

earthworks

FOR A SUSTAINABLE BUILT ENVIRONMENT

ISSUE FOUR | OCTOBER - NOVEMBER 2011

RAMMED EARTH

A STANDARD TO BOLSTER
THE ANCIENT TECHNIQUE

MAMRE

A COMMUNITY RECLAIMS ITS HERITAGE

REDEFINING THIN SOLAR

INSIDE PROF VIMAN ALBERTS' LAB

A 360°
VIEW OF
DUBE
FROM CARBON
OFFSET TO
SETTING TRENDS

€29.95 INCL VAT



SPEED + EFFICIENCY

SANRAL FAST TRACKS ITS GREEN HQ

POLISHED CONCRETE | AGRI-VILLAGES | ENERGY SERVICES APPROACH

WORDS KERRY DIMMER RENDERINGS CN&V



SHOOTING FOR STARS

An ambitious plan to offset carbon emissions from the King Shaka Airport and meet future demand for a sustainable urban environment is taking shape in KwaZulu Natal's Dube TradePort, it's Dube City precinct and its biggest structure: the flagship 29th South building.

Social and business infrastructure design in South Africa has traditionally been dominated by archaic and foreign planning concepts. As a result we are left with some unfortunate architectural legacies that neither reflect the earthy and dynamic nature of Africa and its peoples, nor embrace its climate.

But that's all changing. With the introduction of the Green Star SA rating system, the focus is shifting to creating sustainable buildings. Precincts that have captured some green concepts include Menlyn Main, Melrose Arch and Umhlanga Ridge, but little compares to the scale of the 12-hectare site to be known as Dube City, set within the 2040-hectare Dube TradePort, when it comes to large developments.





It's one of the precincts that others may be measured against in the future. A part work, part play and part stay environment only 35 km from Durban, it is also going to be an important destination venue for international trade and business. As a free-standing vibrant city, Dube will be home to entertainment, hotel and retail outlets, the likes of which will change the way South Africans merge business with pleasure – similar in some ways to Century City in the Western Cape, but with an even sharper focus on sustainability from the outset.

Dube City is just one portion of a project that encompasses the Dube TradePort site and includes the already completed anchor, the King Shaka International Airport, with a cargo terminal, Agrizone and Tradezone to follow. Dube TradePort, owned by the KwaZulu Natal (KZN) provincial government, has already invested R1.8 billion in the area, and with a development budget this year of R530 million, the creation of a green icon is on track.

Right from the start, the CEO of Dube TradePort, Rohan Persad, emphasised that Dube City was to be a sustainable project. This presented an intriguing dilemma as Kate Ralfe, Dube TradePort's planning and environment executive outlines: "There is an obvious environmental impact from having an airport on site, particularly regarding the generation of carbon emissions.

"We felt that it was prudent, going forward with this development, to try to reduce and offset those emissions by the creation of an environmentally friendly precinct. We also considered that future tenants are going to be demanding this type of working space – it is, after all, something that's on the global agenda – so we've had to push all the boundaries around the sustainability aspect."

The resulting brief, and challenges for Dube City, aside from the scale, is best explained by urban designer, Simon Nicks of CNdV Africa: "Simply put, our role was to put together an urban design framework that would guide the engineers and architects about how to incorporate retail, business and play activities to optimise commercial opportunities in the green built arena."

This included the introduction of a new environmental approach for South Africa, namely ensuring that the largest structure on the precinct – 29° South – would dictate standards to other buildings around it, thus ensuring the best chance of obtaining a minimum Green Building Council of South Africa (GBCSA) 4-Star rating.

"It's much more difficult for buildings to achieve that in isolation," Nicks explains, "than being in an environment that is already optimised for sustainable support."

Achieving this is complex. Nicks says this means "looking at the type of environmental projections on all elevations, depending on which way they face for example, and then constantly having to tie those back into the whole so you wouldn't get ad hoc isolated buildings that don't fit in with the whole precinct."

The terrain presents some unusual considerations, despite being an almost blank canvas. Consider the challenges of airport noise, humidity, and a somewhat hostile uninhabited zone. Nicks points out that building on the hitherto uninhabited area has its advantages – there is no retrofitting required and no influence from the colonial and art deco architecture so prominent in Durban.

"What [KwaZulu] Natal architecture has ignored over the past 70-80 years is designing for a micro climate that encompasses, at times, 100% humidity in combination with high temperatures."

Nicks adds that the buildings that will form part of Dube City will have a unique feel, because their designs will consider these climatic conditions as fully as possible.

