





LANDMARK, BENCHMARK

An Art Deco Heritage building in central Tshwane is the cornerstone of the first Green Star SA certification development by the South African Government. The completed Agrivaal building will also be a touchstone for the Department of Public Works.

WORDS MICHELLE LUDWIG

As the first building for the national Department of Public Works (DPW) to receive a 4 Star Green Star SA – Office v1 Design rating, Agrivaal is a flagship project for South Africa that seeks to demonstrate and set a trend for future government buildings, says architect Marco Macagnano of PKA International Architects. Designed in association with Francois van der Merwe Architects, the 10-storey building will be a towering feature of Tshwane's Inner City Regeneration programme and hopes to serve as a catalyst for further sustainable urban development in the area.

The building derives its name from the existing 1938 Art Deco Heritage building that had to be restored and incorporated into the new design. The ambitious brief for the development was to create an

iconic landmark that complements and improves its setting while representing its “green” attributes. In addition, it needed to be future-proofed, designed for longevity, and set the trend for future government buildings. The project also aspires to an As Built Green Star SA rating.

Francois van der Merwe explains: “This project is a learning curve for the consultants as well as the authorities who have to evaluate it. It’s a good case study for the DPW as it is a complex building that touches on all the relevant issues.

“From the beginning, though, the DPW was positive that they truly wanted to do this. This enabled us to really do it the way it should be done. Of course facilities management will have to be done in accordance with the building’s requirements for it to function as intended.”

NUTSHELL

Location Tshwane, Gauteng
Client Department of Public Works
Building footprint 2 069 m²
Gross floor area 26 989 m²
Expected completion end 2014

ICON

The 27 000 m² office building is located in a mixed-use business district and is within walking distance of the Union Buildings. The intent is to represent a “contemporary urban African aesthetic while setting it apart from the rest of the Tshwane skyline”, explains Macagnano. The final construction will be significantly taller than the surrounding buildings and it will be viewable from all angles, thus the design of each facade was equally important.

CHALLENGES AS OPPORTUNITIES

The urban infill site was chosen, not only for its central location, but also for its low ecological value as it had previously been developed and contained dilapidated buildings. One of the first challenges for the design team was to respectfully incorporate the historic building within a larger one to provide sufficient A-grade office space. Integrating the old with the new, Macagnano said the “existing building informed the proportions of the new building” when it came to design approach. The three-storey original Agrivaal building is mirrored in scale as a podium in the new building with the additional office space rising as a fluid, curved tower above.

One highlight of the project for DPW chief architect Helene Nienaber was being able to keep the old building and its architectural details intact while creating a modern building alongside. The historic aesthetic of the original interiors has been preserved through careful removal, refurbishment and reuse

01.



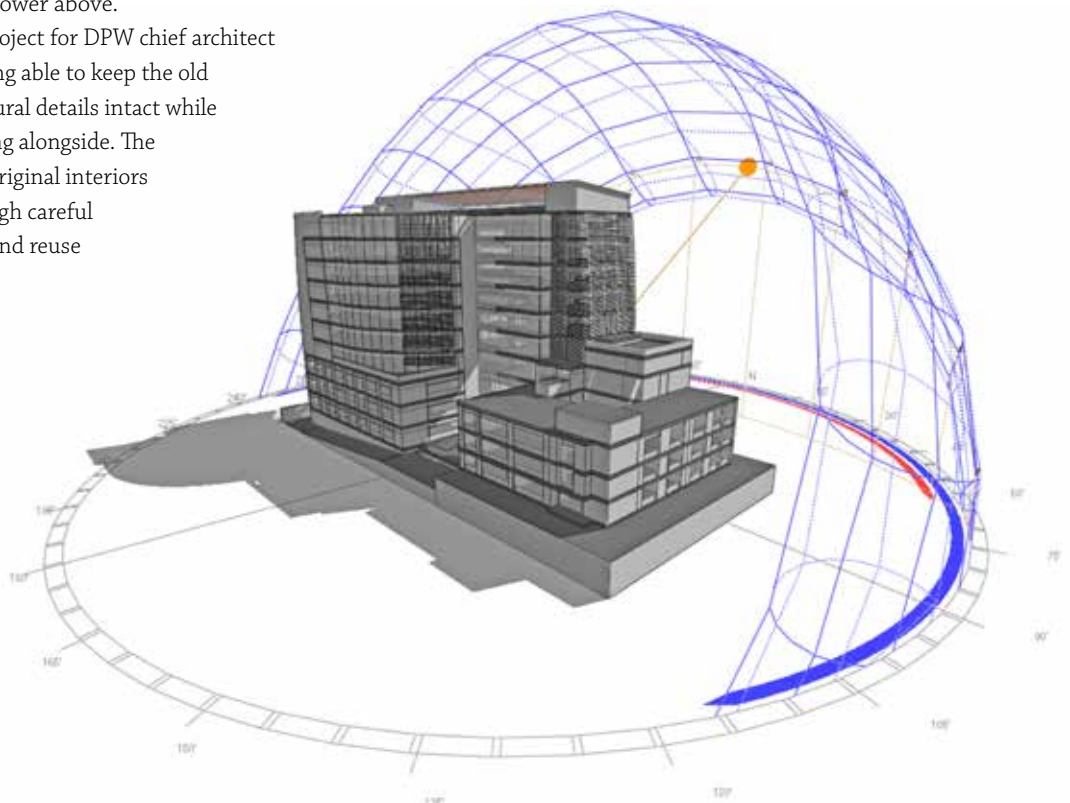
of original fittings and finishes, including parquet flooring, doors and timber cornices. This part of the building will house an auditorium, cafeteria, conference facilities, public areas and some offices.

