The business magazine for the construction industry

DECEMBER 2015

CROWN PUBLICATIONS

Construction WORLD

SAVANNA CITY

PIONEERING THE WAY FOR WATER WASTAGE REDUCTION

During 2013, the former Minister of Water Affairs, Edna Molewa, stated that 1.58 billion cubic metres of water supplied in South Africa each year can be regarded as non-revenue water. This amounts to a financial loss of R7.2 billion per annum. She also stated that a realistic target for non-revenue water of 25% should be achieved over a 10-year period. This would require an investment of at least R10 billion over the same period.

The Water Services Act, Act 108 of 1997 (RSA 1997a) stipulates that all spheres of government must provide water supply services in an efficient, equitable and sustainable manner.

Basil Read, Midvaal Local Municipality, Gauteng Provincial Government and Savanna City Developments, announced the construction and implementation of an innovative water supply and distribution system at Savanna City, with a direct objective of targeting a maximum water loss of 10% in the system. **This equates to a possible saving of approximately R11 million per annum by reducing the anticipated volume of water purchased from Rand Water by 25%.**

The proposed water system is jointly funded by Savanna City Developments and the Gauteng Department of Human Settlements.

Aligning with its objective to build a sustainable city, Savanna City's water supply and distribution system has been designed using the latest technology, aiming to limit water losses in the system to 10%, which is a very ambitious target.

This initiative also supports the Midvaal Local Minicipality's 5-year Water Conservation and Demand as well as Non-Revenue and Water Loss Reduction Plan which was initiated during October 2014. This objective is to reduce non-revenue water in Midvaal from 30.4% to 20% within a 5-year period.

This project also incorporates all Midvaals non-revenue water programmes such as:

- Calculation and preparation of monthly water balance
- Accurate and clear water supply and distribution plans
- Master planning
- War on leaks
- Leak detection and repairs
- Sectorisation and zoning of distribution areas and metering of zones
- Asset management and water infrastructure replacement programme
- Cathodic protection of steel pipes
- Pressure management of water distribution zones
- Meter management plan
- Indigent leak repair programme and retrofitting of toilet plumbing
- Telemetry of water supply and distribution systems
- Consumer data base audits

THE RESERVOIR

A 10Ml reservoir is currently under construction and will be completed by March 2016, with an additional 10Ml reservoir within 5-years.

The reservoir is constructed using a 'self-healing' concrete. **The super-absorbent polymers in the concrete expands and fill the crack, preventing any further loss. The concrete regains its liquid tightness and impermeability, so that it remains durable, extending the reservoirs lifetime and minimising maintenance and repair costs.**

Water network sectorisation is a very effective method to create a sustainable water system. In order to manage the water system efficiently it is divided into manageable zones, making it possible to monitor consumption of these zones independently.

In addition, current leak detection costs are reduced as repair work can be focussed in the high non-revenue water affected areas. Pressure management also limits the potential damage of the water related fittings and devices by reducing the maximum water pressure in the zones from 9 bar to 5 bar, therefore increasing the lifetime of the pipes and all related fittings and devices. Effective sectorisation and pressure management can contribute largely to the reduction of water losses.

The installation of pressure reducing valves (PRV's) within the water distribution network is essential to relieve water pressure on the pipes. The higher or lower the pressure, the higher or lower the leakage. Valves can isolate incidents of pipe breakages and contamination, and limit the risk to the surrounding system. Savanna City opted for the use of automatic pressure reducing valves. These valves that are installed at strategic points in the network to control the water pressure, for example the PRVs will automatically reduce the water pressure during off-peak times and increase pressure at peak times.

The professional team is also investigating the possibility to use the energy developed when the pressure is automatically reduced to generate electricity through a mini turbine system. The electricity developed, which could be regarded as "clean" electricity, will be utilized for community purposes.

Historically, the pipes used to distribute drinking water were made of plastic, concrete or metal (e.g. galvanised iron or copper). Poor quality pipes shorten the pipe lifetime and result in leaks, bursts and corrosion. Poor pipe quality may also facilitate the infiltration of chemicals into the drinking water. Upon embarking on this mammoth project Savanna City considered the size of pipes, the composition, the properties and quality of the available materials and technology to ensure an effective sustainable water system for the development, and chose Orientated Polyvinyl Chloride (oPVC) pipes. oPVC, for the main water distribution pipeline, is a world class technology that adheres to international standards. It is manufactured by realigning the PVC molecules through a process of biaxial orientation, which enhances the material properties - around twice the strength and ten times the impact resistance is achieved compared to traditional PVC pipes.

oPVC pipes' wall thickness can be reduced by up to 50% while maintaining the same pressure as that of the traditional PVC pipes. The result is that oPVC has a larger bore, offering greater hydraulic capacity and is more material efficient compared to other pipe options. It is also the most eco-friendly pipe system in the world as it requires less energy to produce than conventional PVC and other pipe materials. Considering the relative low weight, oPVC pipes are strong and durable. It stays strong through a range of temperatures, resulting in fewer burst pipes and is corrosion resistant which makes it ideal for water infrastructure durability.

This initiative will have a major impact on how efficient planning, technology and experience can be combined to develop future sustainable cities.

With Midvaal Local Municipality's innovative planning, and Basil Read's renowned construction, it is clear that Savanna City is serious about building a sustainable Mega City.

ABOUT SAVANNA CITY

Savanna City Developments (Pty) Ltd with its main partners Basil Read and Old Mutual is busy with the development of Savanna City, one of the largest privately initiated urban lifestyle developments of its kind in South Africa. It follows the successful model pioneered by Basil Read at Cosmo City in Johannesburg.

It is estimated that approx. R28.4 billion will be spent during the construction phases, over a 10-year period.

The development is nearing its second year of implementation. 1500 stands have been provided with engineering services and 1000 houses are in the process of various stages of construction.

Midvaal Local Municipality, Provincial and National Government are in partnership with Savanna City Developments (Pty) Ltd to ensure that a sustainable City is developed in the Midvaal Municipality area of jurisdiction.

SAVANNA CITY WILL CONSIST OF:

- 5517 subsidised houses
- 2935 rental apartments
- 5518 FLISP / GAP houses
- 4729 bonded houses
- 15 educational facilities
- 32 institutional sites such as for clinics, churches etc.
- 9 retail / commercial sites

THIS DEVELOPMENT IS FUNDED BY

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EDITOR'S COMMENT

Karen Grant, publisher of Crown Publications and Wilhelm du Plessis, editor of *Construction World* during the judging for Best Projects in October.

Welcome to the December issue of *Construction World* – a special issue that showcases the winners and entrants of our Best Projects awards for 2015. It contains overviews of innovative and ingenious projects and reflects a construction world that is vibrant ... despite difficult economic times.

For the past six years the December issue has been dedicated entirely to Best Projects. As such, it has become an overview of activity in the South African construction industry during the preceding year. Best Projects recognises excellence in various disciplines within construction, and this issue of *Construction World* is a celebration, not only of the winning projects, but of the industry as a whole: celebrating the ingenuity and wide variety of projects that enter Best Projects annually.

The 'Civil Engineering Contractors' category had five entries this year: marginally more than the three of last year. The five projects that were entered illustrated the diversity of civil engineering though. The category was won by Aveng Grinaker-LTA for its entry 'Majuba Rail – Vaal River Incremental Launch Bridge'.

The Building Contractors category had six entries and was won by Murray & Roberts Western Cape for its complex 'Century City Square' project. This project has five separate buildings, each with complexities of design, and is built on top of a super basement within a confined working area.

A category that attracted double the number of entries than in previous years, was the Civil Engineering and Building Contractors (outside South Africa) category. Group Five Civil Engineering won first prize in this category for its ROMPCO Loop Line 1 Project – a stand out cross-border project for the company.

The Specialist Contractors or Suppliers category is always a challenge for the judges. This category showcases the vastness of the specialist supplier and contracting industry: from scaffolding and piling to products for rockfall mitigation. The category, with its 11 entries, was originally created to ensure that admixture suppliers and related services could enter and so receive recognition. It has matured as a category and is now one of Best Projects' biggest categories. It was won by 'Supply of innovative lightweight screed to upgrade a floor for Super Spar in The Zone@Rosebank' – Lafarge South Africa.

The Professional Services category received 13 excellent entries. Many of these entries were winners in CESA's awards for excellence and as such the competition in this category was fierce and the standard exceptionally high. Top honours eventually went to Aurecon for its incredibly innovative 'Preekstoel Water Treatment Works'.

The AfriSam Innovation Award for Sustainable Construction category illustrates just how far South Africa has progressed in terms of sustainability. This award was one of the first to recognise green building in South Africa, a practice that has gained great importance.

This year the judges found there to be one outright winner (out of the 10 entries) – a worthy recipient of the award: '90 Grayston Drive' – built by WBHO Construction.

To all the winning projects and entries – well done. Your efforts make this issue an extremely interesting one.

Wilhelm du Plessis

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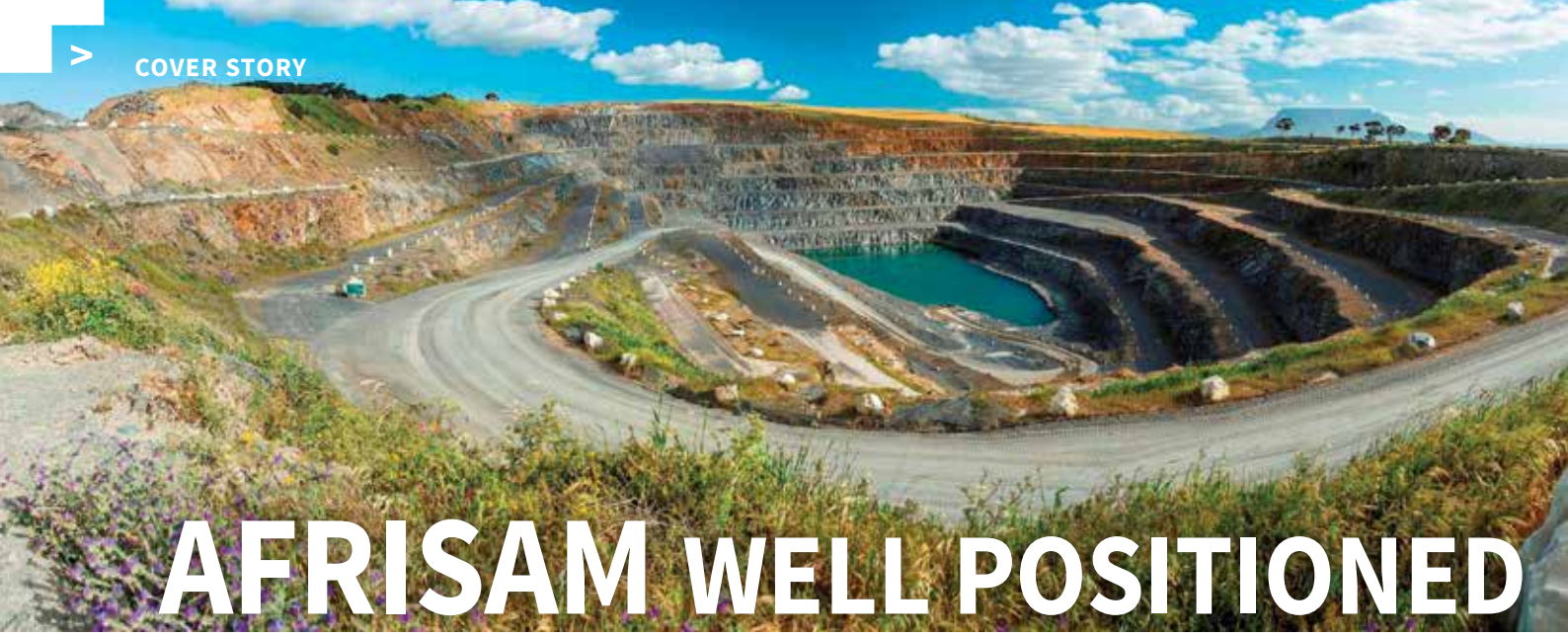


AFRISAM WELL POSITIONED

The ability to supply across the full spectrum of construction materials including aggregates, cement and readymix has seen AfriSam strengthen its presence and market share in the Western Cape region.

Historical overview

It is not by chance that AfriSam is so well positioned within the region. According to Shaughn Smit, regional sales manager at AfriSam Western Cape, the company has a history that goes back to the establishment of the very first cement factory in Philippi by Holderbank at the beginning of the 19th century. (Holderbank later become Holcim who held a majority share in AfriSam between 1998 and 2007.)

Although this limestone deposit was eventually depleted, today AfriSam maintains a solid footprint in the Western Cape with its Peninsula Aggregate Quarry in Durbanville Hills and Rheebok Aggregate Quarry in Malmesbury. The former was purchased almost 30 years ago after it was identified as having a massive deposit of material, while the latter was acquired around 25 years ago.

"Both these quarries enable AfriSam to fulfil its long term strategy of sustainable supply with the Peninsula Quarry producing quality aggregates for the construction and built environment, the civils industry, the precast industry and the retail sector," Smit says. "Everything from dust to dump rock is produced at this quarry and we still have 100 years' worth of deposit available."

The shaping of the aggregate at the AfriSam Rheebok Quarry results in a high quality crushed product from this granite deposit. Significantly it is the only quarry in the Swartland region that services the road surfacing market, and Smit says that AfriSam is currently supplying all the surfacing stone for roads contracts along the West Coast right up to Vredendal and Clanwilliam.

Readymix batch operation in Saldanha

Smit says that with the Saldanha Industrial Development Zone (IDZ) getting underway there is currently between 250 000 m^3 and 300 000 m^3 of concrete out to tender. "This amount of work in this area is going to create major opportunities for contractors, suppliers and service industries," he says.

AfriSam has always adopted a long term strategic approach to supporting customers and during 2014 erected a 70 m^3 per hour readymix batch plant at Saldanha. This proactive move has ensured that customers across the entire Saldanha Bay municipal area, including St Helena, Saldanha Bay, Langebaan, Paternoster, Jacobsbaai, Vredenburg and Hopefield, have ready access to quality concrete. AfriSam's Saldanha Bay readymix facility comprises offices, storage silos for cement as well as storage areas for other aggregates, and delivery and despatch areas to accommodate the fleet of readymix delivery trucks.

In addition to its readymix batch operation in Saldanha, AfriSam has an extremely large limestone deposit in the area and recently received an environmental authorisation to construct a cement factory in Saldanha. This investment will support the burgeoning construction activities of the Saldanha IDZ and the Western Cape region.

Customer collaboration

"AfriSam has always believed that it is more than just a supplier and strategic collaboration with customers is the hallmark of our operating philosophy. A good example of this is the V&A Silo Precinct Project which is being handled by WBHO,' Smit says.

"Everything from dust to dump rock is produced at this quarry and we still have 100 years' worth of deposit available."

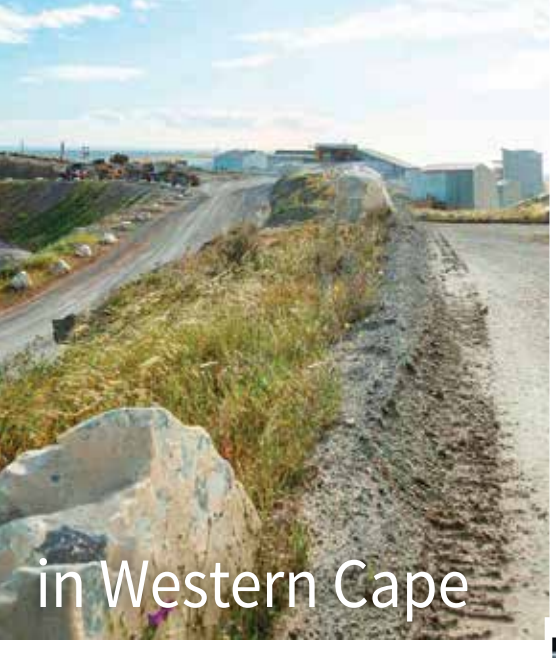
The acquisition of the V&A Waterfront by PIC and Growthpoint saw the release of a 25 year expansion programme which includes the ongoing development of the foreshore. This construction growth node is being serviced by an additional 35 m^3 per hour batch plant which AfriSam strategically located next to its existing plant in Woodstock. The plant is currently supplying product to projects in the Cape Town CBD and the V&A Waterfront.

Close collaboration with WBHO resulted in AfriSam dedicating this particular batch plant to service the construction of the Netcare Hospital being built on the foreshore. Some 15 503 m^3 of readymix was supplied to this project and the newly constructed Netcare Hospital will be open in January 2016.

Commenting on projects in the built environment, Smit says that AfriSam is supplying both aggregates and concrete to the V&A Silos Precinct Project. The project includes eight structures, one of which has already been completed. AfriSam is supplying product for the six buildings currently being built by WBHO. The remaining buildings is still out to tender. More than 55 000 m^3 will be supplied for the construction of Silo 2, Silo 3, Silo 4, Silo 5, the parking garage and the Grain Silo.

Relationships are key

Smit says that things have been quiet during 2015 on the civils side of the supply chain, however AfriSam recently secured several long term contracts for supply of construction materials from both the Rheebok and Peninsula Quarries for 2016. The full spectrum of roads materials including crushed aggregates,



in Western Cape

base, sub-base and 19 mm crushed stone is being supplied for the N7 Upgrade from Atlantis to Kalbaskraal and for the upgrade of the R302 from Kalbaskraal to Malmesbury. In addition to the aggregates, the company is also supplying concrete for the bridges and culverts as well as AfriSam Roadstab. This 32.5 strength class cement is well proven for soil stabilisation applications.

"AfriSam works with its customers to accommodate specific material requirements and mix designs, and our flexibility has enabled us to work at the cutting edge with architects to facilitate the construction of new architectural finishes," Smit says. Examples of this include unique off-shutter finishes as well as unique flooring solutions.

"At the end of the day, it is all about relationships and the ease with which our customers can do business with us. We will continue to provide the high level of responsiveness for which we are known in the Western Cape and look forward to the exciting developments that this region will see in the next few years," Smit concludes.

PICTURES CLOCKWISE:

AfriSam acquired its Peninsula Aggregate quarry almost 30 years ago. This quarry produces quality aggregates for the construction and built environment, the civils industry, the precast and retail sector.

During 2014, AfriSam erected a 70 m^3 per hour readymix plant at Saldanha Bay to ensure that customers across the entire Saldanha municipal area have ready access to quality concrete.

AfriSam operates a fleet of over 50 readymix trucks in the Western Cape transporting this material from its six readymix plants in the area, including the recently established plant in the Saldanha Bay Industrial Development Zone, to customers across the Western Cape. Its aggregates are supplied from quarries in Durbanville and Malmesbury.

AfriSam works with its customers to accommodate specific material requirements and mix designs. AfriSam will continue to provide the high level of responsiveness for which it is known in the Western Cape.

BEST of the BEST PROJECTS 2015

Rob Newberry (right) has been a Best Projects judge for 10 years, while Truman Goba, has been a judge for the competition for eight years.

Ross Stembridge, Master Builders KwaZulu-Natal's building services manager, joined as the third judge.

Construction World's prestigious Best Projects Awards was held for the 14th time at the Royal Johannesburg and Kensington Golf Club in Linksfield, Johannesburg on 5 November 2015.

This year the competition received 51 entries that competed in the seven categories of the awards.

The awards evening was attended by 200 guests. *Construction World's* Best Projects Awards is the only South African award that recognises excellence across the entire construction industry.

