000, the workshop was moved from the living room to premises on Gale Street and the shop, Koop, was opened. It operated as a gallery and showroom for Koop's range of contemporary Saligna furniture. A design office shared the space. It followed, from a customer visiting the shop in 2003, that Koop was appointed as the architects for Dalton Private Reserve (see pp 8–11), a project where all the experience of product design, alternative construction methodology, remote construction and working with semi and unskilled labour was called upon.

For a period of time a close association with Durban-based design and manufacturing company, Barrows, allowed me insight into the

commercial world of product design and invaluable lessons were learned there. Slowly the architectural projects became the primary focus at Koop and although furniture and interior projects hold an important place in the make-up of the practice, architecture is now the primary activity.

A major event in the history of Koop was being asked to design Moyo restaurant at uShaka Marine World. The directors of Moyo are visionary and brave business people who realized that the over defended nature of the design of the restaurant space that they occupied denied any contact with the beachfront. This resulted in a robust engagement with the city departments responsible for the upgrade of the beachfront and the establishment of a strong beach node at the foot of the uShaka pier. Work further up the promenade at Addington Beach node followed



"Linen fold" table.

"Twist" range of chairs.



and the principles established at uShaka were expanded. The World Cup also stimulated the final flourish at Moyo with the Pier Building being commissioned in October 2009 for completion by May 2010, see *KZ-NIA Journal* 3/2010.

The name Koop is a play on the Afrikaans term "to buy" (because it started as a shop) but the obvious association to "co-operate" is also important. One of the principles upheld in the office is that of co-operation. Much of the success of Addington node, the Moyo restau-

rant and Dalton reserve is due to strong co-operation between professionals, clients and contractors. The furniture is based on good relations with craftspeople and a deep understanding of the processes required for manufacture.

Design at Koop is focused firstly on a strong analysis of the projects' needs. This is done without preconception of the end result. In fact it is sometimes quite a cold process that alienates people who are looking first for aesthetic stimulation. Social needs of users, affected parties, builders, investors etc and environmental concerns (geographic, available materials and skills, place) are the primary areas of study and from this the solution is developed spatially and technologically in parallel. This generates the form and the final product is then refined. Very seldom is the image of the object a driver in the design process and most often it is a surprise in the end. In this way design is very process driven.

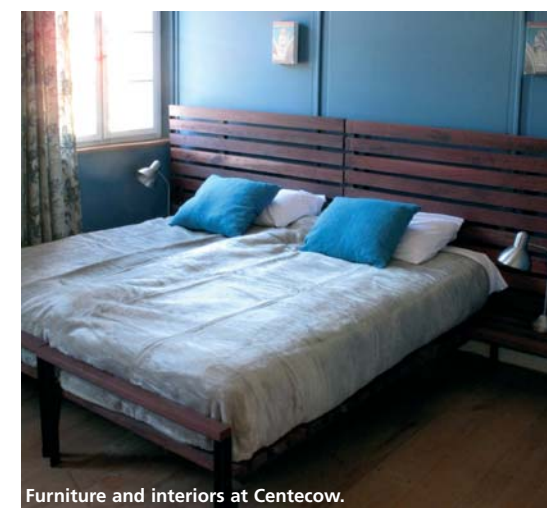
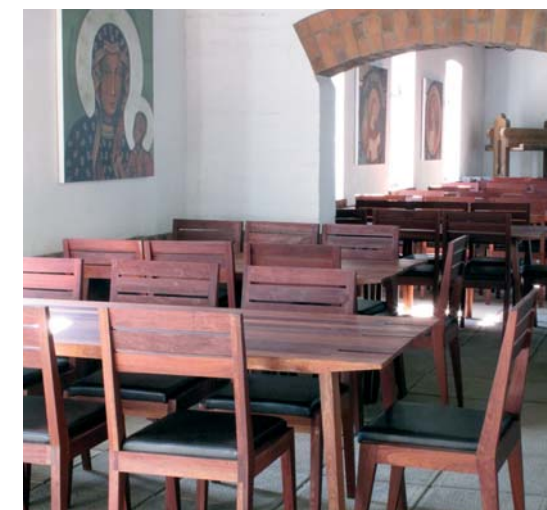
Product design and systems underpin the way in which furniture and architecture are delivered. Generally a structural system is refined which is the main generator of the form. The envelope is resolved in terms of available material, skill and technology as well as environmental and functional performance. So designing a sideboard is not much different from designing a building. Components of buildings (door and window systems, stairs, roof trusses and columns) are resolved in terms of the processes required to produce them and much of this relies on the same resources used in furniture design. The buildings of Dalton reserve are an arrangement of specialist designed components.