Indeed, the climate is the biggest influence in the design of Dube City. "There has always been a big challenge in the urban design world," says Nicks, "where the efforts to create strong public spaces and streets can clash with the requirements for optimal orientation for climate. In KwaZulu Natal this would mean that everything would have to face North with the added fitment of sunscreens, ultimately creating a sort of barracks façade.

"At Dube City the location of uses within buildings was based on where activities occurred over a 24-hour period and at what times of day the different components of buildings were heated or cooled. Thus, where possible, office activities were located in parts of buildings that will be cooler during the day and the residential aspect of hotel activities where they will be cooler at night."

Guidelines were also given on construction materials and colours, particularly their reflectance, to further promote the building's passive temperature control.

"In pushing the green concept when resolving urban design and environmental performance to the greatest level possible, it's going to be very interesting to see how architects carry those

principles through in the designs of the future," ponders Nicks.

Apart from reconciling with the climate, Dube City will also embrace its heritage of Indian, Zulu and settler influences. "This has produced an exciting contemporary mix of designs," says Nicks, "but not in a kitchie-koo kind of way." He adds that their client was very keen that everyone who lives in KZN should feel they "own" the project.

Tanya de Villiers, who works alongside Nicks at CNDV, is responsible for the landscape architecture of the City and the 600 hectares around it that needs rehabilitation. "Around Dube City we have started a massive alien plant clearing project, removing the sugarcane and replacing it, not just with SA indigenous plants, but specifically endemic species which would have occurred naturally on the site."

Then there's the precinct itself. "You don't often get the opportunity to design a whole city from scratch," she says. "We are in the unique position of being able to dictate everything from the road and parking layout to planting. This has given us a chance to do something really original, from paving to signage detail, to lighting, solar power, water features, green rooftops, and obviously all the environmental aspects like the recycling of water and not using potable water for irrigation."

"I can't think of any other South African project that has given us a chance to really think about pedestrians and specifically how people will be using zones," says De Villiers. "The feel is that of pedestrian walkways where cars just happen to be able to drive on, alongside paved cycle lanes."

The real challenge for De Villiers has been the restriction in terms of sourcing materials. One of the precinct's objectives is to source from local suppliers only, which reduces of the carbon footprint across the board. "There has been a lot of detailing, right down to ensuring the quality of the paving needed to be sourced. It's not as simple as transporting what we need from Johannesburg." She says that because they needed to stay local, they almost had to manage the production of the required paving.

The strong connection to the local environment has been blended with key engineering, ultimately to provide a holistic approach to sustainable design. Renier van der Merwe of Virtual Consulting Engineers (VCE) explains that the current makeup of Dube City is twofold. "One part is the reconfiguration of the general area that surrounds the second part, being the construction of 29th South, the office block that will be occupied predominately by Dube TradePort's head office."

VCE is responsible for the overall project manage-

Dube City provides a rare opportunity to design a whole city from the ground up, including prioritising pedestrians and restoring endemic vegetation.





ment and construction supervision on both projects. The greatest difficulty on the Dube City development as a whole, he says, has been the integration of the two project timelines to achieve a workable phased completion.

Ultimately though, it's all about reaching for the stars – the green ones, that is. Van der Merwe says that, generally speaking, the implementation of a green design is not in essence any more complicated than a conventional project. Nevertheless, "as the concept of a green building (in both building and civil environment) is relatively new to the SA industry, a fair amount of research was required by all the professionals as well as the contractor on the requirements prescribed by the GBCSA prior to implementation".

For Dube TradePort's compliance and green projects manager Daniel Smith, ensuring compliance is an intense task that encompasses the first phase development, inclusive of King Shaka International

Airport within the precinct. "Ensuring compliance with the record of decision (RoD) issued by the Department of Environmental Affairs, as well as the RoD for Agrizone has many aspects: rehabilitation as a result of impacts during construction; undertaking construction audits; implementing an operational environmental management plan; and auditing against this for those Dube TradePort facilities that are operational."

In addition, Smith says Dube TradePort also has a number of environment-friendly projects that it hopes will "green its business and thereby contribute to sustainable development as well as to being a responsible developer." The projects under investigation include: rainwater harvesting to supplement water use; bio-diversity improvements; solar power; and most importantly, a water demand management and conservation plan. "These," says Smith, "are over and above those initiatives to green Dube City and the new head office."

Jeané Waters is VCE's Green Star Accredited Professional responsible for securing the Green Star accreditation for 29' South. "At this time we are only looking to secure a Design rating," she says.