Best Projects ensures that excellence in the built environment is not only recognised by an entrant's own institution, but that such excellence also receives wider recognition.

AfriSam has been the main sponsor of this event from the start. The AfriSam Innovation Award for Sustainable Construction, one of the categories, was one of the first awards for sustainable building in South Africa.

The awards are independently judged by specialists who represent various professional bodies: Chartered Institute of Building Africa (Rob Newberry), Master Builders of South Africa (Ross Stembridge) and Consulting Engineers of South Africa (Trueman Goba).

The judging

This competition is by submission only. Judging took place on 7 October in Woodmead, Johannesburg. The judges scored entries based on the criteria for each category and these scores were adjusted on a weighted average basis to ensure equitability across all entries. This year it became very clear how important it is for an entrant to address all the criteria.

Criteria

Entries were judged according to the criteria for each of the categories as set out in the call for entries. Categories A1, A2, A3, C, D and E shared the same criteria, which were:

(i) Construction innovation technology, (ii) corporate social investment, (iii) design innovation, (iv) environmental impact consideration, (v) health and safety, (vi) quantifiable time, cost and quality, and (vii) risk management.

Category B has four judging criteria: (i) construction innovation technology, (ii) corporate social investment, (iii) environmental impact consideration, and (iv) health and safety.

A1: Civil Engineering Contractors

The judges remarked that it is a sign of the times that there are less entries in both the 'civil engineering contractors' and 'building contractors categories' and more for professional services (but more than last year).

- **Winner**
  Majuba Rail – Vaal River Incremental Launch Bridge
  Main contractor
  Aveng Grinaker-LTA

A2: Building Contractors

- **Highly Commended**
  90 Grayston Drive
  Main contractor
  WBHO Construction
- **Winner**
  Century City Square
  Main contractor
  Murray & Roberts Western Cape

A3: Civil Engineering and Building Contractors (outside South Africa)

- **Highly Commended**
  The Horizon – Centro De Negócios (Mozambique)
  Main contractor
  SS Construções
- **Winner**
  ROMPCO – Pipeline (Mozambique)
  Main contractor
  Group Five Civil Engineering

B: Specialist Contractors or Suppliers

- **Special Mention**
  Sasol Process Water Cooling Tower
  Main contractor
  Aveng Grinaker-LTA
- **Special Mention**
  Rockfall Support of Orapa Mine AK1 Pit 805 Ramp and North Eastern Ramp (Botswana)
  Specialist supplier
  Maccaferri Africa
- **Highly cCommended**
  Sika Products Play a Vital Role in Umgeni Interchange Project
  Specialist supplier
  Sika
- **Winner**
  Supply of Innovative Lightweight Screed to Upgrade a Floor for Super Spar in The Zone@Rosebank
  Specialist supplier
  Lafarge South Africa, a member of LafargeHolcim

C: Professional Services

- **Special Mention**
  The Point – Sea Point, Cape Town
  Consulting engineer
  Moroff & Kühne Consulting Engineers
- **Highly Commended**
  Construction of the Northern Areas Sewer – Phase II
  Consulting engineer
  AECOM
- **Winner**
  Preekstoel Water Treatment Works
  Consulting engineer
  Aurecon

E: The AfriSam Innovation Award for Sustainable Construction

- **Winner**
  90 Grayson Drive
  WBHO Construction

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A1: Civil Engineering Contractors

Winner

Majuba Rail – Vaal River Incremental Launch Bridge

Aveng Grinaker-LTA

From left: Raimondo de Simone, Stefan Bothma, Richard Evans, Hanita Bahadoor, Tayeb Achmet, Junithan Moodley, Lonwabo Sizane and Allan Mc Cormack (all from Aveng Grinaker-LTA).

A2: Building Contractors

Highly Commended

90 Grayston Drive

WBHO Construction

From left: Sibusiso Mwandla, Deon Robinson and Raymond da Costa (all from WBHO Construction).

A2: Building Contractors

Winner

Century City Square

Murray & Roberts (Western Cape)

Collin Morrily (Murray & Roberts Western Cape).

A3: Civil Engineering and Building Contractors (outside South Africa)

Winner

ROMPCO – Pipeline (Mozambique)

Group Five Civil Engineering

Ray Govender and Daniel Pettersen.

A3: Civil Engineering and Building Contractors (outside South Africa)

Highly Commended

The Horizon – Centro De Negócios (Mozambique)

SS Construções

From left: Luis Gaspar, Tim Smith, Andre Labuschagne (all from SS Construções) and Johan Brink (Stefanutti Stocks).

A showcase of **EXCELLENCE**

B: Specialist Contractors or Suppliers

Winner

Supply of Innovative Lightweight Screed to Upgrade a Floor for Super Spar in The Zone@Rosebank

Lafarge South Africa

From left: Brent Paterson (Lafarge SA), Gerhard Neethling, Pieter Neethling (both from Landmark DSP), Danie Jordaan (Lafarge SA), Joseph Links (Landmark DSP) and Llewellyn Bennetts (Lafarge SA).

B: Specialist Contractors or Suppliers

Highly Commended

Sika Products Play a Vital Role in Umgeni Interchange Project

Sika

From left: Peter van Eden, Chad Tosen, Donna Crossan, Shaun Saxby, Jacobus Pretorius and Riaan Oosthuizen.

B: Specialist Contractors or Suppliers

Special Mention

Rockfall Support of Orapa Mine A1 Pit 805 Ramp and North Eastern Ramp (Botswana)

Maccaferri Africa

From left: Wynand Meyer, Bertoe Meyer (both from Wepex), Jorge Martinho (Maccaferri Africa), Lans Schick and Servaas Fick (both from Wepex).

B: Specialist Contractors or Suppliers

Special Mention

Sasol Process Water Cooling Tower

Aveng Grinaker-LTA

From left: Gert van der Merwe, Richard Evans, Rodney Johnson and Tobie Theron (all from Aveng Grinaker-LTA).

C: Professional Services

Winner

Preekstoel Water Treatment Works

Aurecon

From left: Danie Rohde, Louis de Klerk and George Langenegger (all from Aurecon).

C: Professional Services

Highly Commended

Construction of the Northern Areas Sewer – Phase II

AECOM

Isak Malherbe (AECOM).

C: Professional Services

Special Mention

The Point – Sea Point, Cape Town

Moroff & Kühne Consulting Engineers

Nik Moroff (Moroff & Kühne Consulting Engineers).

E: AfriSam Innovation Award for Sustainable Construction

Winner

90 Grayston Drive

WBHO

From left: Sibusiso Mwandla, Deon Robinson and Raymond da Costa (all from WBHO Construction).

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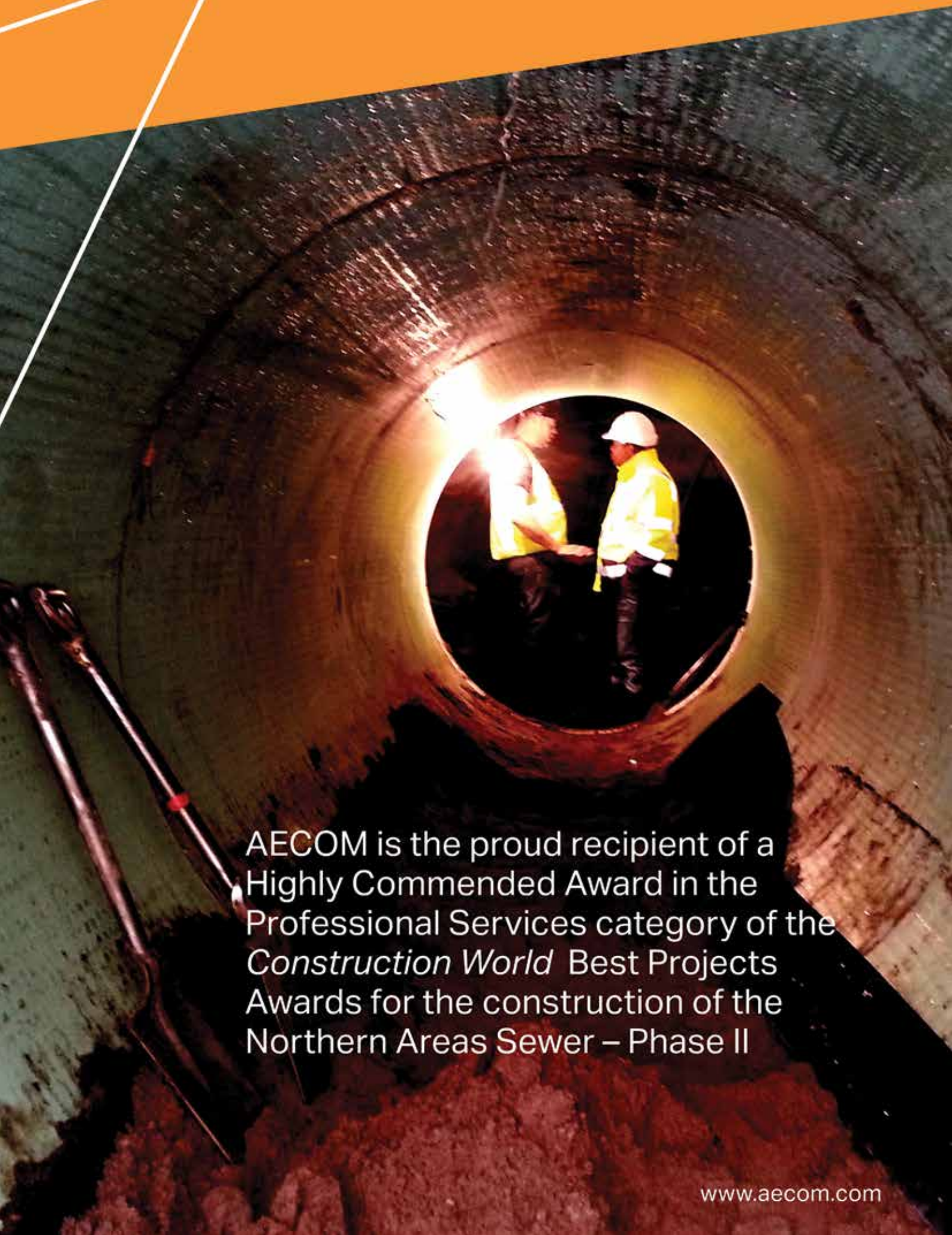

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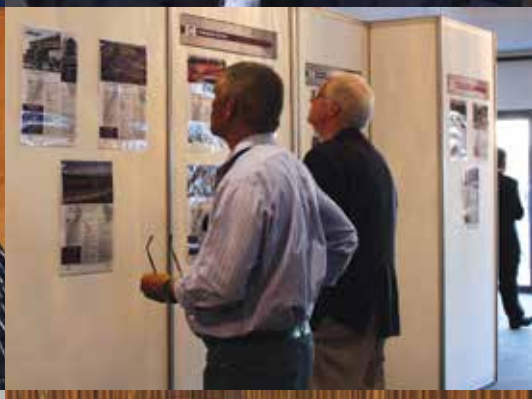


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Afrisam, historically the main sponsor of *Construction World's* Best Projects Awards, sponsors category E. It was one of the first awards in South Africa to recognise advances in sustainable building.

Raymond da Costa, Sibusiso Mwandla, and Deon Robinson (all from WBHO Construction) with Avi Bhoora (third from left) AfriSam's executive: construction materials, receive the award for 90 Grayston, which the judges indicated was an outright winner in this category.

Lucky Draw winners

Guests of the 2015 Best Projects Awards stood a chance to win one of three prizes. Erna Oosthuizen, *Construction World's* advertising manager, presented the prizes to the lucky winners.

FROM LEFT:

**Corlia Snyman from Maccaferri Africa won the De Longhi Nescafe Dolce Gusto coffee machine.
It was sponsored by Ngage, which offers public relations, advertising, multimedia, social media and investor relations to industry.**

Richard Evans from Grinaker-LTA won the Bosch GSB 18-2 RE Impact Drill 800 W. The Power Tools division of the Bosch Group is the world market leader for portable electric power tools and power tool accessories.

Billy van Straaten from PERI Formwork and Scaffolding Engineering won a power tool sponsored by Benray Tool Wholesalers (the exclusive DeWalt importers for Africa and the Middle East).


The 1 to 5 of a complete offering

1 The print edition

Already published for 33 years, the magazine reaches a carefully managed target audience every month (ABC 2 696 – second quarter 2015).

2 Website

www.constructionworldmagazine.co.za with the sections Marketplace, Environment & Sustainability, Property, Projects & Contracts, Equipment and Products & Services, is updated daily. It carries up-to-date news, in-depth articles, product and equipment announcements and project news.

News and announcements are shared with our Twitter, LinkedIn and Facebook following.

3 Online edition

It is powered by FlippingBook Publisher, a software application that allows the user to turn pages, zoom in, print and email articles.

All advertisers in the print edition of the magazine receive a hyperlink in the online version to their websites.

4 eConstruction World

A growing mailing list (in excess of 4 000) receive our bi-monthly *eConstruction World* newsletter. It informs our targeted readership and directs readers to the print edition and the website.

5 Best Project Awards

Construction World hosts its prestigious Best Projects Awards annually, now in its 14th year. The December issue is dedicated to the winners and entrants and is an overview of activity in the construction world – the ideal vehicle to associate your brand with excellence.

ONLINE MONTHLY STATISTICS

- **Sessions: 7 010**
- **Unique visitors: 5 861**
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CROWN PUBLICATIONS


ABSA

Majuba Rail – Vaal Incremental Launch Bridge

The employer's objective is to construct an electrified heavy haul rail line linking the Transnet Freight Rail export coal line with the existing Majuba Power Station rail yard. The intention of the rail line is to transport 21 million ton per annum of coal in 100 jumbo wagon trains. The rail line forms part of the Majuba Power Station coal supply system.

The earthworks construction consists of cut to fill, cut to spoil and layer works activities totalling 8 000 000 m^3 of material and an excess of 35 000 000 m^3/km of overhaul.

Project information

- Company entering: Aveng Grinaker-LTA
- Project start date: August 2013
- Project end date: September 2015
- Client: Eskom and Transnet
- Main contractor: Aveng Grinaker-LTA
- Architect: Transnet Capital Projects
- Principal agent: Eskom
- Project manager: Eskom
- Consulting engineer: Transnet Capital Projects
- Subcontractor: Amsteel Systems

The incremental launch bridge is one of the most highly mechanised erection methods used in bridge construction. The construction methodology follows the manufacturing of the superstructure of the bridge in a prefabrication area behind one of the abutments.

Each new segment is concreted directly against the preceding one and after it has reached required design strength, it is moved forward by the length of one segment.

One of the many challenges faced during construction of the piers was the diversion of the river in stages to gain access for the pier and abutment bases. A further issue is that the construction programme called for the piers to be cast during the rainy season (September 2013 - January 2014), making constructability almost impossible. The nine piers (average height 1,89 m) were cast using a climbing shutter.

With the incremental launch method, the advantages of the in situ and precast construction methods are combined for maximum benefit.

The prefabrication area includes the tower crane, the steel fixing area – as well as storage area for the rebar, the launching yard formwork area and the pre stressing tendons assembly area. The positioning of the batch plant was restricted to setting up outside the 1:100 year flood line.

The exceptional aspect of this incremental launch bridge is that the box section was cast in one pour, i.e. the floor, the walls and the deck in one pour in a seven day cycle.

Central pre-stress (concentric cable) is required during the construction stage. Central pre-stressing means that the pre-stressing cables are arranged such that the resultant compressive stresses at all points in a given cross section are equal and it does not matter whether tensile stresses occur in upper or lower portions of the superstructure during launching process. ▲


AVENG

Construction of the Botshabelo Interchange on National Route 8

The Project is located on the National Route 8, Section 11 at the primary access to Botshabelo. The limits of the project extend from West Intersection N8/1 km 43,7 to the East Intersection N8/11 km 526 on the National Route N8.

The interchange will comprise the construction of four new ramps for the diamond interchange, and the crossing road through a bridge under the N8. The whole interchange will effectively be in cut, with a surplus of material which will be used for the construction of the adjacent fills for the future westbound carriageway of the N8.

The primary access from the N8 into Botshabelo is via Main Road which consists of a single carriageway and will be widened to two lanes into Botshabelo with one lane outbound. Between km 0,6 and 1,15, the existing road will be lowered in order to accommodate the underpass. The re-constructed road in this section will comprise three lanes, surfaced shoulders, side drainage and surfaced sidewalks.

The project start date was 17 February 2014 and is a 20 month project to be completed by 16 October 2015.

The project was designed to incorporate a labour-intensive Waterbound MacAdam base layer on the ramps and crossing road in order to enhance job creation.

The initial expected duration for total construction was 20 months. A very tight programme was conceptualised as traffic accommodation was a critical issue and traffic would have to shift in order to complete the works. The project was set back from day one due to services not being moved on the programmed schedule, and delays were imminent. Thanks to mitigation and innovation in order to assist the client and deliver the project, a bypass was constructed to facilitate works.

Additional political issues with regard to labour also led to a delay, and rain delays will take the project into early next year, tentatively 10 February 2016. Liviero has saved considerable time and money for the client with new logical innovations that are carried out with accuracy.

Being a medium-sized job, the hard rock and massive excavations needed to construct the interchange were critical factors in determining the project cost. Cost increased by up to 20% due to the increased hard rock that was unusable for construction, and excessively deep excavations necessary for stormwater drainage. These items of work, coupled with the additional time for delays, contributed to the increased cost of the project. ▲

Project information

- Company entering: Liviero Civils
- Project start date: 3 February 2014
- Project end date: 30 January 2016
- Client: SANRAL
- Project team: Johan van der Westhuizen (project manager)
- Main contractor: Liviero Civils
- Principal agent: Iliso Consulting
- Project manager: Liviero Civils
- Consulting engineer: Iliso Consulting

Kusile Coal Stock Yard

The coal stock yard project forms part of the associated infrastructure for the Kusile Power Station Project, which is located near the existing Kendal Power Station, in the Nkangala district of Mpumalanga. The power station will comprise of six units, each rated at an 800 MW installed capacity for a total capacity of 4 800 MW. Once completed, Kusile will be the fourth-largest coal-fired power station in the world.

The operational life of the power station is expected to be 60 years. The coal stock yard facility will be used to store the power station's coal supply, which will be used to operate the power station. This project has a value of R408-million and duration of 20 months. Currently the project has achieved 1,2 million LTI free man-hours.

The project has a strong focus on the requirement for local development, local employment, business development, sustainability and financial investiture to leave a long term legacy in Mpumalanga and South Africa.

The designers had to ensure that this mega concrete slab can withstand all the elements during the construction and operational phase. The concrete slab covers an area of 300 000 m^2 and is divided into 1 021 smaller panels which are joined together with 11 8000 tie bars. These tie bars ensure that the movement between the panels because of expansion and contraction (due to the weather exposure) are controlled.

The first and most minor challenge was to do level control on the G5 sand layer that was placed on top of the A8 bidim. Here the team made use of a sophisticated trimble system. However the levels still had to be provided to the earthworks team without using the conventional wood survey poles.

A special reusable and adjustable steel survey pole with a round base plate was the optimal solution.

The largest hurdle to cross was the placing of an average of 360 m^3 of concrete per day for a period of 12 months. Six panels were constructed daily. The team developed a specialised concrete placing operation that used screed beams to strike-off the concrete. This created an ideal level smooth finish that was well within the project tolerances within record time.

The coal stock yard works are designed as such to ensure minimal impact to the environment during the operational phases.