Another challenge was to allow for natural light in the deep interior spaces. Daylight from perimeter windows only reaches so far, leaving the middle of large square floor plates solely reliant on electric lighting. Key to this design was a central atrium with multiple-storey glazing that allows natural light into the interior over multiple floors, creating vibrant, light interiors and reducing the need for electric

01. The original Art Deco Heritage building is an anchor for the new Agrivaal building.

02. The annual sun diagram. This image shows the sun's position at 11h15 on 7 May 2013.

02.



lighting. The atrium also centralises air circulation and allows for visual communication between the floors. The overall effect contributes towards a feeling of transparency between tenanted government departments and the public.

A building information model (BIM) addressed the typical project challenge of coordinating the various disciplines involved. Macagnano says this “allowed for seamless integration with the team when interrogating the design from concept to detailing”. Each discipline could view the existing context to help inform their design and technical contributions.

Nienaber notes that using computer modeling was new to the DPW’s process and it was useful to know in advance the expected performance of the systems. The DPW now has a policy to explore green interventions on all projects but she found it useful to work with an appointed sustainability consultant who could focus on that area specifically and “not get distracted by also doing architecture”, especially when going for certification.

Additionally, computer modeling was used to analyse and develop solutions such as how and where to target solar shading. Green building consultant Karly Spronk of WSP Green by Design says external facades were carefully calibrated to optimise the performance glazing. Fixed solar shading devices were incorporated in key locations to minimise heat and glare while allowing for both maximum natural light to the interior and panoramic views of the city.

Since the building footprint consumes the majority of the site, it was important to dedicate significant surface area for the introduction of green spaces, which aid in carbon-scrubbing as well as provide spaces for recreation and escape for the building users, according to PKA International Architects. The 400 m² roof garden added to the original building offers views of the neighbourhood and includes decking, benches and a water feature. The analysis of the original structure’s loading potential indicated that the screed required minor reinforcement. Landscape elements were positioned on the load-bearing walls below and a design for lightweight planting layers was implemented, according to Green Inc. landscape architect Andrew Kerrin. While not accessible, an additional 1 200 m² of vegetated roof on the office tower will act as a thermal barrier for the top floor and also contribute to stormwater management.

The landscape design proved to be a slight challenge in achieving Heritage status. The original

sightlines from the street had to be maintained, which had implications for adding elements such as balustrades on the roof. However, according to Kerrin, the addition of new vertical planters for sidewalk screening was approved by the Heritage Foundation of SA as these were deemed to complement what was intended by the original design.

FUTURE-PROOFING

A huge challenge is always to design a static structure that will meet the evolving needs of its occupants and accommodate technology improvements for any length of time. The design team approached this task from various angles, including materials, built-in intelligence, and design for users and change.

Durable and simple high quality locally produced materials that could withstand the rigors of a public building were specified. The ongoing maintenance required was factored into the evaluation of finishes.

A fully comprehensive, integrated building management system (BMS) monitors and records usage. It calibrates the operational efficiency of the building’s air-conditioning, ventilation, lighting, water, fire safety, security and accessibility. If a system is not operating at its full potential or becomes defective, it can readily be detected and adjusted to maintain optimal performance.