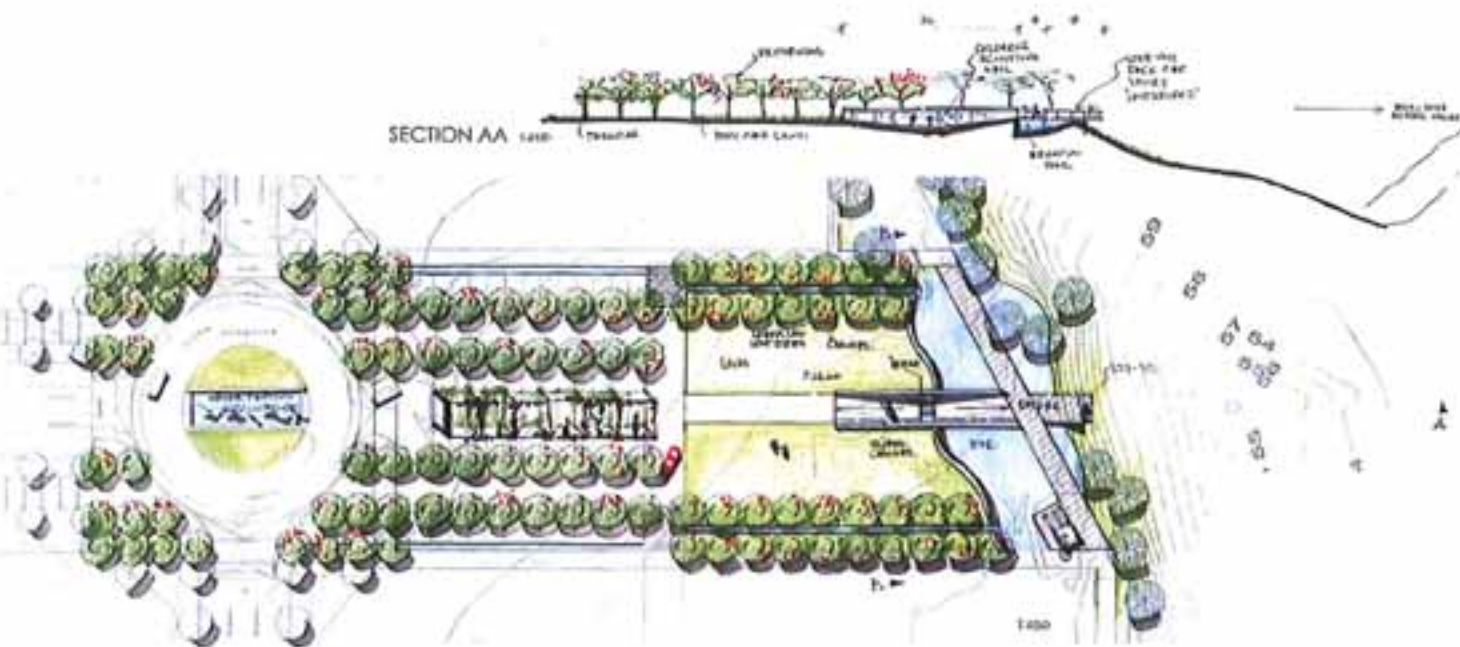
"Once the building is completed, we will then pursue an As Built rating. It can be a lengthy and incredibly document-intensive process, which is why we are preparing the highest quality paper work, aiming for 4 Star ratings in both Design and As Built. This is not an easy process and is an incredible learning experience, largely because the Green Star system is new to all the consultants involved."

Waters says design is an ever-changing process "and with each redesign, the GBCSA's requirements also change. The only way to stay on track is through constant communication and by having a common goal and focus. The validity of a green building can easily get lost or missed out on the stars if the processes aren't followed properly."

The GBCSA may be learning too. Waters says that one aspect of 29' South that is original is the automatic in house lighting design. "The system is able to calculate how much natural light is coming into the

Open stormwater channels reinforce the idea that water connects all sculptural elements and activities.

"What we created is a new culture that talks the language of green architecture without overstating it and without being cliché."
- JOHAN VORSTER



building and can automatically tone down the amount of automated lighting required at any one time.

"We also have the intelligent HVAC air-conditioning system installed that is able to calculate the temperature in the building and automatically adjust to comfort levels. Such energy reductions are vital to the measurement of the carbon emissions of the building – something that has even been applied during the construction phase to ensure the building operates as it has been designed."

The design of the building fell to Shabangu Architects in collaboration with Johan Vorster of Arxus, who has considerable design experience as a green architect. He says that the original client brief was quite sketchy and that the Green Star system was relatively new.

"By the time we reached our second draft though, we had the concept skeleton nailed. What we created is a new culture that talks the language of green architecture without overstating it and without being cliché – one that still offers a modern contemporary feel with an aspect of Africanisation," says Vorster.