A double liner system using Geosynthetic Clay Liner and HDPE liner ensures that run off water from the stockpiled coal does not penetrate and contaminate underground water sources. Due to this construction requirement, a large volume of HDPE liner waste materials are generated.

A number of recycling companies was approached with the aim of finding further use for the HDPE waste materials. Fortunately a company specialising in the manufacturing of HDPE drainage piping for the mining industry was found which has culminated in the removing of all the HDPE liner materials being recycled for further use. ▲

Project information

- Company entering: WBHO Construction
- Project start date: May 2014
- Project end date: February 2016
- Client: Eskom
- Project team: Kusile Executive Team
- Main contractor: WBHO Construction
- Principal agent: Eskom
- Consulting engineer: WorleyParsons
- Design engineer: SRK Consulting (South Africa)
- Project value: R402 793 494,90

Kusile Combustion Waste Terrace

WBHO was awarded the Kusile Ash Dam contract in 2011, but due to permitting issues, construction only commenced in the third quarter of 2012.

A major component of this contract is to line the proposed ash dam area. This operation consists of a complex layer of different liner materials all aimed at preventing harmful substances from coming into contact with the environment. The sequential set of operations involved in achieving this target is summarised in the following major operations:

1. Topsoil removal: vegetation is cleared and grubbed from the work area, topsoil is then removed and stockpiled for later reclamation works
2. Surface preparation: Exposed soil is ripped to 200 mm depth, moisturised, blended spread and compacted to achieve a smooth organic matter and stone free surface to receive the first bottom HDPE liner layer.
3. Bottom liner: The approved soil surface is then covered with a 2 mm double textured liner, welded, quality checked and handed over.
4. Bottom geotextile: The bottom HDPE liner is then covered and protected with an A8 Bidim layer.
5. Geo-cell: A 50 mm geo-cell matt is stapled together and stretched out over sloped areas, this is to prevent erosion in the leak detection area.
6. Washed river sand: a 100 mm washed river sand laver is spread over the Geo-cell and A8 bidim layer, which acts as a leak detection layer.
7. GCL: A Geosynthetic Clay Liner layer is then placed to cover the washed river sand layer.
8. Top liner: the GCL is covered with a 2 mm double textured liner, welded, tested, quality checked and handed over.
9. Top Geotextile: The top 2 mm HDPE liner is protected by an A8 Bidim layer.

10. Drainage layer: The liner and associated sandwich is them covered with a 300 mm drainage layer of G5 gravel.
11. Drainage pipes: A network of 50 mm perforated drainage pipes is then installed 200 mm deep in the drainage layer, cradled by washed sand and rapped in A4 Bidim.
12. Tie in: the perimeter of the HDPE liner ties into a leak detection channel connected to a concrete drain. This tie in consists of two rubber gaskets between the concrete and a stainless steel baton with holding down bolts every 250 mm.

The first two contractual milestone dates on this contract was achieved and final completion is expected within the allotted contract period in 2016. ▲

Project information

- Company entering: WBHO Construction
- Project start date: April 2012
- Project end date: April 2016
- Client: Eskom
- Project team: Kusile Executive Team
- Main contractor: WBHO Construction
- Principal agent: Eskom
- Project manager: WBHO Construction
- Consulting engineer: Worley Parsons
- Design engineer: Knight Piésold Consulting Engineers
- Project value: R1,1-billion

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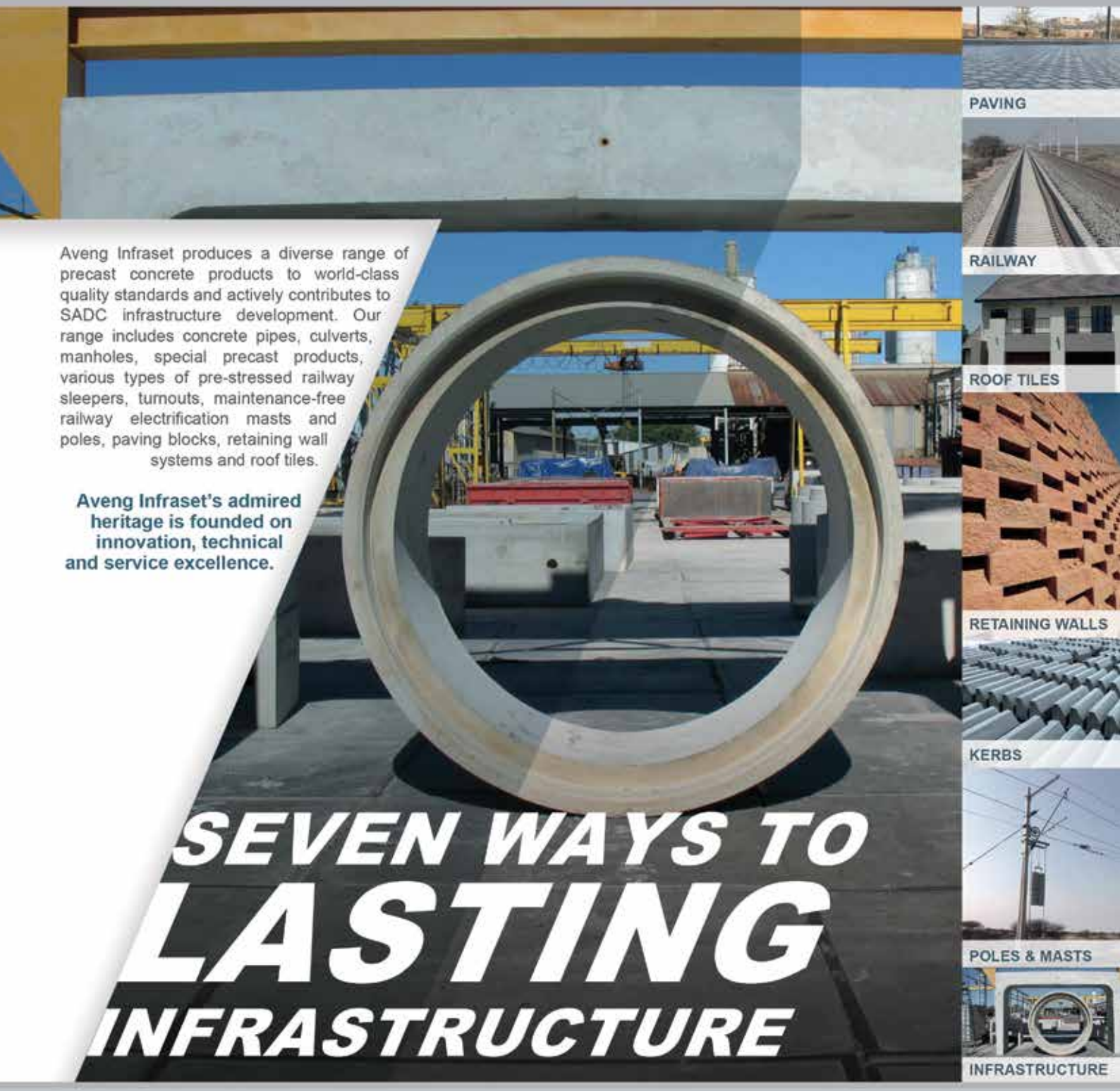

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SAB Alrode New Malting Plant

South African Breweries has invested in a new state of the art maltings plant located in Alrode, Alberton. The maltings plant, which is not only a first of its kind in Africa, will be the biggest in Africa and third biggest in the world and saw the congregation of a multicultural design and construction team join SAB: Malteurope and Hatch Goba. WBHO was appointed to carry out all civil works on the project.

WBHO kicked off construction in May 2014. The site team consisted of 31 foreman, 450 labour and 15 managerial staff. The original scope of work was priced at R131-million and was to last 12 months. After additional scope of work was included, the contract value has increased to R190-million and the duration has extended to 19 months.

Construction saw an excess of 13 000 m^2 of structural concrete placed, and consisted of 6 500 m^2 of formwork to bases and ground beams, 10 000 m^2 of horizontal formwork and 30 000 m^2 of vertical formwork. Five tower cranes were erected on site, strategically planned to ensure that all areas of the site were covered and wall formwork could be placed and removed from all locations.

Due to the soil conditions on site (high clay content with poor bearing capacity), structures were designed to be supported on piles. All floor slabs were designed as suspended slabs and due to potential heaving of the clay subgrade, a void below ground slabs was required.

For the construction of the 6 000 m^2 concrete slab for a silo terrace, a conventional reinforced concrete slab was designed. Due to the nature of the in-situ material, a 1 000 mm deep RC slab was required.

The opportunity for precast elements was identified during the early phases of construction, which saw the construction of 65 precast elements the majority of which were ring beams.

Potentially the biggest risk on this project was labour overspend and the extremely tight programme.

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The heart and soul of the germination area an essential part of the malting plant, was the germination bed walls. These process walls required extreme attention to detail. A total of seven germination beds, 68 m in length, 9,1 m wide and 4,9 m high were to be constructed. ▲

Project information

- Company entering: WBHO Construction
- Project start date: May 2014
- Project end date: December 2015
- Client: South African Breweries
- Main contractor: WBHO
- Principal agent: Hatch Goba
- Project value: R190-million

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Century City Square

Fast track projects are common today, however the construction of the Century City Square Project with five separate buildings, each with complexities of design, being constructed on a super basement within a confined working area, has required innovative thinking in terms of risk management and operational logistics.

This flagship development for the Rabie Property Group forms part of the burgeoning precinct on the N1, 10 km from the Cape Town CBD. Century City Square is pioneering a new 4 star mixed-use Green Building Council of South Africa rating, ensuring that sustainable green design principles are implemented where possible.

Prior to the project commencing, a detailed and rigorous risk assessment was compiled and this was taken on board by the project team.

During the 19,5 month contract period, Murray & Roberts Western Cape has to interface with multiple consultants as each section of the development has its own professional team.

Added to the project management complexity is that various components of Century City Square have different completion dates. Work started on 13 May 2014 with final completion scheduled for 11 February 2016.

The complexity and scope of the project is evident in that it comprises a 19 500 m^2 super basement on top of which the five individual buildings are being built. These include an office tower, a boutique hotel, a mixed-use office and apartment building and a conference centre over two levels.

The strong architectural form of the conference centre has been taken through to the 125 room hotel and this forms an L-shaped footprint that is offset by the dramatically curved glass façades of the seven storey freestanding office building known as The Apex.

Effective and efficient construction methodologies have been used to future proof the structures and ensure optimal response to climate, envelope and occupancy which varies daily and seasonally. The buildings share an overall environmental strategy that encompasses transport, health, energy, water and waste. Aspects such as air quality, thermal comfort, adequate lighting and glare control, access to daylight and views, and sound levels have all been factored into the design which at the same time prioritises comfort, productivity and health of the occupants.

With the project site being bordered on two sides by the canals and sitting within a ring road system, the logistics of moving materials to the various work areas has necessitated careful and detailed planning.

Over the project duration, some 40 000 m^3 of concrete will be supplied and having the batch plant in such close proximity to the project site has the minimised transportation of materials

The strategic positioning of four tower cranes in support of the materials handling and structural activities has optimised reach and access across the site.

The design of Century City Square includes a large proportion of natural material finishes such as facebrick, brick paving, tiling and cladding. In addition to this, there is a fair amount of off-shutter concrete finish which is maintenance friendly.

Recycling of in excess of 80% of all waste generated on site is being undertaken. Following best practice methodologies, this process is fully documented and verifiable. ▲

Project information

- Company entering: Murray & Roberts Western Cape
- Project start date: 13 May 2014
- Project end date: 11 February 2016
- Client: Rabie Property Group
- Project team: Century City Square
- Main contractor: Murray & Roberts Western Cape
- Architect: Vivid Architects
- Principal agent: Vivid Architects
- Project manager: Rabie Property Group
- Quantity surveyor: B&L Quantity Surveyors and BTKM
- Consulting engineer: Aurecon
- Project value: R664 078 524 (inclusive of VAT)

Also entered Category E

Also entered Category E

85 Grayston Drive

The brief from Investec Property was to create new P-grade commercial offices in Sandton. Due to its prominent positioning along Grayston Drive the design of the building needed to make a visual statement that accentuated this important address.

The new offices of Shanduka Foundation and McDonalds, located at 85 Grayston Drive Sandton, is a striking multi-faceted building that sits prominently on the northern side of Grayston Drive.

The residential building to the east is recessed from the building line and to the west the site is bounded by Stan Road, which makes 85 Grayston easily discernible from all approaches. This unique development offers the perfect combination of a highly public office with a connection to the street and a peaceful elevated urban refuge.

The building frames a five-level central atrium which houses the main reception, softened with lush trees, some informal lounges, a staff restaurant and provides access to the bank of glass lifts. The office levels wrap around the central core and atrium, linked from the north to the south through the atrium by bridges, with the top two office levels capping the atrium allowing more floor area. The glass lifts and bridges create a visual link for users and visitors of the building to the atrium and office levels.

The exterior of the building consists of a combination of two bold tones of tiling creating strong geometric forms and crisp glass elements.

The western and eastern façades slope into and out of the building, reinforcing the angular forms.

Various sustainable building principles have been incorporated in the building. These include electrical light sensors, LED light fittings, water saving sanitary and brassware. The façade maximises natural daylight into the building and external views out of the building.

The geometry of the sloping brickwork required an unconventional solution to ensure that the angled brickwork is structurally stable. The structural solution was a series of dummy concrete columns and brickwork nibs that follow the line of the façade. These mock columns formed the structural elements to which the brickwork was then secured and the tops of the walls were tied back into the soffits.

Joints on the angled façade are 8 mm as opposed to the 5,5 mm on the vertical faces with a 54 mm expansion joint that aligns with the stack joint of the façade glazing. The tiles on the angled façades were then centred on the centre of the vertical faces resulting in all the tiles across the building to be aligned. Due to the narrow site and layout within the basement the column positioning was not conducive to economical space planning in the office levels. This challenge was overcome by sloping the entire column grid away or towards each other on the last parking level some 800 mm in places to create office plates which are mostly column free with the columns along the perimeters of the building. ▲

Project information

- Company entering: WBHO Construction
- Project start date: 2 September 2013
- Project end date: 28 February 2015
- Client: Investec Property
- Main contractor: WBHO Construction
- Architect: GLH Architects
- Principal agent: SIP Project Managers
- Quantity surveyor: Brian Heineberg & Associates
- Consulting engineer: Pure Consulting
- Project value: R134 535 561,94





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Photos by Oliver Karstel

Alice Lane Phase II

The Alice Lane Precinct is in the heart of Sandton's commercial hub at corner Fifth Street and Alice Lane. Alice Lane Phase II forms part of the greater precinct that entails the development of three new office towers that are linked by a central landscape piazza, pedestrian friendly and naturally green environment.

Phase II is designed to relate to both the leaping horse design Phase I, and the future flagship tower Phase III, and stand on its own architectural merit. The offices are interconnected by a super basement with seven levels of parking which measure at an area of approximately 107 000 m^2. Phase II is designed around an office anchor tenant with six office levels.

The three structures might be joined at the hip to each other by the piazza and the super basement, but they couldn't be more different from each other: from the Angular Phase I to the Curvaceous Phase II to the soon to be completed Towering Phase III.

Alice Lane Phase II's design philosophy is exceptionally executed internally and externally. Externally, the building's dominant street-facing façade is softened by sweeping curves and tight-pinched curves as a noticeable departure from Phase I's angular and faceted façades.

The north and south elevations are glazed to introduce more natural light into the working spaces. The glazing specification comprises mainly platinum grey double glazed on all the main glass façades and single glazed on the ground floor.

The ground floor extends to the exterior as a floating platform with spill out spaces for the canteen and auditorium. This interacts visually with the street. The relationship with the street is further explored with the idea of surfaces that peel away to provide vehicular and pedestrian access. Once the vegetation has matured, it will appear as a layered opening.

The building has a central atrium with clerestory light to illuminate the work spaces. This atrium is formed as the two building forms enter inside from the piazza, allowing for an internal-external continuity of space. Each floor has bridge links connecting the common area to the floor plate.

Alice Lane Phase II was awarded a 4-Star Green rating. The structure of the building is predominantly concrete. The main electrical supply consists of two sections. The critical section is backed up by a generator. The non-critical section powers items such as HVAC chillers, pumps and other non-areas not requiring generator backup. All other items are backed up via the generator. There is one generator which provides the emergency backup required for the building.

The fire protection system does not expel water during testing; alternatively, water is directed back into storage tanks. Energy consumption is reduced to 165 kWh/m^2/year and carbon emissions to 198 kg CO_2/m^2/year. A groundwater harvesting system is in place. The building is mechanically ventilated. Heating and cooling is provided by means of a four pipe central chilled water system using air cooled reversible hear pump chillers and four pipe in-ceiling fan coil units. Chillers placed on the roof make use of the compression cycle of refrigerants in order to transfer heat from the chilled water circuit to the atmosphere. ▲

Project information

- Company entering: WBHO Construction
- Project start date: June 2012
- Project end date: November 2014
- Client: ABLAND
- Project team: AP Da Costa
- Main contractor: WBHO Construction
- Principal agent: Paragon Architects
- Project manager: ABLAND
- Quantity surveyor: Quantity Cost
- Consulting engineer: L&S Consulting
- Project value: R289-million (excluding VAT)

Refurbishment of the Mercedes-Benz AMG Driving Academy, Zwartkops Racetrack, Pretoria

The refurbishment contract awarded to J.C. van der Linde & Venter Projects called for the demolition of the western part of the building, to be replaced by an ultra-modern double-storey structure overlooking the race track. Luxury balconies and a mini-pavillion adjacent to the track also had to be provided.

As part of the refurbishment contract, J.C. van der Linde & Venter Projects had to replaster all the walls that were not demolished, and provide additional new walls, floors, and ceilings, as well as undertake the tiling of the walls.

Mercedes-Benz South Africa, while the existing designs were already in the process of being built, appointed new structural engineers to re-evaluate the existing design and to assess the actual structural elements that had been built according to the original design. The client also requested that the electrical and mechanical designs be re-evaluated.

Delta Built Environment Consultants (Delta BEC) was then appointed as new electrical, mechanical, and structural consultants for the refurbishment project.

Before Delta BEC took over – and substantially re-designed the project – building work had already progressed significantly and J.C. van der Linde & Venter Projects had completed about two of the five months allocated for the completion of the project.

At that stage the shaft foundation and two concrete beams had already been cast, the steel slab support beams had already been purchased, and the internal load bearing walls and the first floor slab had been demolished which, Delta BEC comments, added to the complication of taking over the project.

The new plans called for the redesigning of the foundations for the new section of the building and its heavy roof. The design features large volumes of open spaces inside the premises so the new consultants felt that the structure had to be strengthened.

In addition, 1 627 chemical steel anchors and several structural steel I-beams, up to 457 mm in depth, were employed to carry the weight. For additional support – and to maximise the interior open spaces – 15 relatively thin steel columns with 10 mm thick sidewalls with base plates 30 mm thick, were installed instead of conventional bulkier columns.

Massive excavations had to be undertaken and, in all, over 1 200 m^3 of soil had to be backfilled after the foundations were completed. The excavations and provision of new foundations took about two months to complete.