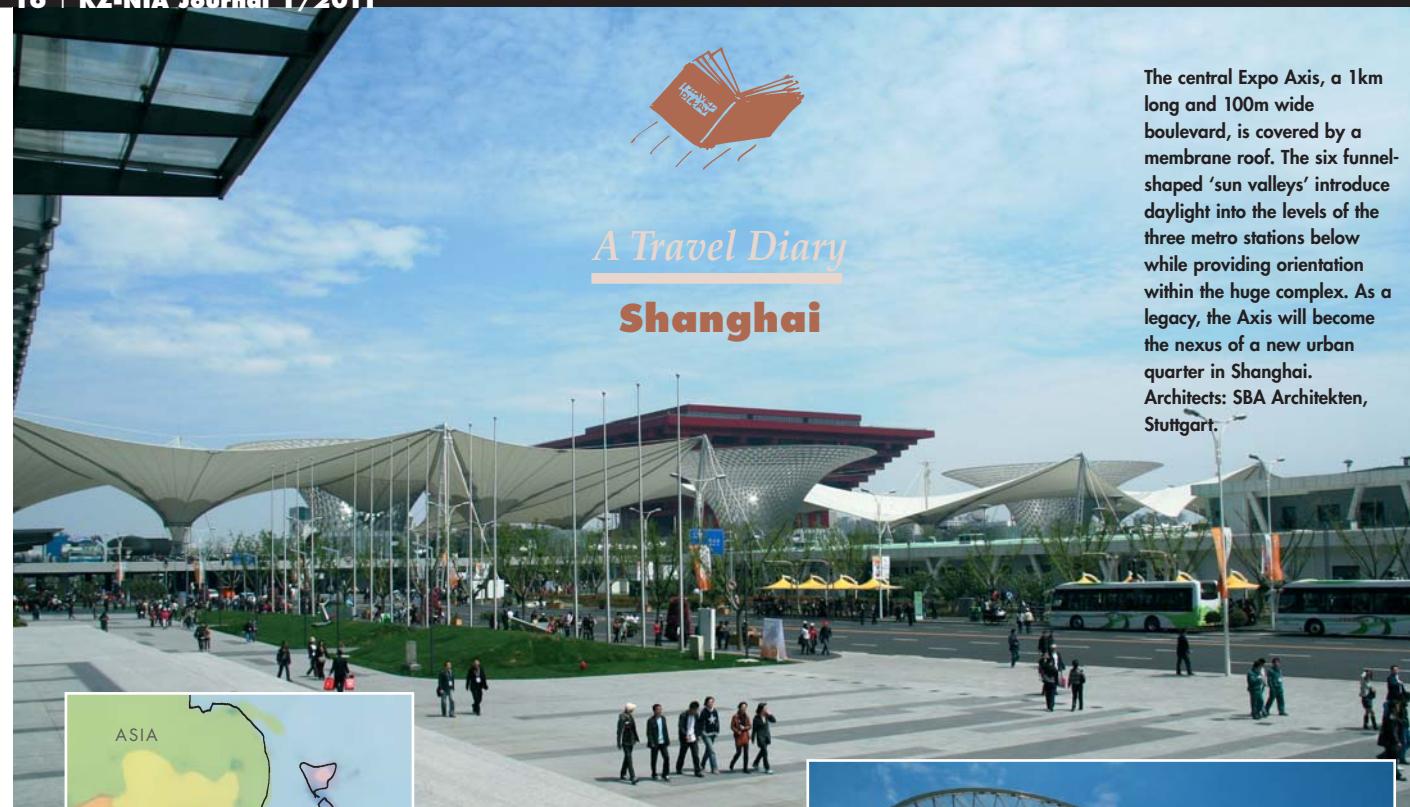
Chapel at Nottingham Road.

Koop is inspired by the architects who toil to get their contractors to think outside the box, who seek out interesting materials and develop new systems for their buildings, who are the first to know how each element of the building will be produced on site and guide their team to work in service of the end product and who use the economic process of development to benefit the environment (social, economic and geographic) in which they exist as much as possible. There is a big difference between architecture and building. Architecture is not the easiest or most profitable option but design, as a vocation, is understood at Koop to be more of an affliction than a job.

Richard Stretton



Furniture and interiors at Centecow.



A Travel Diary Shanghai

The central Expo Axis, a 1km long and 100m wide boulevard, is covered by a membrane roof. The six funnel-shaped 'sun valleys' introduce daylight into the levels of the three metro stations below while providing orientation within the huge complex. As a legacy, the Axis will become the nexus of a new urban quarter in Shanghai. Architects: SBA Architekten, Stuttgart.



The theme of sustainability was brought home when viewing the exhibits put forward by many of the guests to the Chinese soil and also many of the local portrayals, although lots of criticism was leveled against the organizers accusing them of green-washing and not being sustainable at all. Some of the positive things that I witnessed will be shared with you as there is always something to be learned from these combined efforts when many people are focused on the same end goals.