He believes that "when you start a green project, you have to tackle it from a primary level – which is exactly what we did with 29° South. This means looking at aspects like orientation, window configuration, glazing, the sourcing and use of local materials, and even more importantly, water and energy."

Those early days saw the team spending

considerable time looking for products that would serve the green concept (like recycled steel) – but by the time the design was finalised, every contractor was on board with some form of green certification.

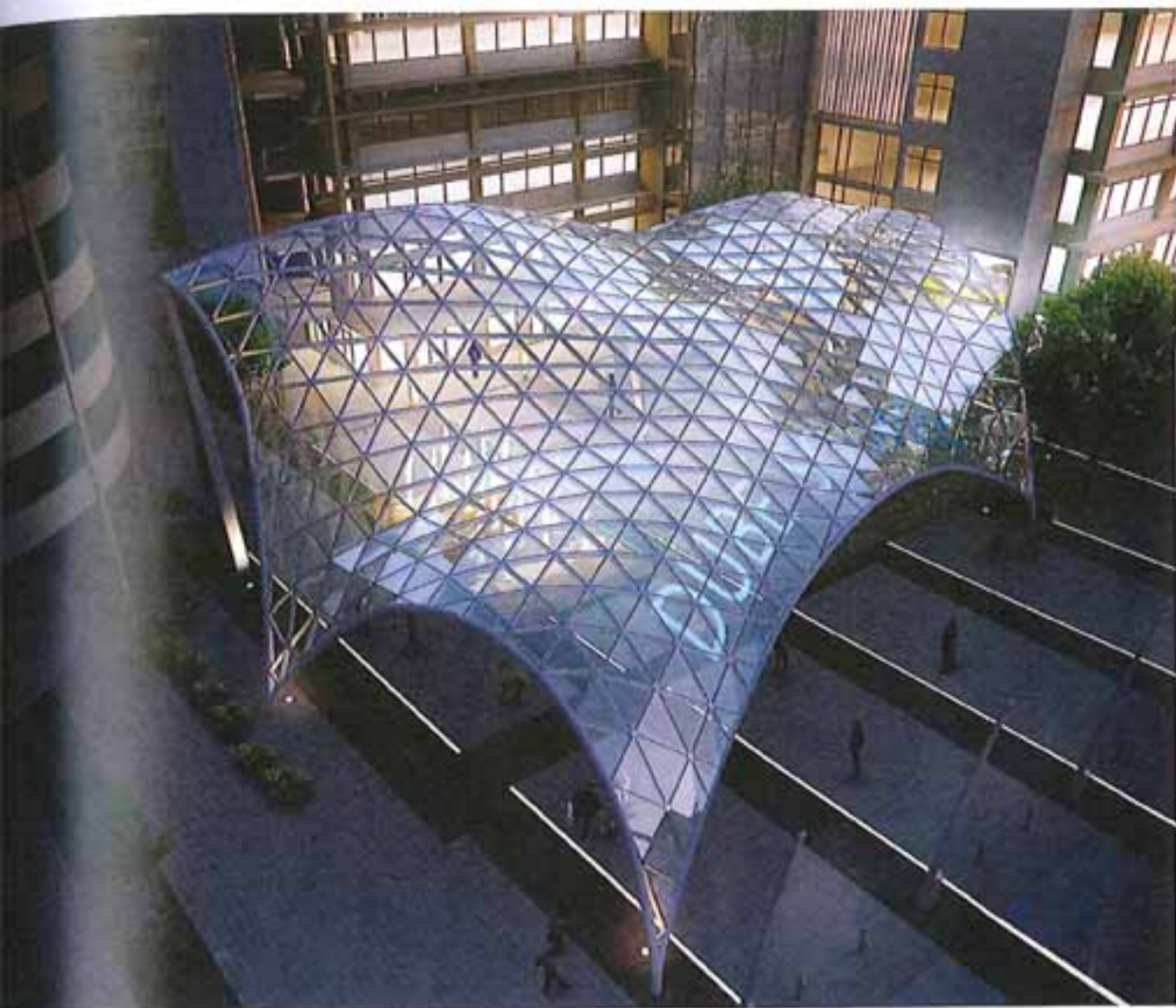
SAVINGS ON WATER, COSTS AND MORE

But green comes at a premium doesn't it? "When we started, figures were being bandied about that there would be an extra 10-15% cost margin because we were going to build a green building," Vorster says.