J.C. van der Linde & Venter Projects started work on the contract in May 2014. The contract was scheduled for completion in October 2014 but the building contract's period was extended to March this year to cope with the new structural changes specified by the new consultants. ▲

Project information

- Company entering: J.C. van der Linde & Venter Projects
- Project start date: 17 June 2014
- Project end date: 20 March 2015
- Client: Mercedes-Benz SA
- Project manager: Mercedes-Benz SA
- Main contractor: J.C. van der Linde & Venter Projects
- Architect: ARCA Architects & Designers
- Principal agent: ARCA Architects & Designers
- Quantity surveyor: Taljaard Meyer & Storm
- Structural engineer: Delta Built Environment Consultants
- Electrical engineers: Delta Built Environment Consultants
- Civil engineer: Delta Built Environment Consultants
- Mechanical engineer: Delta Built Environment Consultants
- Project value: R21-million


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Also entered Category E

The Towers

Careful planning and management of façade cladding activities allowed Murray & Roberts Western Cape to gain 38 days on the construction programme for Redefine Properties' The Towers project in Cape Town's Central Business District. An emphasis on innovation, teamwork and safety characterised this landmark project, which was completed in August 2015.

Originally built in the 1970s, The Towers, previously known as The Standard Bank Building, consists of two towers, a 13 and a 23 storey building complex, with a four storey building linking the two towers. A planned upgrade of the complex to an A-grade office building incorporated wrapping the envelope in high performance architectural glazing. It also involved adding an additional 1 500 parking bays in the form of a 13 storey parking structure between the two towers, as well as upgrading of the public square.

Construction commenced in April 2013, with the parking structure columns being constructed in the current basements. The existing foundation of the seven storeys was insufficient to cope with the loading of the proposed 13 storey parking garage. New foundations were required for the basement, which continued to operate in the interim as a three level parking garage for the tenants.

After construction of the foundations for the new columns, a letterbox was constructed in the existing slab above these to facilitate the casting of the concrete for the column. Once the first column on the lower basement level was cast, the slab above was back propped and a bigger aperture was cut to extend the column through the slab.

Concurrently with this operation the existing four storey link building, situated between the two towers and on top of the old parking area where the columns were being constructed, was being demolished.

The construction programme was carefully coordinated to ensure that the construction progressing from the basement level upwards would simultaneously meet with the demolition of the four storey link building on the ground floor. Once this was accomplished, the construction of the 14 storey garage began.

One of the interesting challenges encountered on the project was maintaining a column-free space in the existing ground floor public square, with the top 10 levels of the parking structure cantilevering 13 metres over this square for a distance of 50 metres. This was achieved with the construction of a 55 metre span by 25 metre high A-frame megatruss.

The truss is designed to span 50 metres, carrying nine suspended floors by transferring the gravity load to the L-shaped shear walls at the ends.

What is especially noteworthy is the fact that an entirely separate, temporary concrete structure was built, complete with five piles, to support the A-frame until the full frame was completed, whereafter the temporary frame was demolished. This was required due to the large magnitude of the temporary loads, which would overload any conventional back-propping system.

Once the A-frame was completed, the tension ties and hangers were prestressed to between 5 000 and 14 000 kN and the bearing on the temporary columns was released through a phased downward-jacking process, using 8 000 kN flat-jacks on top of the temporary columns. ▲

Project information

- Company entering: Murray & Roberts Western Cape
- Project start date: 20 June 2013
- Project end date: 30 August 2015
- Client: Redefine
- Main contractor: Murray & Roberts Western Cape
- Architect: Smuts & Boyes
- Principal agent: BFH de Jager Project Managers
- Quantity surveyor: LDM Quantity Surveyors
- Consulting engineer: Aurecon SA
- Subcontractor (façades): World of Windows
- Project value: R370-million (excluding VAT)

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ROMPCO – Pipeline, Mozambique

In October 2000, Sasol and the Government of Mozambique signed a Petroleum Production Agreement for the development of the Temane and Pande gas fields in Inhambane Province, Mozambique. This agreement was followed by the construction of an underground, 865 km long, high-pressure pipeline from the Temane Central Processing Facility in Mozambique to the Sasol Synfuels plant at Secunda, South Africa (Mozambique Secunda Pipeline).

This current and existing gas pipeline is owned by the Republic of Mozambique Pipeline Investments Company (ROMPCO) with Sasol, the South African and Mozambique governments as the main stakeholders.

The first section of this project was awarded to Group Five Civil Engineering in July 2013 and was successfully completed in November 2014.

The Sasol, ROMPCO Loop Line 1 Project consisted of the construction of a 26 inch, 127 km long, pipeline running parallel to the existing MSP and located within the same 30 m wide servitude.

The new pipeline was looped/tied in with the existing pipeline – increasing the carrying capacity of the pipeline.

The overall project programme was 16 months. This included site establishment of a fully functional 400 man accommodation camp, construction of the pipeline, hydrostatic testing, commissioning and reinstatement.

Saddles, or Set-On Weights, were used to secure the pipeline. For logistical purposes a concrete batch plant was established on site to cast the weights while a local laboratory was subcontracted to test and monitor the quality control of the concrete weights.

The pipes utilised for the pipeline were 'free issue' and the clients responsibility (each 18 metre long). However some of the pipes delivered were magnetized as a result of the coating process during manufacture. This resulted in many difficulties and dramatically increased the weld failure rate. It was necessary to demagnetise the pipes temporarily in order to create a secure weld. This was done using a degauss coil that induces an opposing current through the coil. This temporarily eliminates the magnetic field while completing the weld, but returns again slowly once the coil is removed.

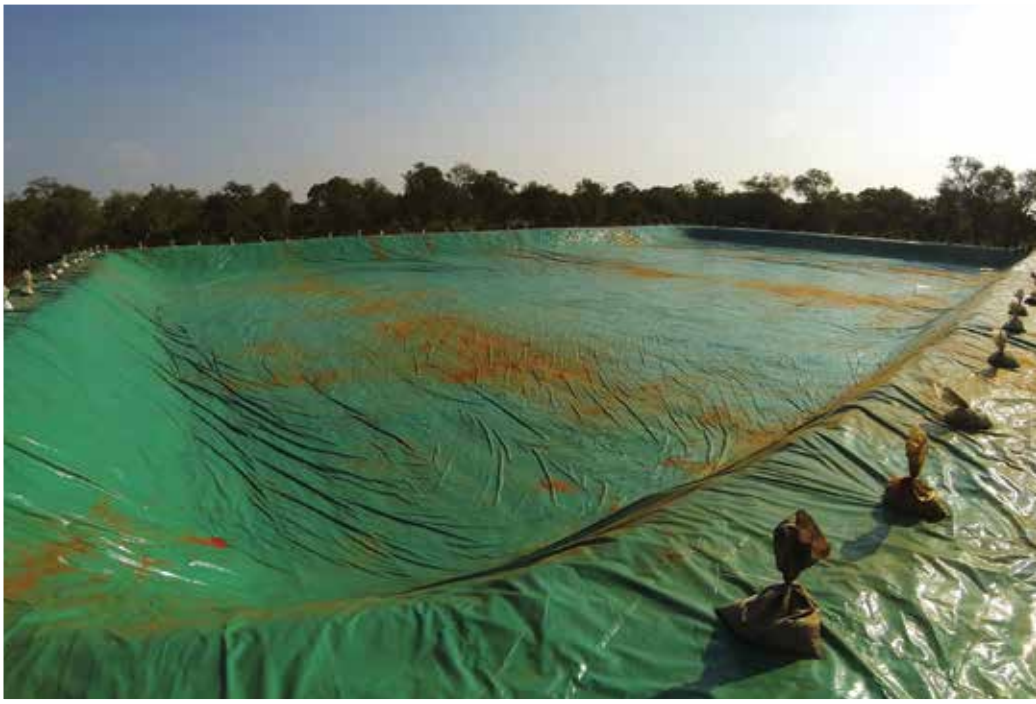
The construction of the new line was within 10 metres of the existing (operational) gas pipeline, thus blasting was not the favoured option for the removal of rock. At first the trenching activities caused a number of delays. The contractor solved this problem by procuring two TESMEC trenchers to cut through the rocky sections.

Eight new boreholes were drilled and sunk, each capable of delivering up to 10 000 cubes of water per hour. One of the boreholes was sunk purposefully for donation to the surrounding community, Muabsa. This borehole was equipped with a hand pump and concrete base for water collection.

The main design innovations came into play with the limited access of the Right of Way (30 m width). It had to be utilised not only for placing of the pipes (load and stringing), welding and coating activities but also for excavation, placing padding material (<12 mm) separate from excavated backfill material, placing concrete saddles in ROW and still have enough space to lower the pipes into the trenches. This had to be done without causing any harm to designated wetland areas while still having access for local and construction vehicles in both directions at all times. ▲

Project information

- Company entering: Group Five Civil Engineering
- Project start date: 05/07/2013
- Project end date: 11/04/2015
- Client: Sasol
- Project team: Group Five Civil Engineering, WK Construction and WorleyParsons
- Main contractor: Group Five Civil Engineering
- Consulting engineer: WorleyParsons
- Subcontractor: WK Construction
- Project value: USD59-million



The Horizon – Centro de Negócios, Maputo (Mozambique)

The Horizon project which is currently being constructed in Maputo comprises of a 19 storey apartment tower and a 15 storey office tower positioned above the four floor mixed use podium. With the main contract value of USD90-million, the contract had to be built in 24 months.

The foundation design consisting of 534 continuous flight auger piles were designed and installed by the Stefanutti Stocks Geotechnical team, and was completed in six weeks.

The striking design of the two towers features the office tower with its curved shape on plan as well as a double conical shape in elevation.

The concrete balustrades interface neatly with the curtain wall system where each floor is unique.

The apartment tower appears to mimic the rippling shape of water with clean lines of the concrete structure enclosed with an aluminium and glass façade system.

To meet the very tight programme, SS Construções opted to precast the curved shaped concrete balustrades and cast them into the edge of the in-situ coffer slabs.

The two tower cores, consisting of five lift shafts each were constructed with the use of a hydraulic climbing shutter system, the first of its kind to be used in Mozambique. The slab design employed the use of coffers and a double boarding formwork design.

The use of the precast concrete elements played a significant role in the success of the project and provided the client with an exceptionally high class finish to the building which will last for many decades.

The 34 000 m^3 of concrete cast on the project was largely batched on site with all 75 000 m^2 of slabs pumped from the batch plant via a static pump.

The client's project safety specification is based on the South African Construction Regulations. Suitably trained people to fulfill the roles of all the required safety related appointments and functions were also trained in-house to meet the demand for the safety officers, safety representatives, scaffold supervisors, erectors and inspectors to name but a few.

The labour force employed on site peaked in March this year with over 1 800 people on site.

The Horizon development includes the upgrading of the roadway which currently will be inadequate to handle the expected drastic increase in traffic in the streets around the development.

The increase in road width will result in the loss of pavement width which in turn will result in many trees being lost. Some are being replanted inside the new landscaped areas but unfortunately not all.

The apartment tower consists of 17 typical floors with 11 apartments per floor. These are made up of a three bedroom units, 3 x 2 bedroom units, 3 x one bedroom units and 4 x studio apartments. The 20th and 21st floor levels are dedicated to six double-storey penthouse apartments. ▲

Project information

- Company entering: SS Construções
- Project start date: 19 August 2013
- Project end date: 30 November 2015
- Client: Fenix Projectos E Investimentos (Rani Group)
- Main contractor: SS Construções
- Architect: DSA Architects
- Principal agent: Metrum Project Management
- Quantity surveyor: Pentad
- Consulting engineering: DG Consulting
- Project value: USD90-million

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Also entered Category B

Project information

- Company entering: Maccaferri Africa
- Project start date: 1 May 2014
- Project end date: 11 June 2015
- Contract period: 55 weeks
- Client: Swakop Uranium
- Project manager: Husab Joint Venture (HPJV)
- Main contractor: China State Construction Engineering
- Design and supply: Maccaferri Africa
- Project value: R3 000 000 (Maccaferri Africa's supply)

Mechanically Stabilised Earth Wall for the Husab Project, Namibia

The Husab Project is located in the central west region of Namibia.

Maccaferri Africa was asked to tender on the design, supply of construction material and on-site training relating to the Crusher Building MSE Retaining walls.

The MSE (Mechanically Stabilised Earth) system chosen for the construction of the wall was Maccaferri Africa's MacRes® T, which consists of a granular structural backfilling reinforced with horizontal layers of high strength polymeric reinforcing strips known as Paraweb™.

Paraweb ™ produces an apparent cohesion in the direction of the reinforcement and permits the fill to function as a homogenous gravity structure.

Maccaferri Africa's MacRes® T is located on top of a 15 m high soil nail section, this nail section was design by ARQ Consulting Engineers. In April 2014 the project was awarded and it was the start of a long road with the engineers of HPJV to get all ready for construction. Maccaferri Africa also provide full site assistance with a supervisor on site and regular inspection meetings from its engineers. Together with this Maccaferri Africa gave a complete Quality Management System to the contractor to include in their site data pack. This wall was constructed (included the casting period) in 12 months. Operations on this wall are due to start in December this year.

The use of the MacRes® T with the geosynthetic reinforcements and connections made this system ideal for the corrosive nature of the area.

The design of the wall was done Maccaferri technical department using ADAMA (MSEW) computer software for analysis of a supporting structure using Geogrid.

As on any other construction site, the Husab site had its own challenges, but none that couldn't be solved by the Maccaferri Africa team. This was a project where all the relevant parties had to work closely together to achieve the end result.

This is Maccaferri Africa's first MSE wall that was constructed on top of a lateral support system. The MacRes® T has proven itself as an adaptable solution for the design of Crusher Tip Retaining walls. Its use in conjunction with high strength geosynthetic reinforcement makes it possible to carry relatively high loads for the full design life, at strains within serviceability requirements. ▲

Nacala Rail Corridor (Section 2), Mozambique

Vale's Nacala Rail Corridor Project is being constructed to provide a new route for product to be exported from their Moatize Coal Mine in Tete via the new port at Nacala in Mozambique. The newly completed Section 2 forms part of this railway logistics corridor, starting at Moatize and covering a length of 62,5 km to the border of Malawi.

Aggressive implementation timeframes were the cause for innovative modular bridge designs being introduced to ensure that constructability would be fast-tracked.

The rail line crosses numerous rivers, streams and watercourse ways found typically on the flat plains in Mozambique. With the topography being of such a flat nature, difficulty arose with the diversion of water flowing through the Works. Due to the nature of the watercourses and the flat gradients for water to flow, the rainy season would see continual flooding.

The bridge deck designs were hence engineered to span the water with precast concrete beams. This was subsequently changed by the contractor who instead opted to use steel girders and cast the beams in-situ. Three cast-in-situ culverts were substituted with Armco Culverts found to be cheaper and quicker to construct.

There was an exceptionally short time frame afforded to this project. After losing the first six months to establishment, there was a slow start due to difficulties in plant acquisition.

The earthworks quantity went from 466 350 m^3 to 1 709 222 m^3 (a 267% increase) with the rock component being 1 110 994 m^3 and the backfilling for the concrete lined drains increasing from 4 950 m^3 to 84 376 m^3 (a 1 605% increase). Overburden stripping at borrows went from 20 000 m^3 to 137 715 m^3 (a 589% increase).

The rock protection at the toes of the fills increased from the 410 m^3 billed to 86 959 m^3. In the six months that it took to construct the rail line, the team was at peak, moving in excess of 120 000 m^3/week: through rock cuttings, having to drill and blast, load out, crush the materials, and then cart to the rail line, simultaneously building the layers on top of the fills.

Existing gravel routes were upgraded to allow for safe passage across points where intersecting with the rail line occurred. All cut areas were safe-guarded with earth berms and concrete v-drains. ▲

Project information

- Company entering: Aveng Grinaker-LTA
- Project start date: January 2013
- Project end date: June 2015
- Client: VALE Mozambique Limitada (Corredor Logistico Integrado De Nacala S.A.)
- Main contractor: Aveng Mozambique Limitada
- Project value: USD128 698 213,29

Strand Hotel – Swakopmund, Namibia

The New Strand Hotel is a 4 star luxury hotel located on the Molen in Swakopmund which is a very prominent and historical beachfront site located in the heart of Swakopmund. Stefanutti Stocks Construction Namibia is constructing this 125 room hotel for Ohlthaver & List Leisure.

The piling commenced in November 2013 with construction scheduled to start in January 2014. However unexpected ground conditions were encountered which resulted in the majority of the piling being abandoned and revised to raft foundations. This presented the first of many challenges having to source an earthworks contractor at short notice to work through the Christmas break and undertake the bulk earthworks and create the platforms for the raft foundations while the piling continued in an isolated area.

The contractor commenced with the reinforcement and concrete to the rafts in February 2014 and cast the first slab in April 2014. The quantity of reinforcement doubled with the introduction of the raft foundation which placed extreme pressure on the local reinforcement supplier both from a supply and fixing scenario.

The majority of the reinforcement was cut and bent in Windhoek some 380 km away from Swakopmund which required careful planning and transport logistics. In order to achieve the structural programme an additional reinforcement supplier from South Africa was engaged.

There was a special additive added to the concrete design mix in order to protect the raft and foundation concrete from the very corrosive soil and wet ground conditions.

The logistics of operating and maintain a tower crane in the extremely misty and damp conditions was also a challenge and the tower crane technician had to service the crane every four weeks. The concrete reinforced structure including the rafts totalled 860 tons of reinforcement, 10 831 m^2 slabs formwork and 7 300 m^3 of concrete. The structure topped out on programme in October 2014.

A challenge encountered which is unique to the area, is the Swakopmund climatic conditions. Swakopmund has one of the most corrosive climates in the world and with the site located on the beach front this added to the already sensitive climatic conditions.

The climate in Swakopmund is very misty with a constant cold south west wind. During June to August Swakopmund can experience the 'East wind' which is a very strong wind/dust storm condition with the wind blowing from desert.