In 2010, the world was once again poised to meet in Shanghai, with 70 million visitors expected to visit the World Expo, themed, "Better City, Better Life".

I had arrived in Shanghai after a conference in Sydney and was in the city a few days before the official opening of the event on the 1st May. Instead of delaying my return home, I managed to persuade someone to pass up their opportunity to visit the fair for the test run by officials, workers, media and other special guests so felt rather privileged. On entering the 5,28km² site, and being one of nearly four hundred thousand people there for the day, it strikes you that China does not mess about when undertaking projects. Many people were displaced for the event (18000 families) and after all work was carried out, an amount of US\$45 billion was spent. All that for a 184-day event! Most of the exhibits of the 192 countries and 50 private companies were to be demolished and removed after the end of the show in October. The mascot, called "Haiboa" and pronounced as you see it, made me feel I was allowed to use this term often when I saw something that struck me as amazing or simply out of scale.



The frames of the structures were mostly made of steel, deemed easily recycled and where these were not coated, the process would be carried out with no fumes from burning off the paint first. The Australian, Chilean and Luxemburg pavilions were built with unfinished steel plate in order to be recycled in the easiest possible manner. A large amount of timber and glass was used as other main materials, and some of these in rather interesting ways to showcase the thinking and philosophy of the designers. A favorite was most certainly the Norwegian pavilion (left and below) with sweeping timber beams and columns, lightweight translucent roof and simple detailing.

The theme of screens and lightweight materials was used successfully by the Swedes,

Germans (right), Spanish, Swiss and French with new types of fabrics, new specially manufactured concretes and solar shading elements that produced their own lighting at night.

The site was more spectacular at night, and must have resulted in a fair amount of electricity being used to showcase all the features and entertainment on hand. I was encouraged by the extensive use of solar energy and self-sufficiency of certain pavilions, such as Saudi Arabia and Switzerland.

Vertical planting (below) was used extensively on the site with mesh screens and hanging plants in specially manufactured plant pots, set at a slight angle off the vertical to capture water when it rains but also to encourage the plants to hang and form interesting green walls to shade the facades.



Electric busses and golf carts were the exclusive forms of transport for the site with over 700000 passenger trips per day. The vehicles emit no fumes and are very quiet. It struck me that we should have used vehicles such as these during the World Cup as we managed to secure many shiny new busses that run on diesel instead.

Foster & Partners were commissioned to design the UAE Pavilion, which was a shiny, metal clad undulating roofed structure to simulate the desert sands, with clever use of roof lights to illuminate the interior. This was in stark contrast to the other more traditional structures of the neighbouring countries grouped together.



UAE Pavilion. Architects: Foster & Partners.



The most disappointing pavilion for me on the day was that of South Africa (right), as it resembled an incomplete shed, still being clad and having the outdoor shading elements still lying on the ground in a heap of metal components. We could not enter the structure but seeing the pavilion afterwards, I



was again disappointed as only Nelson Mandela and the World Cup featured. We have a lot to offer regarding the plight of the poor and how the government has intervened to



improve the lives of many. None of this was showcased from what I could see and it was a certain lost opportunity. I could not find information on who was responsible for the exhibit, designers or the theme, so I am afraid I cannot add value to the dull exhibit.

Shanghai is a city of some 18.5 million people and they are well positioned to host and protect the nearly three times the amount of

visitors over a six month period. On returning home, it saddened me to see that our brand new airport could not cope with a football match in the city that seats only 70 000 and we have a city of 4 million people. Something just does not stack up in this comparison, as only a few people arrived on the actual day of the event.

In the city of Shanghai, a place with many CBD type places, a building has been erected in pride of place near a park, with a 1:500 scale model of the city and it is used for the testing of new developments to check the physical, social and economic impacts. An impressive display is able to be viewed in both day and night modes, changing every few minutes and from three different floor levels.

The older parts of the city are quaint with a very strong

colonial influence in the main promenade alongside the river fronts. Food is able to be obtained on the streets and at the markets where one can buy dog meat, scorpions, snakes and many other delicacies. I can't tell you what any of them tasted like but the fruit looked safe and that did taste good.

Transport in and around the city is by taxi which is cheap and by train which is fast, at nearly 500 km per hour. We only travelled at 300 km/hr close to the city to visit Tongli, a 1000 year old water village which was really fascinating as most of the structures were built of wood and stone, still standing today. Makes us think hard about what we specify today in lightweight steel cladding and thin materials supplied from catalogues. The days of making things ourselves and increasing the life span of our building stock with good natural design concepts to start with will go a long way to saving our planet.

Bruce Clark