Incorporating a facilities management point of view was a particular focus in the design process to ensure the building was designed to perform consistently with the client’s needs and how it would be managed in regards of operations, maintenance and hand-over. Here the Afroteq and FM Solutions teams played a crucial role. A building user’s guide for the occupants, maintenance training and

SUSTAINABILITY FEATURES

- HVAC featuring ice thermal storage
- Central atrium
- Programmable electric lighting
- Electricity meters
- Building management system
- External fixed shading devices
- Efficient low-flow toilets and taps
- Rainwater harvesting
- Water meters
- Reused urban infill site
- Near public transport
- Incorporated the renovation of an existing historic building
- Roof gardens

extensive operational instructions will facilitate understanding of how the building systems work and how best to operate them.

The modular and reconfigurable interior fit-out elements provide flexibility in layouts, allowing for easy future reorganisation with less demolition and costly infrastructure upgrades.

Change is a continual challenge to government departments in response to their political context. As departments grow and shrink, and needs change, a common problem is space becoming obsolete or departments fractured over various office suites. This building's architecture provides a framework that allows for flexibility. The structure is a repetitive grid within which demountable partitioning systems can be rearranged. These floor to ceiling partition assemblies look and function as normal walls but due to their design and modularity, they can be reconfigured and reused with significantly less construction mess and disruption than a conventional build.

Other fit-out elements that facilitate change include modular raised access flooring, which can be lifted in small sections to allow electrical and communications cabling to be redirected or entirely upgraded as technology improves. Lighting fixtures are linked to the BMS and when offices reconfigure, the fittings require simple reprogramming but do not need to move.

By being able to reorganise spaces without significant demolition and damage, the entire building can be used in a variety of ways. Providing a building that is flexible means that it will be operationally optimised for the foreseeable future, Macagnano says.

This project also serves as a testing ground for new technologies and as a comparison to conventional approaches for the DPW. Most notably, the HVAC will encompass efficient ice thermal storage. Electricity is used during off-peak times at night to make ice used during the day to passively cool chilled water for the air-conditioning.

Nienaber says all innovative systems, such as ice thermal storage, greywater reuse, and programmable lighting were required to be well-researched and ensured to be workable before approval... and that all green items, experimental or otherwise, had to fit within a tightly controlled budget that was approved specifically for the green elements. The performance of this project and the various interventions will be studied to inform future DPW decisions.

SETTING AN EXAMPLE

Government has previously committed to set a national target for 12% energy efficiency improvement by 2015 as part of its involvement with the UNEP Sustainable Buildings & Climate Initiative. Spronk highlights that this building contributes towards meeting that goal and sets an example. The project will also be the first DPW project to pursue a Green Star SA As-Built rating that in effect will verify that the designed intent was accomplished.

The fact that this was a tendered project meant that the details were finalised before construction, which aided the process of gathering documentation for a green building rating application.

The DPW has incorporated green strategies in projects in the recent past and has a policy to do so for all new projects, but this is the first time it has pursued certification. At first expecting it to be easy, Nienaber says once involved, they discovered the task was more intricate. "It was a good learning curve to help us evolve policy for how to get rated and is helping us think of new policy, for instance, how we appoint consultants, their scope of work and fee structures."

The DPW are also noting "lessons learned" and advice from the professional team to pass on to future projects as well as writing a manual for professionals on going green. This project "seeks to set a new benchmark for the design, construction and operations of government buildings", explains Macagnano, "...green and sustainable construction is no longer a nice to have; it is a minimum requirement and the way forward." ●

SOURCEBOOK

Architects (joint) PKA International Architects Martin Pretorius and Philip Kruse 012 365 1724 www.pkainternational.co.za

Francois van der Merwe Architect 082 373 0057 francois.architect@gmail.com

Sustainability consultant WSP Consulting Engineers Karly Spronk 011 300 6166 www.wspgroup.com

Project manager HPM Consultants Hendrik Prinsloo 012 755 6741/2 www.hpmconsultants.co.za

Client chief architect Department of Public Works Helene Nienaber 012 406 1369 www.publicworks.gov.za

Mechanical engineer WSP Consulting Engineers Gerhard Bothma 011 300 1300 www.wspgroup.com

Landscape architect Green Inc. Andrew Kerrin 011 327 3687 www.greeninc.co.za

Interior designer Afroteq FM Solutions Marlene Ash 021 528 8991 www.fm-solutions.co.za

Building management system supplier Landis & Staefa 011 088 6700 www.landisandstaefa.co.za

Contractor Trencon Construction (Pty) Ltd 011 974 4464 www.trencon.co.za