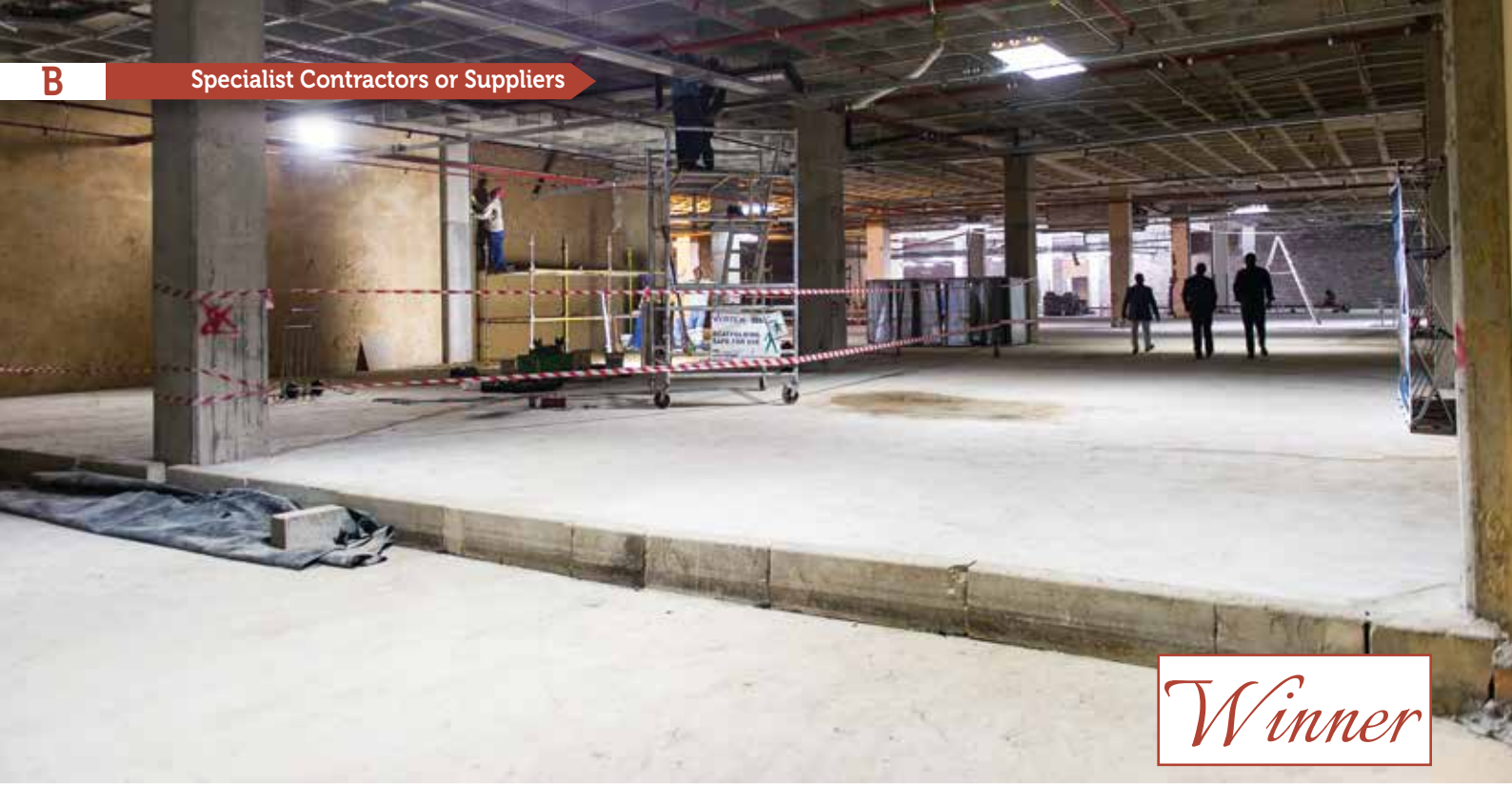
The temperatures soar to 40 degrees Celsius with extreme wind and dust. This presents another challenge with respect to the filters and dust proofing of the building including mechanical and electronic equipment.

The air-conditioning installation proved especially challenging as the specified chilled water system of this size is not normally used in Namibia.

The resources available within Namibia, both labour and materials, are very limited and even more so in remote Swakopmund. The majority of the material and specialised labour force had to be resourced and secured in South Africa which involved additional logistics regarding material import permits and working visas for skilled labour/supervisors. ▲

Project information

- Company entering: Stefanutti Stocks Construction (Namibia)
- Project start date: January 2014
- Project end date: September 2015
- Client: Ohlthaver & List Leisure
- Value: NAD204 -million
- Project team: Stefanutti Stocks Construction (Namibia)
- Main contractor: Stefanutti Stocks Construction (Namibia)
- Architect: dhk Architecture in JV with Erhard Roxin Architects
- Principal agent: Mirage Leisure & Development
- Project manager: SIP Project Managers
- Quantity surveyor: MLC in JV with JH Potgieter Quantity Surveyor
- Consulting engineer: Bigen Africa Services in JV with SCE Consulting



Winner

Supply of Innovative Lightweight Screed to Upgrade a Floor for the Super Spar in The Zone@Rosebank

The current R500-million revamp of The Zone@Rosebank, the trendy lifestyle centre in Johannesburg, includes a 3 500 m^2 Super Spar as an anchor tenant on the ground floor. Preparation of the floor area to meet the Spar specifications presented two main refurbishment challenges: it had an extremely uneven surface and structurally had load limitations because it was also the roof of the basement parking.

As a result, the specified density for the screed was 800 kg/m^3 compared with typically over 2 400 kg/m^3 for a standard concrete screed. Other challenges were meeting a tight contract timeline set by Spar's intention to open in September 2015 and the restraints set by a congested, high traffic area that precluded options such as on-site batching of concrete.

Project information

- Company entering: Lafarge South Africa, a member of LafargeHolcim
- Project start date: April 2015
- Project end date: June 2015
- Client: Landmark DSP
- Project manager: Landmark DSP

Main contractor for the Spar refurbishment project is Landmark DSP. As per the engineer's requirements, Lafarge designed a complete new product under the name Ultra® Light, an innovative lightweight concrete as an addition to its Ultra® range of lightweight ready-mixed concretes.

This high fluidity product was designed to provide cost-effective solutions for placement of concrete in difficult situations without the need for vibration. While offering the same performance as standard concrete with regard to strength and setting characteristics, Lafarge Ultra® products eliminate the need for additional working, as well as provide better finishes and durability.

Ultra® Light is normally used as a void filler rather than in a flooring application, but the Lafarge technical team considered it could provide a very effective solution for meeting the demanding requirements of the screed.

It needed high workability as well as a sufficient open time to deliver the mix to the pour site, and achieve placement and finishing; high early compressive strength to meet the specification of 15 MPa in 28 days; and be self-compacting to minimise levelling and finishing.

After successful laboratory trials and confirmation of the 28 day strength, the serious access problem posed by a congested site and the surrounding mall continuing to trade, had to be addressed by Landmark DSP. Landmark DSP came to the conclusion that the solution was to use dumpers to bring the readymix about 100 m from the two conveyor belts feeding the delivery area from the Lafarge Readymix delivery truck mixer outside the complex.

Landmark DSP gave the challenge to design a solution for the Super Spar floor to Lafarge Industries South Africa in April 2015 and the screed was completed in June 2015. The average screed thickness achieved was 152 mm with a variability of 20 - 340 mm, indicating the unevenness of the existing surface.

The contractor's team, although experienced in concrete placing, had not used this special type of mix before, which was stickier and wetter than a standard screed, but soon adapted to it and achieved excellent results that more than met the targeted strength of 15 MPa in 28 days and a maximum density of 1 000 kg/m^3.

The execution of the floor contract had to take place while The Zone continued trading. This imposed significant noise and safety constraints on the screed material supplier. The use of Ultra® Light readymix obviated the need for vibrators and grinding tools, as well as the noise and dust problems associated with on site batching. ▲

Sika Products Play Vital Role in Umgeni Interchange Upgrade

The massive R352-million Umgeni Interchange upgrade that was recently completed on one of Durban's arterial routes is a feat of engineering skill. Sika was proud to supply a varied selection of their internationally renowned products for this multi-bridge construction project.

Having successfully designed the bridges for the Gillooly's Interchange in Gauteng, one of the busiest interchanges in the southern hemisphere, consulting engineers, Hatch Goba were commissioned by SANRAL in 2009 to design an upgrade for the old split-diamond, signalised intersection between the N2 and the M19. The new design was for a free-flow directional four-level systems interchange, involving the construction of five new bridges and two pedestrian bridges, with two incremental launch bridges as prominent features.

Project information

- Company entering: Sika
- Project start date: March 2011
- Project end date: July 2015
- Client: SANRAL
- Main contractor: Rumdel Cape/EXR Holdings
- Architect: Hatch Goba
- Consulting engineer: Hatch Goba

The incremental launch technology involves sliding sections of bridge deck over special bearings, which are concrete blocks covered with stainless steel and reinforced elastomeric pads. The first such bridge constructed was 232 m, from Umgeni Road onto the N2 Northbound while the second one measured 205 m from the N2 Northbound onto Umgeni Road.

Métier Mixed Concrete supplied shotcrete for rock stabilisation of the Umgeni on-ramp to the N2 Southbound.

Two Sika products were added to the shotcrete: SikaPlast V210, an aqueous polymer solution that is a multi-purpose water reducer and superplasticiser, and SikaTard-930, a retarding concrete admixture developed for the control of cement hydration. It can be used in wet or dry spray shotcrete where cement hydration of the concrete mix is prevented (for up to three days, if required).

Sikadur-31 CF Normal was used on the base plates of the columns supporting the incremental launch to be used for the launch bridges. This extremely versatile, moisture-tolerant, thixotropic, structural two-part adhesive and repair mortar is based on a combination of epoxy resins and special fillers.

Rugasol-2-Liquid was applied on all concrete pours to prevent cold joints and to allow a keyed surface for new concrete. This surface retarder eliminates scabbing, reduces labour costs and is solvent-free.

Exposed rebars were protected by Sika-Top-Armatec 110 EpoCem, an anti-corrosion coating and bonding agent that provides excellent adhesion to steel and concrete.

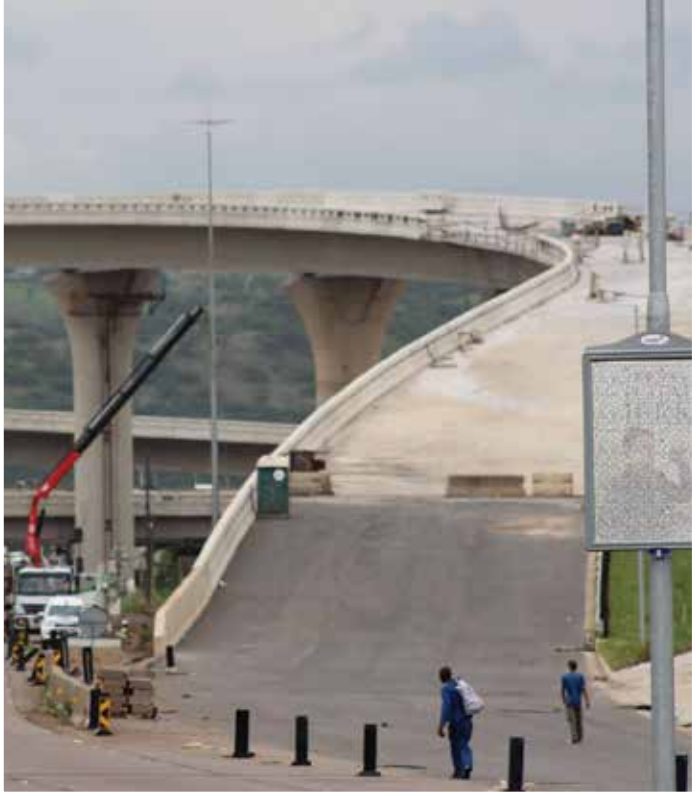
Sika AnchorFix-3+, a thixotropic, two-part, epoxy-resin based anchoring adhesive, was used for bonding the rebars.

Many of the concrete repairs were done by applying SikaGrout-212, a cement-based, fluid grout that expands by gas generation while still in the plastic state of curing. Supplied as a ready-to-mix powder that allows for an adjustable consistency, it is easy to use and provides rapid strength development and high final strengths. SikaGrout-212 is also non-corrosive and shrinkage compensated.

Further concrete repairs were carried out using Sika Rep LW, a one-component, non-sag, cement based, multi-purpose patching and repair mortar that is suitable for vertical and overhead applications.

To fill void cavities formed on road barriers on the bridges, Sika's economical, expanding grout admixture, Intraplast-Z, was used. Designed to introduce micro bubbles into the mix, Intraplast-Z creates wet volume expansion and increases fluidity without segregation. It is used to increase cohesion in cement grouts.

Another economical product supplied was Sika Separol GU ZA, an oil-based release agent for all formwork. ▲



Also entered Category A3

Special Mention

Rockfall Support of Orapa Mine AK1 Pit 805 Ramp and North Eastern Ramp, Botswana

How do you limit rocks from being dislodged from the upper areas of degrading slopes in open pit mines?

How do you limit these rocks from, once being dislodged, falling, gaining momentum, and eventually becoming virtual missiles when they come to rest at the floor of the mine pit, or onto the haul roads.

The answer is simple … you cover the guilty slopes of the open cast mine with a big fence. The execution of the design, correct product choice and installation of this big 'fence', is not quite so simple.

In 2013, Wepex, a specialist geotechnical contractor based in Durban South Africa, partnered with global steel manufacture and suppliers, Maccaferri, and consulting engineers Melis & Du Plessis of Somerset West, to undertake a rockfall mitigation installation to giant Botswana mining company Debswana Diamond Company.

One of Debswana's flagship open cast diamond mines, Orapa Mine, was facing some challenges with rocks falling down some of their slopes, particularly during rainy season.

Orapa Mine is a conventional open pit mine, situated 240 km west of Francistown, Botswana. Orapa Mine is currently mining at a depth of 250 metres and is expected to reach 450 metres by 2026.

Debswana Diamond Company awarded Wepex the contract to design and install a mitigation solution to two areas of concern on the Orapa Mine's highwall pit slopes. Both high walls were above active haul roads, that allow vehicular traffic into, and out of the open mine pit.

If these haul roads were not able to be kept operational and adequately safe throughout the year, it would severely impact the operational capability of the mine.

The wire mesh chosen as the project needed to be strong, long lasting, and of a correct weave to restrict the size of the smallest rocks that may pass through the aperture of the drapery mesh system.

Maccaferri's STEELGRID HR 50 was selected as the product of choice. The STEELGRID mesh is the new woven geocomposite made by interwoven steel wire and ropes inserted in place of the conventional selvedge wire, during hexagonal double twisted wire mesh production.

The design for Rockfall Support of Orapa Mine AK1 Pit 805 Ramp and North Eastern Ramp via Drapery Wire Mesh Support project was designed by consulting engineers, Melis & Du Plessis. It required an anchoring system at the crest of the highwall slopes; the drape wire mesh to cover the entire extent of the project scope; and be weighted at the toe to limit the runout distance of falling rock rock onto the haul road.

The anchoring of the drape wire mesh had its own unique challenges, as there are two different types of bed rock at the crests of the two drape wire mesh installation areas.

The anchoring system for the drape wire mesh also has to be strong enough to anchor the weight of the drape wire mesh and hold back any blocks of rock that worked itself loose on the slope highwall, and remain trapped behind the drape wire mesh curtain.

Specialist geotechnical contractor, Wepex, constructed all elements of the Rockfall Support of Orapa Mine AK1 Pit 805 Ramp and North Eastern Ramp via Drapery Wire Mesh Support project. ▲

Project information

- Company entering: Maccaferri Africa
- Project start date: December 2013
- Project end date: November 2015
- Client: Debswana
- Project team: Wepex, Maccaferri Africa and Melis & Du Plessis
- Main contractor: Wepex
- Consulting engineer: Melis & Du Plessis
- Project value: R5 725 661 (Maccaferri Africa's supply)

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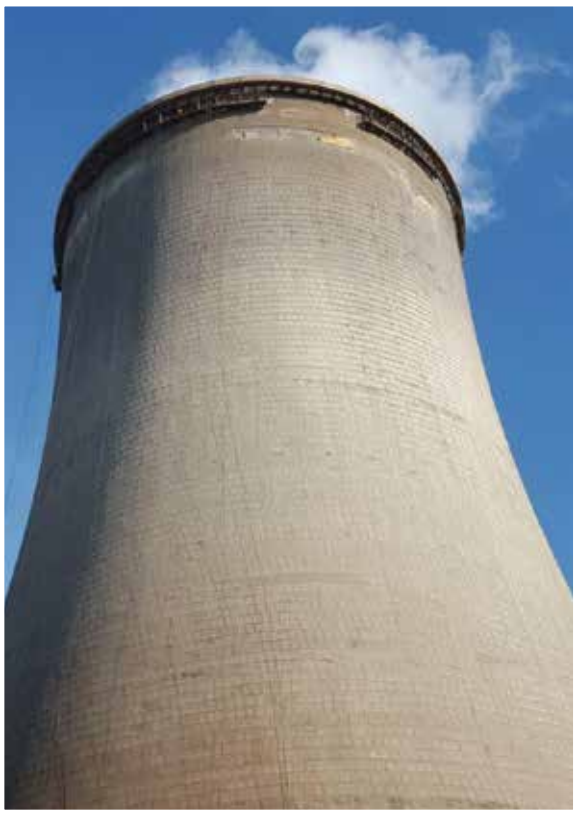


Sasol Process Water Cooling Tower

Repeat client, Sasol Group Technologies, required urgent repairs to their eight rapidly dilapidating concrete process water cooling water towers.

The scope would entail the removal of spalled concrete, replacing of reinforcing, reinstating with structural grout and sealing of the entire structure with polyurethane coatings. Sasol engaged the services of Aveng Grinaker-LTA's specialist concrete repairs team to carry out the repairs to the first tower in need of the most repairs, with the possibility of more towers being awarded at a later stage.

Providing safe access to the top of the tower and work face provided the most complicate challenge – especially with the complex shape of the structure. The Process Water Cooling Towers at Sasol Secunda are 140 m high, 65 m in diameter at the top and 105 m at the bottom.

The structural raking columns take up the bottom 20 m and prop up the structure. Access is provided by a means of Alimak and 24 Temporary Suspended Platforms. These comprise of 16 x 8 m wide working platforms and 8 x 4 m wide shuttle platforms. Alimak is installed to the profile of the Process Water Cooling Tower.

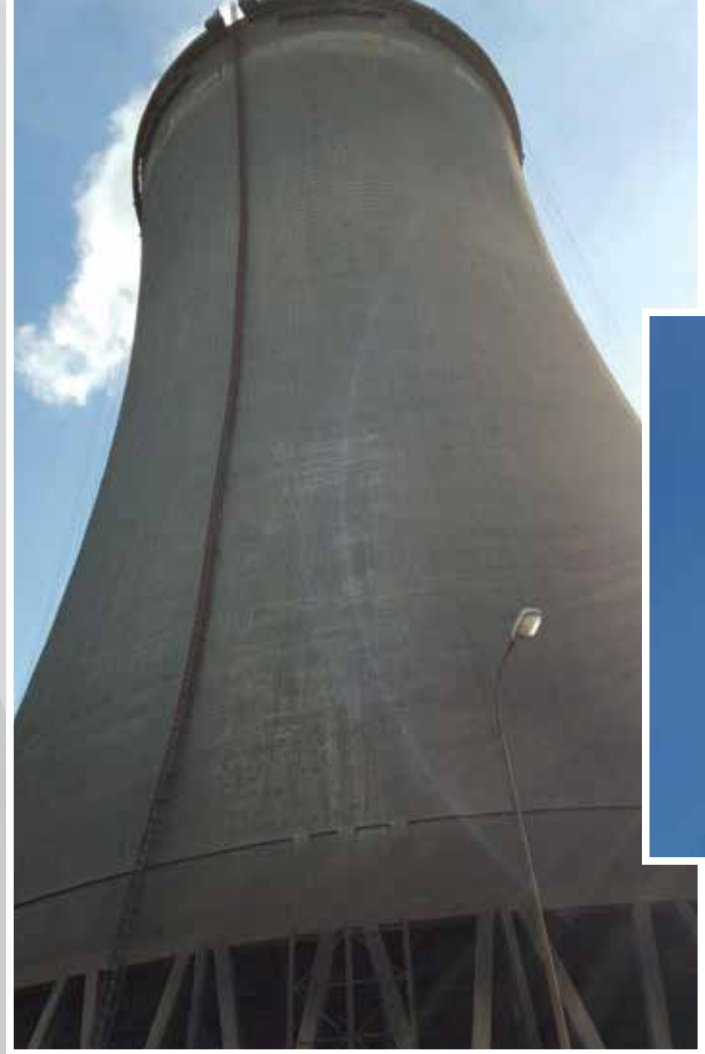
The vertical level was controlled with a theodolite. Mast sections were running parallel to the tower surface and anchored to the concrete. Initially the anchors were chemical anchors which changed over to express anchors due to the 150 mm thickness of the wall. The profile against the tower was achieved by installing spacers to the mast sections to allow the sections to curve. This is only done every second section. Special brackets were designed to accommodate the walking platform on the top rim of the cooling tower.