"What we have shown is that if you start with the right key ingredients very early, and by analysing the climate and applying the correct scientific simulations, we've ended up with a building that has a cost premium of only something between one and three percent. And that's just the upfront construction costs, ignoring even the benefit of the operational costs that the client is going to realise."

A major focus of the design was water. Vorster believes that 29° South should save around 30 million litres of water during its lifetime. This is going to be possible among others through the use of waterless urinals, the installation of only cold taps, and the collection of all the rainwater (around 180 000 m³) to be used for toilet flushing, fire and irrigation, inclusive of roof gardens. "So we're harvesting everything we can, and reusing everything we can, resulting in a zero landscaping water bill," says Vorster.

uMhlabini Junction East is a more contemplative space than its opposite, which hosts the market, but with areas for exhibitions and functions.



Energy savings are to be affected by maximising natural light: a narrow plan that forms no deep space, will ensure that glare is reduced. Even the lifts are able to generate their own power as they descend, while the heat generated by the air-conditioning system is also not wasted and serves to heat the hot water requirements of the building.

In terms of waste, Vorster says that even before the building plan and right from concept when they were working on the precinct plan, the proposed mechanisms for waste recycling and separation had to be adjusted for the Green Star motivation. "This meant we had to look at a complete waste management system that included organic materials, metal, batteries, and the usual paper, plastics, and glass." The inclusion of a recycled wall at the entrance to the building will continue to emphasise the importance of public participation by fostering recycling habits.

With no green transport plan yet in place, the idea is to introduce a shuttle and tram system, so that ultimately the entire precinct will become pedestrian orientated rather than car orientated. They believe this will attract a great deal of interest, particularly from those businesses that need a head office away from their manufacturing facilities. These facilities could ideally be situated just 1.5 km away in the Dube TradeZone.

Working on 29th South was a new experience for Dierk Volavsek of Shabangu Architects, having never been involved with a green building before. "The danger," he says, "is getting bogged down with bureaucratic processes. For instance, architects want to bring out the design and features of a building, but in terms of the Green Star requirements, certain restrictions need to be considered that might mitigate what you are trying to achieve. There are solutions of

The iconic glass and steel structure of the Dube Square canopy, located in a relatively wind free zone, will provide protection from rain and special glass provides protection from UV light and heat, whilst maintaining a light, transparent feel.

course, but this is a complicated process and requires considerable testing to ensure compliance."

Volaysek also points to the sourcing of compliant products. "It was our intention to ensure that all materials, be it timber, paint, or doors, came from compliant-registered suppliers. This proved a real mission in some respects." Volaysek provides an example: "[Some paint manufacturers] have developed water-based paints that are compliant. All good so far, but when it comes to a sealant for timber, the water-based product does not enhance the quality of the timber in the same way as a solvent-based paint. We had a similar problem on the granite walls in the lobbies, where the compliant sealant would not have brought out the lustre of the finish.

"So you can have the best design intentions, and you can lay down all the specifications and go out to tender, but ultimately some of it can't be realised."

Commercial property executive Mark Beckett says that, "without exception the green concept of 29° South is one of the major attractions for potential tenants." There is a good demand for the mix of available spaces ranging from 100 m² to 500 m² on the two floors out of the total of five at 29° South that are available for external tenants.

29° South and Dube City may be setting a new precedent for precinct design. It is proving that, not only is there virtue in connecting business with its community, but if a more natural workplace can interface with its organic environment and there is the additional benefit of cost savings, why then shouldn't all businesses go green?

It's the cerebral thing to do. ○

SOURCEBOOK

Architect Shabangu Architects 011 880 1214

www.shabanguarchitects.co.za

Structural Engineer Themba Consulting Engineers

011 234 9380/84 www.themba.co.za

Electrical Engineer Lebone Consulting Engineers

0860 532663 www.lebone.com

Mechanical Engineer Spoomaker 031 201 7355

www.spoormaker.co.za

Civil Engineer Virtual Consulting Engineers

031 539 7442/7437 www.virtualconsulting.co.za

Fire Consultant Chimera Fire Protection Consultants

012 663 5580 www.chimerafire.co.za

Landscape CNdV Africa 021 424 5022 www.cndv.co.za

Green Star SA Consultant Virtual Consulting Engineers

031 539 7442/7437 www.virtualconsulting.co.za

Project manager Virtual Consulting Engineers

031 539 7442/7437 www.virtualconsulting.co.za

Main Contractor Ilembe Airport Construction Services

(Building Joint Venture)

Terazzo Tiling Lovisa and Sons 032 533 1076

Airconditioning and Ventilation Luft Technik

011 312 2430

Ironmongery Bildware 031 332 5764

www.bildware.co.za