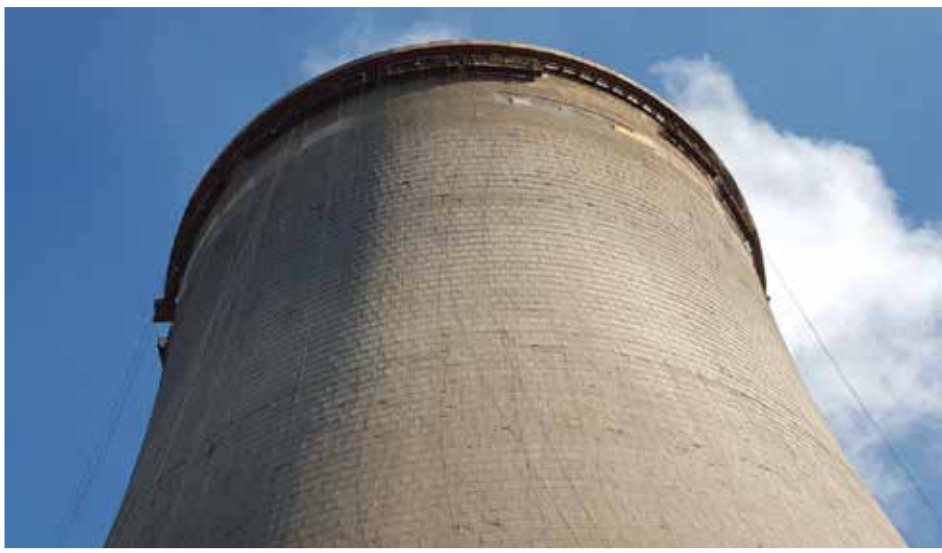
A monorail section is installed with brackets to allow a temporary platform to suspend from the brackets while still being able to transverse horizontally. The movements (vertically as well as horizontally) of the temporary suspended platforms (TSPs) were the main concern of the project as this is where the most time would be lost.

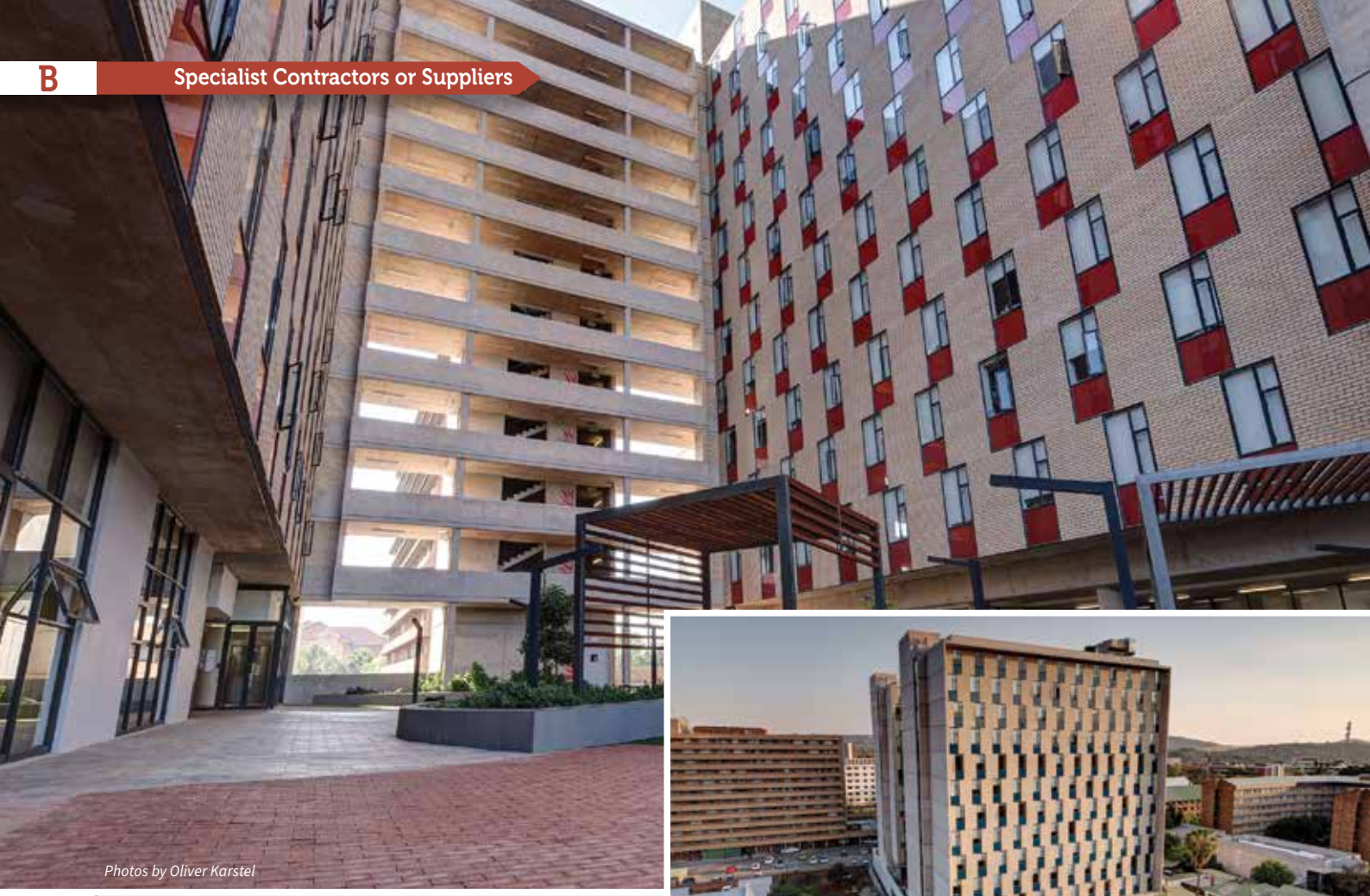
As the project kicked off into the construction phase, extra methods were adopted and innovated to achieve a higher efficiency. These included a trap door design to allow the team to enter from the top platform to reduce the lost time of access to the system. This eliminated the time lost by using the shuttle platforms to access the work area from ground level. ▲

Project information

- Company entering: Aveng Grinaker-LTA
- Project start date: 28 May 2014
- Project end date: 28 February 2016
- Client: Sasol Synfuels
- Main contractor: Aveng Grinaker-LTA
- Project manager: Aveng Grinaker-LTA
- Consulting engineer: Wynand Louw & Associates
- Project value: R66 037 396,82







Photos by Oliver Karstel

Hatfield Studios

With the University of Pretoria continuing to grow and more and more students coming from outside Pretoria, student accommodation is very scarce. Ellinas Developers saw an opportunity here and successfully leased the planned 'Hatfield Studios' to the University and a very ambitious build commenced in November 2013, occupation date December 2014.

Project information

- Name of company entering: PERI Formwork & Scaffolding Engineering
- Project start date: 8 July 2013
- Project end date: December 2014
- Client: Feenstra Group
- Project team: Feenstra Group
- Main contractor: Basil Read
- Architect: Boogertman + Partners
- Project manager: Feenstra Group
- Quantity surveyor: DelQS
- Consulting engineer: DG Consulting Engineers

Generally a building will have two to three shafts for access, one for lift access, and one or two for stair/emergency exit. Hatfield Studios which consisted of a large parking basement and two towers of rooms, had a grand total of 12 shafts.

In addition to this, the east and west walls of the basement and towers were off-shutter concrete feature walls. The progress of a shaft or feature wall always determines the progress of the whole project.

Cranage was always going to be a critical resource and with the construction site having a relatively small footprint, the main contractor decided on only two tower cranes.

With each shaft and feature wall requiring at least four hours of crane time, 56 crane hours would be consumed every two weeks on the shafts and feature walls alone to meet the ambitious programme.

Also, the towers were designed with structural internal walls requiring crane lifting of gang-formed shutters there too.

The advantage of this design is that the floors are very modular which is perfect for custom made table formwork.

The initial plan from the formwork supplier was to utilise 16 m^2 tables and crane them into position, one by one.

It soon became apparent that there would not be sufficient surplus crane capacity to move flooring formwork.

The tables were replaced with the light man-handable Skydeck 1,125 m^2 panel which could be carried from floor to floor. The heaviest part of the Skydeck system, the 2,25 m long main beam, weighs just 15,5 kg.

Eight hour days quickly turned into 16 hour days with self-compacting concrete being poured late into the night. Although it was a very ambitious programme, accuracy was paramount as the main contractor had opted for a pre-manufactured modular bathroom requiring tolerances of millimeters to fit into the rooms.

Errors did occur and critical remedial work had to take place including breaking down an interior wall, propping the floors and then recasting the walls from the bottom of the shutters with self levelling concrete and a special pump/shutter adaptor.

Labour took strain with the long hours, there was a month-long steel strike during winter, but the University took reasonable occupation in the middle of December 2014. ▲

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Kaytech System Used in Major Ballito Road Upgrade

Introduced into the South African market by Kaytech, the Tensar TW1 System was developed as an alternative to traditional retaining wall options and has been used extensively in Europe and elsewhere internationally. The system was recently used on a major road upgrade contract in Ballito, one of the first and largest local applications of the system to date.

Project engineers, SMEC South Africa, were involved in the detailed design of the system and realised a number of cost benefits on the project by using the Tensar TW1 System.

The scope of works entailed the widening of a two-lane, single carriageway to a three-lane, dual carriageway in Ballito, about 40 km north east of Durban. Due to the site's undulating topography, earth-retaining structures had to be built to bring the extra lanes to level. The lane widening had to be constructed within the road reserve to eliminate encroachment into existing developments. To reach this objective, two near vertical, Mechanically Stabilised Earth (MSE) walls of 11 m and 5 m, covering a total length of over 400 m and 2 000 m^2, were proposed.

A key consideration in the design was to optimise the use of lower quality fill material, while simultaneously minimising the amount of lateral support required in cutting back and benching into the existing roadway; i.e. the back excavation slope. Limited space was available for the 11 m high wall, which restricted the length of the strips to 7 m. At the same time it would be beneficial to the project if Berea sands could be utilised. However, by using the lower quality fill, strip lengths would need to be increased, which implied either increased cut or the use of a near vertical back excavation slope requiring the use of shotcrete and ground anchors or nails.

After a number of iterations, the final design for the 11 m high wall comprised the use of 7 m long strips, a granular backfill for most of the height and 1 m thick granular soil-raft foundation. No lateral support was thus required and conventional benching into the existing fill was utilised. For the upper 3 m of the 11 m wall and for the 5 m high wall, Berea sand was used throughout.

In utilising the new system a number of challenges were experienced during construction. These included: the setting of the base block, which is key to achieving the final face inclination of 86°, compaction criteria, stormwater control, and the use of labour inexperienced in building these walls. However, these problems were quickly resolved through close collaboration between the contractor, consultant and supplier.

From the Environmental Assessment it was noted that the removal of existing indigenous trees within the road reserve would result in a loss of biodiversity. This however was unavoidable due to the nature of development. Rehabilitation measures had to include replanting the same species of trees. Also during construction large amounts of soil disturbances are expected. Re-vegetation of all disturbed soil was instituted immediately after construction.

As another environmental advantage, the TensarTech TW1 system (MSEW) is ideal as an alternative to traditional retaining wall options as the geogrid and geotextiles used in its construction assist in reducing the project carbon footprint, and at the same time minimise the use of natural materials. ▲

Project information

- Company entering: Kaytech
- Project start date: June 2013
- Project end date: September 2014
- Client: Kwadukuza Municipality
- Project team: Kaytech, SMEC and Afriscan
- Main contractor: Afriscan Construction
- Project manager: SMEC South Africa
- Project value: R8,5-million (walls and fills)

Neckartal Dam: Kwikspace Modular Buildings Breaks New Ground in Namibia

The construction of the Neckartal Dam, Namibia's largest dam, is underway along the Fish River and is of great significance to the country as it will create a reservoir capable of holding 857 million m^3 of water, based on figures by Salini Impregilo S.p.A.

On completion, the dam will bring about economic growth and prosperity in the country as it will be used for power production, irrigation and agricultural development. In addition, the development thereof has created a number of job opportunities.

To ensure the smooth running of the construction process, the provision of buildings such as accommodation camps and office space for the construction team is essential. For this reason, Kwikspace's rapidly deployed units were highly suitable to the project requirements.

Kwikspace played a valuable supporting role in the processes surrounding the construction of the Neckartal Dam. This was achieved as part of the following three phases:

Phase I: Rental units (accommodation)

In order to accommodate the construction team involved with the development of the Neckartal Dam, Kwikspace was contracted by Salini, the construction and engineering company responsible for the construction of the dam, to provide six 6 m x 3 m accommodation units.

This project was a milestone for the company, as it marked Kwikspace's first ever delivery of rental units in Namibia. Kwikspace has the largest rentals fleet in sub-Saharan Africa and had had prior involvement in Namibia on other projects, and thus it was a positive expansion of its presence in this neighbouring country.

Phase II – Site-erect buildings (offices)

Shortly after this project was initiated, Kwikspace was contracted by Salini to construct two offices at the Neckartal Dam Project site. Measuring 1 206 m^2 in total, the two offices were set up as site-erect buildings, which allowed for easy transport of the building materials and on-site completion according to the clients' specifications. In this instance, the Salini office measured 758 m^2 and the engineer's office 448 m^2.

On completion of these buildings towards the end of 2014, over 60 employees were provided with office space.

Phase III – Site-erect buildings (accommodation)

Based on the success of the first two deliveries, Kwikspace was yet again awarded a contract to set up accommodation facilities at the site of the Neckartal Dam. This phase of the project, however, entailed the construction of site-erect accommodation units and a laundry unit, measuring 3 753 m^2 in total.

Kwikspace was responsible for the supply, manufacture, delivery and construction of the building shells and made provision for the client to include their own fittings.

Never afraid of a challenge, Kwikspace completed the construction of the buildings at the top of a plateau, with a valley reaching 120 metres below, where winds can reach up to 120 km per hour.

The success thereof, coupled with the fact that Kwikspace has completed numerous accommodation and office projects throughout sub-Saharan Africa at the sites of massive projects and in remote locations, has proven that the company is a reliable and highly competent supplier of rapidly deployed buildings.

Due to the robust nature of Kwikspace's products which are manufactured using polyurethane panels, its clients were provided with comfortable accommodation and office space as these insulated panels allows for temperature control, noise reduction and prevention against the ingress of dust, water and insects. ▲

Project information

- Company entering: Kwikspace Modular Buildings (Kwikspace)
- Project start date: June 2014
- Project end date: July 2015
- Client: Salini Namibia
- Project team: Kwikspace Cape Town Branch, Kwikspace Klipriver Branch
- Main contractor: Kwikspace Modular Buildings

Project information

- Company entering: Gauteng Piling
- Project start date: 13 May 2014
- Project end date: 30 May 2015
- Client: The Market Theatre Foundation
- Main contractor: Solidaire Construction
- Architect: KMH Architects
- Principal agent: Solidaire Construction
- Project manager: Badat Developments
- Piling contractor: Gauteng Piling
- Project value: R810 000

Piling for The COSAC Project, Newtown

Piling is not normally an indoor assigment, nor is a piling company usually required to preserve the walls of a relatively small 98 m² 'room' while driving piles as much as 7 metres into the ground inside such a small enclosed area.But to provide new foundation elements for COSAC Building, which comprise extensions to the Market Theatre complex in the Johannesburg CBD, Gauteng Piling had to do piling inside an old, landmark restaurant famous for defying the racial laws in the days of apartheid.

The Market Theatre Foundation commissioned the alteration and demolition of some of the buildings on a city block bounded by Bree Street to the north, Miriam Makeba Street on the east, and Margaret Mcingana Street on the west. COSAC Building, the new development east of Mary Fitzgerald Square, will provide additional facilities for the Market Theatre precinct, including a new theatre, rehearsal rooms, library, gallery space, classrooms and offices. It has been designed by KMH Architects.

The construction site is located among some early Johannesburg buildings and façades, including Schlom's Eating House, and the Graffiti Building, east of Mary Fitzgerald Square.

Schlom's Eating House dates back to 1914 and has, according to leading heritage consultant, Herbert Prins, 'strong social significance'. Graffiti Building, which was at one stage a grain warehouse before its walls were over the years adorned with graffiti by some talented street artists, was built a few years after Schlom's.

As the Market Theatre Foundation had re-arranged the large-scaled redevelopment of its property to preserve these historic buildings, particular and stringent piling precautions were essential to avoid damaging the revered heritage structures.

The contractor utilised a bored piling rig, equipped with an 800 kg hammer, which was then dropped from a height within the building itself to create 14 piling holes, between 6 m and 7 m deep, and 410 mm in diameter. Reinforced steel cages were then placed in the piling holes prior to these being filled with concrete.

The use of the 'old-fashioned' compact rig was essential because a normal rig obviously would not have been able to access the old restaurant without damaging its façade.

For COSAC Building, Gauteng Piling was subcontracted by the main contractor, Solidaire Construction, to provide 73 auger cast piles and 14 bored piles, varying in depth from 8 to 12 metres, and 250 mm to 850 mm in diameter, on the development site of about 2 000 square metres in Newtown. ▲

Photos by Oliver Karstel

Sasol Corporate Offices

In recent months, a number of office buildings on Wierda Road West have been demolished and construction is under way at a rapid pace on the contemporary structure which will be the new premises of petrochemical giant Sasol. The 10 storey high building which is aiming for Green Star Rating by the Green Building Council of South Africa will undoubtedly change the landscape of Wierda Valley permanently.

Described as a 'floating glass box' by its designers, Paragon Architects, the building is the latest in a stream of high profile structures which Paragon Architects, led by Anthony Orelowitz, have been commissioned to design. Other iconic designs include the Norton Rose Towers, Alice Lane and the Alexander Forbes building.

Project information

- Company entering: PERI Formwork & Scaffolding Engineering
- Project start date: October 2013
- Project end date: November 2016
- Client: Alchemy Developments and Projects
- Main contractor: Aveng Grinaker-LTA
- Architect: Paragon
- Consulting engineer: Sotiralis
- Project value: R1,3-billion

Alchemy Properties was awarded the tender to develop and lease this massive structure, will be equal investment partners with the Sasol Pension Fund, and will lease this commercial space to Sasol.

The major challenge for the site which is on a curving edge of the street, is to ensure a large building of 70 000 m^2 can be accommodated and well-connected both vertically and horizontally.

The basements were constructed with the PERI Skydeck system as the system allows for exceptional turnaround times from erection to pouring and then stripping. The main contractor Aveng Grinaker-LTA had approximately 10 000 m^2 of decking for basement construction. Vital to the success of the projects programme was to avoid delivering a decking system (10 000 m^2) for the basement just to replace it by introducing a new system for the towers. The sheer volume of equipment would have had a negative effect from a lead in standpoint, hence the importance of a versatile decking system catering for all variances.

The core of the towers that rose from lower ground to ground floor, shaping the tower footprint, introduced large slab thickenings from 2 m up to 15 m at depths of 750 mm creating vast areas of concrete at heavy loads.

These loads were supported off the PERI Skydeck with the MP Multiprop system by introducing smaller panels sizes on the grid, enabling sufficient load carrying capacity. Thus, utilising the PERI Skydeck to its' full capacity, supporting the aforesaid statement of a versatile system.

The uniquely shaped towers were designed with the intention of coming off a smaller footprint and increasing every level from Ground to 10th floor, thus creating larger floor sizes per level.

The cantilever areas floor to floor varies between 500 mm to 1 500 mm creating large overhang areas, challenging as to what is regarded as safe working practice. The columns that enabled certain slabs to cantilever excessively were designed allowing for various sizes, shapes and at numerous angles.

Equally challenging were the bridges connecting the tower blocks where some spanned up to 37 m across from block to block. The height of certain bridges are in excess of 20 m, adding to the complexity of the structure which required specialised shoring to counter deflection over such a dramatic span.

The structure will sit as a floating glass box hovering above indigenous parkland. The building will have seven basements levels with 10 stories above ground. The concept of open, transparent and remote work spaces is extended to embody the traditions of Sasol to include restaurants, canteens, art galleries, coffee shops and a Sasol One Stop Shop. ▲

Also entered Category E

Stable Roads at Geelkrans Nature Reserve

The client, Cape Nature was looking for a permanent, yet flexible solution for jeep tracks on deep sandy substrates at Geelkrans Nature Reserve, Stillbaai, without the associated footprint impacts of commonly used hard structures such as asphalt or paving.

Mobicast, Terraforce licensee in the Garden Route area, suggested the Terracrete paving block, a permeable and interlocking eco-surface paver that can be laid in different patterns and may be used with or without ground anchors for the lining of riverbanks, roads and other areas subjects to soil erosion.

The blocks where installed to form a two-wheel jeep track as an erosion control and maintenance measure for existing sand tracks. Says Jean du Plessis, conservation manager, Geelkrans Cluster & Stilbaai Marine Protected Area: "We have a network of maintenance jeep tracks that give us access to the different sections of the reserve. The substrate is mostly deep dune sand, making it inadequate to surface with normal paving. Putting down a road base foundation and or compacting have been proven to be very costly due to the nature of the substrate.

"Investigating alternative solutions produced the principle of putting down a 'hard' surface that is permeable for water and vegetation. The idea is also that the surfacing material should then be able to move with the substrate while keeping its shape and integrity. We decided to use the Terracrete blocks because of their permeable nature, minimal impact on the environment and cost-effectiveness."

The blocks are relatively easy to work with, compared to other methods that involve more sophisticated machinery and labour. Says Du Plessis: "We do get breaking of about 2% of the blocks during handling as the transport of the blocks to the target areas does require a minimum of two loading/offloading processes due to the nature of the terrain, but on the whole the process is straightforward and causes very little disturbance in the reserve, which is what we were looking for. Another benefit is that the blocks, if they do break, are easy to replace, making maintenance of the tracks quick and easy."

Construction commenced in March 2013 and is still ongoing. The tracks are installed in stages of 250 m each, with 7 000 blocks already laid down. To rehabilitate any destabilisation that did occur during construction, *Carpobrotus edulis* (Sour Fig) were planted on the verges of the jeep track. ▲

Project information

- Company entering: Terraforce
- Project start date: March 2013
- Project end date: October 2015
- Client: Cape Nature (Western Cape Conservation Board)
- Project team: Cape Nature Geelkrans Complex Management
- Main contractor: Cape Nature
- Project manager: Jean du Plessis
- Project value: R415 000


DOOSAN

Preekstoel Water Treatment Works

Located in the scenic Hemel and Aarde Valley, near the rapidly-expanding town of Hermanus, in the Western Cape, the Preekstoel Water Treatment Works (WTW) was constructed in 1974 with a capacity of approximately 14 megalitres per day (Mℓ/d). The works was extended in the 1990s to treat a total of 28 Mℓ/d. The works, which is operated by the Overstrand Municipality, was designed to treat surface water with high colour and high Natural Organic Material from the De Bos Dam.

The project team was required to address two problems presented by the client. Firstly they needed to ensure that the municipality could meet the peak demand flow for the next 25 years. Secondly they needed to provide a means of treating available ground water within the municipality to ensure a sustainable baseline flow independent of the surface water supply the Municipality as dependant on.

The former requirement was met by refurbishing the existing WTW to achieve its design flow of 28 Mℓ/d. This was a challenging exercise as the plant had to remain in operation throughout the construction period, and needed to be able to process its full capacity during key seasonable periods. This required significant planning and co-ordination from the entire project team. The peak flow would further be augmented by the utilisation of an alternative water source, groundwater as discussed below.

The latter requirement required the treatment of groundwater. Concentrations of 1,0 mg/ℓ of iron, and 0,4 mg/ℓ of manganese in drinking water can cause health issues, particularly in infants, young children and other sensitive groups. However, most of the problems are usually aesthetic and start at concentrations of between 0,01 mg/ℓ and 0,2 mg/ℓ for iron, and 0,05 mg/ℓ for manganese. The concentrations of iron and manganese in the water were typically greater than 2 mgFe/ℓ and 0,5 mgMn/ℓ respectively.

Due to the nature of the surface water chemistry it would not be possible to blend the ground water and surface waters and treat them conventionally. The blended water would make the treatment process much more complicated. Thus the Municipality would need to treat the groundwater either before the WTW, or separately. The Municipality had already experimented with chemical oxidation of groundwaters but had found this solution to be unsustainable for a number of reasons, namely: the cost of the oxidant chemicals was high, the stoichiometry of the oxidation reactions are unforgiving, thus overdosing, or under-dosing would result in either breakthrough of the dissolved metals, or the oxidant, lastly the chemical dosing system required significant operator input and was a strain on the existing municipal resources.

The Municipality proposed that Aurecon investigate the option of biological oxidation (biofiltration). This technology had been piloted by Umgeni Water in 2008, however it had never been implemented at a full scale in South Africa.

The two solutions, namely the refurbishment of the existing works, and the construction of a biofiltration plant were executed between 2010 and 2014. The existing works was commissioned in 2012 and the Biofiltration Plant commenced seeding in late 2013 and fully commissioned in early 2014. Following the successful operation of the biofiltration works other treatment facilities in South Africa are projected to follow suit and adopt this type of water treatment process in the near future. ▲

Project information

- **Company entering: Aurecon**
- **Project start date: 2010**
- **Project end date: 2014**
- **Client: Overstrand Municipality**

Project team

- **Electrical/electronic design: Aurecon South Africa**
- **Process and civil design: Aurecon South Africa**
- **Structural design: Aurecon South Africa**
- **Architect: Alex Stewart & Associates**
- **Contract management: Aurecon South Africa**
- **Environmental consultant: SRK Consulting Engineers and Scientists**
- **Geohydrological specialist: Umvoto Africa**

Preekstoel Biofilter

- **Civil contractor: Inyanga Projects**
- **Mechanical contractor: PCI Africa**

Highly Commended

Construction of the Northern Areas Sewer – Phase II

AECOM was appointed in 2009 by the City of Cape Town (CCT) for the professional services related to the design of the new Northern Areas Sewer – Phase II (NAS2), and the subsequent tender compilation and contract administration.

The existing Northern Areas Sewer (NAS) is a major collector sewer currently serving an area of 4 100 ha of the northern suburbs of Cape Town. The NAS starts just east of Jan van Riebeeck Drive and follows the Elsieskraal River up to Jan Smuts Drive where it turns south along Jan Smuts Drive up to the Langa Pump Station. The total length of the NAS is approximately 8,7 km.

The NAS was originally commissioned in 1951 and is over 60 years old. Since 1994 it was reported that the NAS does not have sufficient capacity to service the existing catchment area. To this extent a portion of the NAS (from the start just east of Jan van Riebeeck Drive to a position just west of Jakes Gerwel Drive, i.e. a total length of approximately 3,8 km) was replaced in 2000/2001.

This project entailed the replacement of the remaining 4,9 km portion of the original NAS, downstream of Jakes Gerwel Drive up to the Langa Pump Station.

AECOM conducted an updated estimate of the expected future flows in the NAS (in terms of the required capacity) based on a design life of at least 50 years. The predictions took into account all future development plans in the catchment, including the plans to develop Wingfield, Acacia Park, the Conradie Hosipital Site and the Old Mutual Golf Course site. In addition, densification was taken into account based on the CCT's Densification Strategy.

Based on these assumptions, it was estimated that the maximum flow that the NAS2 would need to accommodate during future peak wet weather flow conditions would be approximately 3 000 ℓ/s. This is significantly higher than the current capacity of the existing sewer which is in the order of 600 ℓ/s

CSV Construction was appointed for the construction of the NAS2 in May 2013. ▲

Project information

- Company entering: AECOM
- Project start date: 7 May 2013
- Project end date: 20 October 2015
- Client: City of Cape Town
- Main contractor: CSV Construction
- Principal agent: AECOM
- Project manager: AECOM
- Consulting engineer: AECOM
- Subcontractor: Wepex
- Project value: R160 708 688,14 (including VAT, 10% contingencies and escalation)

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The Point, Sea Point

When the V&A Waterfront was developed, Sea Point's locals and tourists flocked to the Waterfront, leaving Sea Point's restaurants and shops empty. This resulted in the slow demise and eventual collapse of business in this once bustling community. Sea Point Main Road became third world, and crime crept in.

Now, revitalising Sea Point, is The Point, a massive redesign and rebuild of the old Galleria building on 76 Regent Road. The old double storey building, built in 1984, was centred around its anchor tenant, Checkers.

The building has been totally transformed into a light and airy nine storey shopping and lifestyle centre servicing all ages and incomes.

Besides the completely redesigned Checkers store and various small boutique tenants, The Point also houses big brands such as Sportsman's Warehouse, Dis-Chem Pharmacy and Pick n Pay Clothing. Above the retail shops is a gym, health and lifestyle specialists, various medical practitioners and offices.

The new centre now comprises almost 28 000 m^2 of retail and commercial space with 480 parking bays. The Point has brought new life to Sea Point and has uplifted the community and Sea Point as a whole.

The existing building with a footprint of 4 940m^2, comprised three levels of basement parking with ground and first floor being retail and office space.

About 2 600 m^2 of the ground floor was occupied by the anchor tenant, Checkers. Besides Checkers and some small line stores, the remainder of the building was vacant, and was falling into a serious state of disrepair.

Due to the proposed increase in retail and commercial office space, additional undercover parking was needed to provide an off-street facility for shoppers and tenants. To this end various options were investigated of which the most obvious would have been to demolish the entire building and to start from scratch.

This option was however out of the question due to the fact that Checkers had to remain fully operational throughout the building process. Temporarily closing and relocating Checkers was not a viable financial solution.

From the onset it became clear that the success of the engineering component of this project would hinge on the close collaboration between engineers, client, project manager and contractor.

Careful planning was required to ensure that Checkers shoppers were not adversely inconvenienced by the construction works. While the planning of this was expertly handled by the project managers, it was up to us to ensure that the execution thereof would be safe.

To this end a special temporary access ramp was constructed to give shoppers direct access to Checkers via the B-1 parking area. A crash deck was constructed over the temporary ramp to ensure public safety.

On the design side, the contractor was faced with the challenge of having no structural information in terms of plans and reinforcement bending schedules for the existing structure.

Only a limited amount of architectural plans could be sourced. The existing building and its structural elements therefore had to be surveyed. In order to determine the reinforcement within the existing slabs and columns, non-destructive scanning methods were utilised. ▲

Project information

- Company entering: Moroff & Kühne Consulting Engineers
- Project team: Nik Moroff, Patrick Hut, Nicolaas Liebenberg
- Client: Berman Brothers and HCI
- Main contractor: WBHO Construction
- Architect: Louis Karol
- Quantity surveyor: AECOM
- Structural and civil engineers: Moroff & Kühne Consulting Engineers
- Electrical engineers: Louis & de Kroon Inc.
- Mechanical engineer: WSP Group Africa
- Wet services: Benatar Consulting
- Demolition: L.O. Rall
- Project value: R280-million

Cosmo Mall Pedestrian Bridge, Cosmo City

A new pedestrian bridge is currently under construction across Malibongwe Drive (K29/R512) in Cosmo City, Randburg with completion scheduled by mid-October 2015. The new pedestrian bridge is supported by the Gauteng Department of Roads and Transport, the City of Johannesburg's Planning and Transportation Departments and the Johannesburg Roads Agency (JRA).

Project information

- Company entering: WSP Group Africa
- Project start date: 1 October 2015
- Project end date: 30 August 2015
- Client: XTLS Investments 43
- Project team: WSP Group Africa, Quad Africa
- Main contractor: Tri-Star & Ferro Eleganza
- Architects: Rob Bray Concepts
- Project manager: WSP Group Africa
- Quantity surveyor: WSP Group Africa
- Consulting engineer: WSP Group Africa
- Project value: R16-million

The pedestrian bridge is intended to provide for a safer and convenient pedestrian and cycle crossing between the Cosmo City integrated housing development on the western side of the road and the new Cosmo Mall Shopping Centre on the eastern side of the road.

The Malibongwe Drive arterial is a high-speed road of four lanes and acts as a barrier to the flow of residents from Cosmo City to the east, and to the shopping destination of Cosmo Mall.

The bridge will also be accessible to pedestrians from/to the Cosmo City Regional Transport Facility and Market on Erf 671 Cosmo City Proper. It is foreseen that the new bridge will become a familiar landmark in the area as well as a tourism attraction that will be of benefit to the City and the local communities.

The bridge concept has been developed by prominent concept architect, Rob Bray. The bridge design and the 'forked' supports are derived from the iconic thorn tree that is symbolic of the African experience, the Acacia Tree.

The design statement reads as follows: "Endemic to only Africa it speaks of a great continent that is home to its many peoples. Located at the tourist gateway and the great new residential node of Cosmo City, it symbolically links the people with their roots. Designed to flow in the direction of travel, the walkway and bridge deck curves like a path through the bush, providing pedestrians with an uninterrupted walkway over the traffic below".

The bridge is crossing over a provincial road and road reserve, i.e. Malibongwe Drive (R512/K29) under the jurisdiction of the Gauteng Department of Roads and Transport.

It is considered as a significant corporate social investment by the developer of the Cosmo Mall development that will benefit Cosmo City residents by providing a much safer route to the shopping centre than crossing the busy Malibongwe Road at-grade while also creating a new focal point in the area.

The structure is a multi-span structural steel pedestrian bridge on concrete columns with a composite concrete deck. The expected design life is 100 years.

The bridge is made up of steel U-shaped steelwork girders spanning between concrete columns. The girders are made up from H-sections, tubular-sections and angle-sections welded and bolted together. The bridge is supported by reinforced concrete pad foundations using an allowable ground bearing pressure of 300 kPa. ▲

Project information

- Company entering: SMEC South Africa
- Project start date: 2013
- Project end date: 2014
- Client: Western Cape Department of Transport and Public Works
- Consulting engineer: SMEC South Africa

Emergency Repair and Stabilisation of Franschhoek Pass

Franschhoek Pass was the first professionally located, designed and constructed stretch of highway in South Africa. Completed in 1825, the route traverses the Middagkransberg, serving as a gateway to the Overberg, a vital link between the communities of the Franschhoek Valley and Villiersdorp.

During the latter half of 2013, unseasonably high rainfall in the region lead to several slope instability cases along the route, resulting in the pass being closed on a number of occasions. The majority of instabilities occurred as rock falls and superficial slidings.

SMEC South Africa was appointed by the Western Cape Department of Transport and Public Works, under an emergency works appointment, to develop a timely solution to the problem to ensure the pass could remain open to traffic while not compromising on safety. Furthermore, in keeping with the heritage of the route and the surrounding environment, aesthetically pleasing and environmentally friendly solutions were required.

Remediation measures comprised the stabilisation of an embankment by means of an anchored gabion wall, the stabilisation of a failed cutting by means of a soil nail wall with subsoil drains, and reinstating and improving sections of the route's road drainage, including dissipater structures, culverts and debris barriers.

While mesh is less obtrusive than say concrete, it simply would not support and distribute the high loads anticipated from the anchors stabilising the 10-m-deep slip failure.

A key feature of the solution was to significantly improve surface and underground drainage. Sub-surface drainage was collected by drilling 12-m-deep, purpose-designed perforated-pipe-and-geotextile drains at regular intervals and at several different levels into the slope at an inclined angle. The surface drainage was improved by providing a cut off trench over the top of the cut, and providing benches to the slope with drainage channels on each step to collect and rapidly discharge the collected water, including that from the subsurface drains which discharge into these channels.

The above geo-structural components were modelled in both structural and geotechnical finite element software to ensure the integrity of the system materials/products chosen and that these effectively integrate with the overall geotechnical solution.

The project demonstrates ingenuity and quality in engineering design and implementation and did not detract from the routes aesthetic value while at the same time the safety and effectiveness of the pass was not compromised. This and various aspects of the project deem this project suitable for nomination. ▲

Impumelelo Shaft Project

Sasol Mining's Impumelelo Shaft Project is a new 8,5 Mtpa (expandable to 10,5 Mt/a) replacement tonnage coal mine complex to its Brandspruit Mine, located in the Secunda area, Mpumalanga.

Sasol Mining appointed the RSV ENCO Hatch Goba Coal Joint Venture as the Engineering, Procurement and Construction Management (EPCM) consultant, which brought together expertise in materials handling, civil engineering design, mechanical, electrical, shaft-sinking, project management, procurement, construction management and coal mining.

A total of 24 500 m^2 of surface infrastructure was built for the 62-month, R4,6-billion multi-disciplinary Greenfield project, which had an integrated management team at its helm. Specialised package managers were responsible for total delivery within their areas of responsibility.

Project information

- Company entering: Hatch Goba
- Project start date: 2009
- Project end date: October 2014
- Client: Sasol Mining
- EPCM consultant: RSV ENCO Hatch Goba Coal Joint Venture

The basic engineering design packages ensured suitability, functionality, constructability, operability and maintainability of the new mining infrastructure and associated materials handling system. All the systems were designed to be energy efficient and optimised within strict coal degradation and spillage tolerances.

The joint venture's multi-disciplinary team had to interface between the Sasol project team, the Sasol Mining team and the Sasol Coal Supply team, which would ultimately run the entire operation and therefore had to be brought up to speed with the project's technical scope.

A techno-economic review of the project's feasibility was completed by the joint venture in June 2009, followed by a detailed engineering design phase from July 2009 to December 2010. Construction began in earnest in June 2011.

Phase I construction was completed in June 2015, with Phase II scheduled for completion in June 2019. Upon completion, Impumelelo Mine will have 13 production seams, with a total shaft depth of 235 m.

The project scope entailed the design and development of the complete Greenfield mine complex. For this reason, special consideration had to be paid to the build-up of the new operation, in conjunction with the phasing out of the existing coal-mining operation.

During construction, a temporary river diversion was made to enable the casting of the centre abutment. Concrete augured piles with an 800 mm diameter were cast in situ through the river bed to a maximum depth of 15 m in order to support the new bridge.

The underground surge bunker beneath 4 Seam provides surge capacity as well as a constant flow of 2 900 tph to the incline conveyor. The live capacity is 1 500 t, aimed at controlling surges during peak production and to feed onto the incline conveyor via vibrating feeders.

The longest single flight overland conveyor in the southern hemisphere was constructed on this project. It has a length of 27 125 m and a design capacity of 2 400 tph. Four underground trunk conveyors provide the coal feed from section conveyor belts to the underground surge bunker with a maximum design capacity of 3 600 t/h.

Three shafts had to be sunk, two vertical and one decline, to a depth of 240 m, with the decline being 1 060 m in length. Both the vertical shafts were sunk to 4 seam only and the decline shaft to the 2 seam coal horizon.

An 11,7 m diameter coal bunker will be established between the 4 and 2 seam horizons. Two seam reserves were excluded in the shaft area and sub-declines will be developed from the four seam coal horizon at a later stage to establish the necessary infrastructure on the two coal seam horizon. ▲

Newtown Junction

Newtown Junction is situated in the cultural district of the suburb Newtown, in the heart of Johannesburg, next to the Museum of Africa and the striking 1913 Edwardian building that was redeveloped into the popular Market Theatre. This multilevel development offers a vibrant 36 000 m^2 shopping centre, 30 000 m^2 of office space, gymnasium and four basement levels providing a total of 2 400 parking bays.Developed by Atterbury Property Holdings, Newtown Junction signals both the growth of Johannesburg's city centre, as well as the renewal and revival of the city in a way that preserves its heritage and history.

Three major challenges were encountered during the refurbishment: maintaining the integrity of the 'potato sheds' structure; careful consideration of heritage structures and the inputs of multiple stakeholders; and accommodating existing steel structures. The design team adopted a hybrid approach consisting of partial restoration, partial replacement and partial additional strengthening.

The R1,3-billion development is backed by the Johannesburg Property Company (JPC) and has seen the SAHRA inputs carefully considered, due to the historic nature of the site.

The building is partly situated under the elevated M1 highway, which required a very unique geometry in order to accommodate the existing highway piers. Some sections of the structure's roof are only 3-4 m below the structure of the M1 highway. Furthermore, the floor level of the lower retail level is up to 3 m below the founding levels of the highway piers and columns. This meant the project team had to isolate construction while building around existing highway piers and columns.

Project information

- Company entering: Aurecon
- Project start date: October 2012
- Project end date: September 2014
- Client: Atterbury Property Holdings
- Main contractor: WBHO Construction
- Architect (heritage): MRA Architects
- Architect (retail): LPA Architects
- Architect (principal): dhk Architects
- Principal agent: Metrum Project Management
- Project manager: Metrum Project Management
- Quantity surveyor: Norval Wentzel Steinberg
- Structural steel detailer: BSM Baker
- Structural engineer: Aurecon

Also, the project team had to design lateral support systems to protect the bridge piers, ensure that the safety of motorists was not jeopardised, as well as design a roofing system that caters for stormwater flooding from the highway in these areas.

Construction on the project commenced in October 2012 and was successfully completed at the end of September 2014, with the development's office component being awarded a 4-Star Green Star Office Design V1 rating from the Green Building Council of South Africa.

Newtown Junction is now a unique and bustling hub that is bringing new life to the surrounding precinct. Coupled to this, the heritage-inspired design will make it a go-to destination for the people of Johannesburg as well as tourists.

The new Newtown Junction mixed-use development successfully retains the magic of the past, blending it with the excitement of the future and breathing new life to the surrounding precinct. ▲

Renovations and Additions to The Port Elizabeth Opera House

Port Elizabeth's much loved Opera House is acclaimed as the oldest theatre, not only on the African continent but also in the southern hemisphere. It is a national treasure, and its expansion and renovation this year has been sorely overdue.

AfriCoast was part of the Matrix Architects Consortium Joint Venture appointed by the PE Opera House for the makeover of the historical building.

Due to the sensitive nature of this project, heritage approval for the construction work on this historical building was sought and granted from the Provincial Heritage Resources Agency well in advance.

The upgrade includes the construction of an extended foyer and other renovations such as damp damage repairs, office upgrades, and replacement of carpets and wallpaper.

In addition new heating, ventilation and air-conditioning (HVAC) systems, lighting and fire detection are being installed to ensure that the PE Opera House is fully compliant with the latest building and energy regulations.

The original structure was wedged tightly up against the rock in a space specially carved for it out of the natural sea-facing hillside. Careful preparation had to be undertaken before excavation work could commence in the restricted space for extended structures to come.

The topography presented the team with tight spaces and tricky heights: approximately 10 m x 10 m, on a 12 m slope of more than 45 degrees. Getting big machines into that space for the excavations was a challenge and the stability of the embankment was always a concern.

As the Opera House is a heritage site, strict regulations were applied to the design and construction work, and the architect received official sign-off before work began.

As there was not sufficient leg-room for theatregoers in the suspended Gallery, it was decided to increase the size of each step but reduce the number of rows.

It addition, it was discovered that the existing timber work needed to be replaced – the timber was split and over 100 years old, and certainly did not meet SANS requirements. New timber supports were designed and the original steel trusses retained.

Retaining and protecting as much of the original finish as possible – from pressed ceilings and tiles to ornate fretwork – was critical to the project, because of its heritage value.

All of these elements were never envisaged at tender stage, and there were many variances to the original plan as the project progressed, so to keep within budget and time was certainly another large challenge that the AfriCoast team has overcome. The labour load was increased by as much as three times in order to stay on track.

The size of this upstairs theatre area needed to be increased – however, the rock face is so close to the building that there was simply no room for traditional extension supports. Instead, innovative and modern-looking suspended clip-on boxes were designed to provide additional room.

The heavy steel support columns, though, were found to be in the way of the new fire escape, so they had to be shifted around until they were no longer an obstruction. Now in place, they offer a chunky, industrial aesthetic appeal that is in pleasing contrast to the ornate Victorian character of the original building. ▲

Project information

- Company entering: AfriCoast Consulting Engineers
- Project start date: 24 March 2014
- Project end date: 1 November 2015
- Client: The Port Elizabeth Opera House
- Main contractor: GVK-Siya Zama Building Contractors
- Principal agent: The Matrix Urban Designers and Architects
- Architect: The Matrix Urban Designers and Architects
- Consulting engineer: AfriCoast Consulting Engineers
- Project value: R27 360 000

Shemula Water Project – Upgrade: Phase I – Shemula Water Treatment Works

UWP Consulting was appointed in April 2011 to commence planning of the Shemula Bulk Water Supply Scheme Upgrade, a R845-million bulk water supply scheme to serve 230 000 people in the northern half of the Jozini and Umhlabuyalingana Municipalities.

During the preliminary design, the client decided that the water works itself should be let as an EPC (turnkey) tender. Certain elements of the design had already reached an advanced stage and it was decided to split the contract into two sub-phases.

Phase IA, a conventional EPCM contract, included the raw water pumpstation and rising main, the clear water storage reservoir and the clear water pumpstation and rising main. Phase IB, an EPC contract, included the full water treatment works design and construction.

The design of Phase IA was carried out by UWP while the design of Phase IB was carried out by the contractor. UWP prepared a detailed specification for the turnkey tender to ensure that a state-of-the-art facility was provided under the EPC contract.

The raw water pumpstation has been designed as a dry well and consists of a 9 m deep x 7 m diameter concrete structure embedded in the left bank of the Pongola River. Generally the flow in the river is kept constant at 5 cumec and is controlled at the Pongolapoort Dam some 60 km upstream.

However every September DWS releases a controlled flood peaking at 600 cumec. During the flood the water level rises to within 2 m of the roof of the pumpstation.

To allow for a variable flow rate into the head of the waterworks in the absence of a raw water reservoir, variable speed drives controlled by the works operator were installed on the raw water pumpsets. Allowance has been made to install larger pumps when the works is increased from 20 Mℓ/day to 40 Mℓ/day.

The waterworks layout allows for the smallest feasible footprint. Emphasis was on simplicity of operation, operational control and maintenance, high performance efficiency and stability together with reliability, flexibility and economy of operation, as well as a pleasant working environment.

One of the main design features was using natural slope of the land to eliminate the need for any pumping requirements within the plant and hence save on electricity. The filters discharge potable water from the clearwell directly into the 2,5 Mℓ clear water reservoir from where a 700 mm diameter gravity main conveys water to the clear water pumpstation.

The clear water pumpstation, pipework and rising main have been sized to cater for the ultimate demand. Allowance has been made to add a further two pumps alongside the current four when the plant is upgraded to 40 Mℓ/day.

The pumps operate at a working pressure of 20 bar and deliver water via a 2 500 m long x 700 mm diameter GRP rising main to the existing 4,5 Mℓ command reservoir from where an existing bulk distribution system distributes water.

The existing bulk distribution system is severely undersized and in very poor condition and Phases 2 to 6 of the scheme will include bulk pipelines from 700 mm Ø to 200 mm Ø, terminal reservoirs and booster pump stations to supply water to the entire region. ▲

Project information

- Comany entering: UWP Consulting
- Project start date: 14 October 2013
- Project end date: 10 June 2015
- Client: uMkhanyakude District Municipality
- Main contractor: Icon Construction/Veolia Joint Venture
- Consulting engineer: UWP Consulting
- Project value: R125-million

Sundays River Bridge

In 2005, the South African National Roads Agency Limited (SANRAL) found signs of distress and extensive cracking in the 14,23 km, two-lane pavement of Section 11, National Route 2 between Soutwerke and Colchester in Eastern Cape.

Concerned about the health and safety risk the damage posed to drivers, the SANRAL appointed the Semenya Aurecon joint venture (JV) to rehabilitate the route, which runs north-east and ends at the intersection to Colchester. The appointment included detail assessment, detail design and documentation.

In the assessment stage, it was also found that the Coega Industrial Development Zone (IDZ) development – the largest of its kind in South Africa – would generate traffic that would require a dual highway by 2015.

Taking this factor, the financial viability of an upgrade, the existing road's structural condition, and road capacity implications into account, SANRAL then decided to not only rehabilitate the two-lane route, but to also upgrade it into a four-lane divided highway.

The new bridge is 201,18 m long and consists of six spans, each 33,53 m long. The deck is supported by five piers and two abutments that are all founded on piles. Each deck span consists of six precast, pre-stressed concrete beams.

Permanent formwork in the shape of precast concrete planks was placed between the beams before casting the in situ deck slab. The deck is made continuous over three spans during the casting of the in situ deck slab to reduce the number of high-maintenance expansion joints.

The successful construction of the new bridge over a perennial river with challenging conditions as well as raising the decks of the existing bridge required innovative design solutions and construction techniques, such as the implementation of a meticulous and sophisticated technical design process that made extensive use of AutoCAD 3D.

The addition of a new bridge over the perennial river provided the project team with an opportunity to incorporate innovative design elements to ensure the optimal safety of the road for the increasing amount of travellers, as well as serving as an aesthetically pleasing addition to the upgraded route.

By incorporating aesthetic components throughout the design and construction phases to ensure the functional efficiency of the aesthetic elements, the project team delivered a product which serves as a model of an efficient, safe and aesthetically pleasing design.

The bridge site is approximately 3 km from the ocean in a very corrosive environment. The decision to use concrete as the construction material for this project was based mainly on its excellent durability characteristics.

Pre-stressed concrete beams were used for the main structural elements of the deck, with a composite precast permanent shutters and in situ concrete deck slab.

The final construction value of the new bridge came to R44 157 000 compared to a tender amount of R42 760 000. The construction cost of R16 300 per square metre of deck area compares well with similar bridges, especially when considering the very deep piled foundations.

The construction of the new bridge over a perennial river with challenging conditions, as well as raising the decks of the existing bridge, required innovative design solutions and construction techniques.

The bridge was successfully commissioned in June 2014 and has seen the road conditions and safety significantly improved, as well as being able to accommodate the growing traffic volumes generated by the Coega IDZ. ▲

Project information

- Company entering: Aurecon
- Project start date: 2013
- Project end date: 2014
- Client: SANRAL
- Main contractor: Concor Holdings
- Subcontractor: Ibhayi Contractors
- Consulting engineer: Dura Soletanche Bachy, Semenya Aurecon JV

Project information

- Company entering: ERO Engineers
- Project start date: May 2012
- Project end date: January 2015 (32 months)
- Client: SANRAL
- Project team: ERO Engineers and AECOM Joint Venture
- Main contractor: Haw & Inglis Civil Engineering
- Consulting Engineers: ERO Engineers and AECOM Joint Venture
- Project value: R360-million

The Improvement of National Route 7 Section 1 between Melkbos and Atlantis Intersections

National Route 7 (N7) provides the main long distance access route to the Northern Cape and Namibia. As such, it forms an integral part of the national and regional road network and contributes to the network's strategic role.

This project is located on National Route 7 Section 1 of the South African National Roads Agency SOC Limited (SANRAL) road network between Melkbos Intersection (km 18) and Atlantis Intersection (km 25,5) just north of Cape Town.

The tender offer by ERO Engineers for the improvement of this section of road was accepted by SANRAL on 3 June 2009.

The purpose of the project was to upgrade Section 1 of the N7 to freeway standards by increasing the existing design speed to 120 km/h, to improve road safety levels over the current situation and to increase carrying capacity to the required levels for accommodating current and future traffic volume increases.

A high incidence of fatal accidents occurred on this busy route with its high traffic volumes. Heavy mist and foggy conditions contribute to the dangerous conditions experienced at both the original at-grade intersections.

The upgrading of this section of the N7 became a priority due to safety issues. A high incidence of fatal accidents occurred on this busy route with its high traffic volumes at all times.

This upgrade was therefore necessary to improve the safety levels and to increase the capacity. The existing Melkbos intersection comprised a T-junction at-grade intersection. ESKOM power lines and pylons to and from Koeberg Power Station were in close proximity on the west side with the closest pylon located approximately 10 m from the shoulder breakpoint.

Similar to the Melkbos intersection, the Atlantis intersection comprised an at-grade intersection of MR217/R304 and the N7. The intersection also posed safety issues.

A diamond and parclo configuration grade separated interchange was constructed. The design used was similar to Melkbos Interchange. Traffic flow projections were also the main consideration in determining the preferred ramp configuration in this case.

Due to the topography with a steep down grade on the eastern side, constructing the interchange with MR217 passing over the N7 was not practical. The resultant grades were too steep for safe vehicle operation and also had negative sight distance implications.

An additional requirement which formed part of the Environmental Process, was the acquisition of a parcel of additional land to ensure future conservation of sensitive areas.

The successes of this project include the following:

- safety improvement of the road for the road user
- improvement of the intersections
- improvement of this section of road to a dual carriageway with freeway standards
- improvement of the high value endangered indigenous vegetation environment next to the road
- the creation of job opportunities to relative large numbers of people
- training of these workers in an effort to provide sustainable empowerment
- the training and employment of small emerging contractors. ▲

Umgeni Road Interchange Project

Hatch Goba and SANRAL have been collaborating successfully for a number of years on such flagship projects as the Gillooly's Interchange in Johannesburg, one of the largest and busiest of its kind in the Southern Hemisphere. Hatch Goba was originally appointed by the South African National Roads Agency (SANRAL) in 2009 to complete the detailed design and relevant documentation for the extensive upgrade of the interchange. Construction commenced in March 2011 and was expected to be complete at the end of July 2015.

Umgeni Road has been a major transport hub for decades, and has seen considerable urban development over the years. This meant that a major consideration was to minimise traffic disruption during the construction phase along the N2 and M19 major routes. Another constraint was posed by the Umgeni River, along with existing commercial and residential areas that had to be accommodated.

To overcome these challenges, two directional ramps were built by means of the incremental launch construction method. While this by itself is not new, having to design and construct using extremely tight radii on a global curve was a complex process.

This entailed the entire bridge deck being built from one end of the structure, as opposed to the traditional segmental construction method where the bridge is built one span at a time. The application of this innovative technology had a substantial impact on the construction requirements, as well as minimising traffic disruption.

The 20-m-high elevated casting yard, combined with the stunning sight of the two incremental launch bridges being constructed at the same time and crossing each other, was a first in South Africa and attracted a lot of attention.

The three bridge decks over Umgeni Road were designed to include precast beams to minimise disruption to traffic during construction. Twelve 30 m and twenty-three 20-m-long beams were constructed off-site and erected during overnight road closures. The remaining bridge decks were cast in situ.

Particular attention was paid to the aesthetics of the concrete structures during design and construction.

The bridge pier heads were designed to have elegant and fluted shapes. The excellent quality of the concrete finishes produced has enhanced the appearance and durability of the structures on this project.

The overall bridge works were 1 200 m long, with a surface area of 14 000 m^2. The roadworks alone comprised 56 000 m^2 of asphalt, while the bulk earthworks totalled 100 000 m^3 of cut material and 200 000 m^3 of fill material.

Another major challenge was posed by the fact that a large quantity of existing services not only had to be relocated, but had to be searched for and identified. These ranged from electricity, Transnet and water reticulation to sewerage and telecommunications infrastructure. This was an exceptionally demanding and challenging process.

Hatch Goba monitored the project continually to ensure correct procedures were followed. This was in order to avoid negative impacts on the environment, such as extensions of construction time on the project, materials used and product wastage or disposal.

Concrete trucks were returned to the Roadhouse plant in the Umgeni Area to release any extra concrete on a daily basis so as not to leave any material behind on-site. eThekwini Municipality undertook monthly checks/audits to ensure the impact on the environment was kept to a minimum.

The completed Umgeni Interchange upgrade project has significantly alleviated traffic congestion by allowing the free flow of about 14 000 vehicles during morning peak hour and about 16 000 vehicles during afternoon peak hour. ▲

Project information

- Company entering: Hatch Goba
- Client: eThekwini Municipality
- Project start date: March 2011
- Project end date: July 2015
- Consulting engineer: Hatch Goba

Upgrade of the Ballito Interchange on National Route 2, Section 27

SANRAL appointed SMEC South Africa in 2009 for improvement works to the Ballito Interchange, situated 45 km north of Durban. Upgrading of this interchange was necessary due to capacity limitations and poor operational efficiency at the existing interchange configuration.

The original scope of services for the improvements to the Ballito Interchange included signalising the existing ramp terminals and the design and construction of a single loop ramp for the east to north right turn movement. To accommodate the envisaged loop ramp, the western bridge jack-span required reconstruction.

A structural capacity analysis was carried out on the existing bridge over the N2 at Ballito. The results showed that the deck lacked sufficient shear reinforcement and that significant deck strengthening would be required.

The bridge deck also required modification or lengthening for the proposed loop ramp. This could only be achieved in half-width construction with significant traffic accommodation complications.

It was established from the traffic study that two free flow loop ramps as well as additional lanes were required on the bridge over the N2. The terrain and road reserve constraints were such that it was not possible to provide the loop ramps at the required 50 m radius within the existing interchange configuration. A number of layout options were investigated by the geometric design team.

The preferred geometric layout for the Ballito Interchange is a Partial Cloverleaf Type A2 Interchange System, allowing for free-flow movements of the dominant approach and departure ramps at the interchange.

The new interchange bridge was designed with two centre spans of 26 m each as determined by the existing N2 and provision for future capacity improvements and outer spans of 21 m.

With a maximum span of 26 m and no vertical clearance issues, the optimum deck design was a cast in-situ, 1,3 m deep voided slab. As the proposed MR445 roadway width would total 32 m, it was decided to accommodate the arterial roadway on two decks as opposed to a single very wide deck. This option reduced the amount of reinforcement required in the deck and simplified the construction sequence.

The new bridge is 95 m long with a vertical clearance over the N2 of more than 7 m. The proposed construction method was a cast in-situ staged construction method with a construction joint at the quarter point of one of the main spans.

The piers consist of four columns per pier, one under each voided slab beam and each supporting two bearings. To improve the appearance, the columns were tapered in both directions, widening to 3,6 m at the top transversely and varying in thickness from 900 mm at the foundation level to approximately 1 500 mm at the pier top.

Large chamfers were placed in the corners of the piers to further improve the aesthetic appearance of the bridge.

As the new bridge would be on a new alignment, the construction of the new bridge did not have an impact on the existing overpass and therefore did not impede the traffic flow through an interchange during construction. ▲

Project information

- Company entering: SMEC South Africa
- Project start date: January 2011
- Project end date: August 2011
- Client: SANRAL
- Project team: SMEC South Africa
- Main contractor: Stefanutti Stocks
- Consulting engineer: SMEC South Africa
- Project value: R130-million






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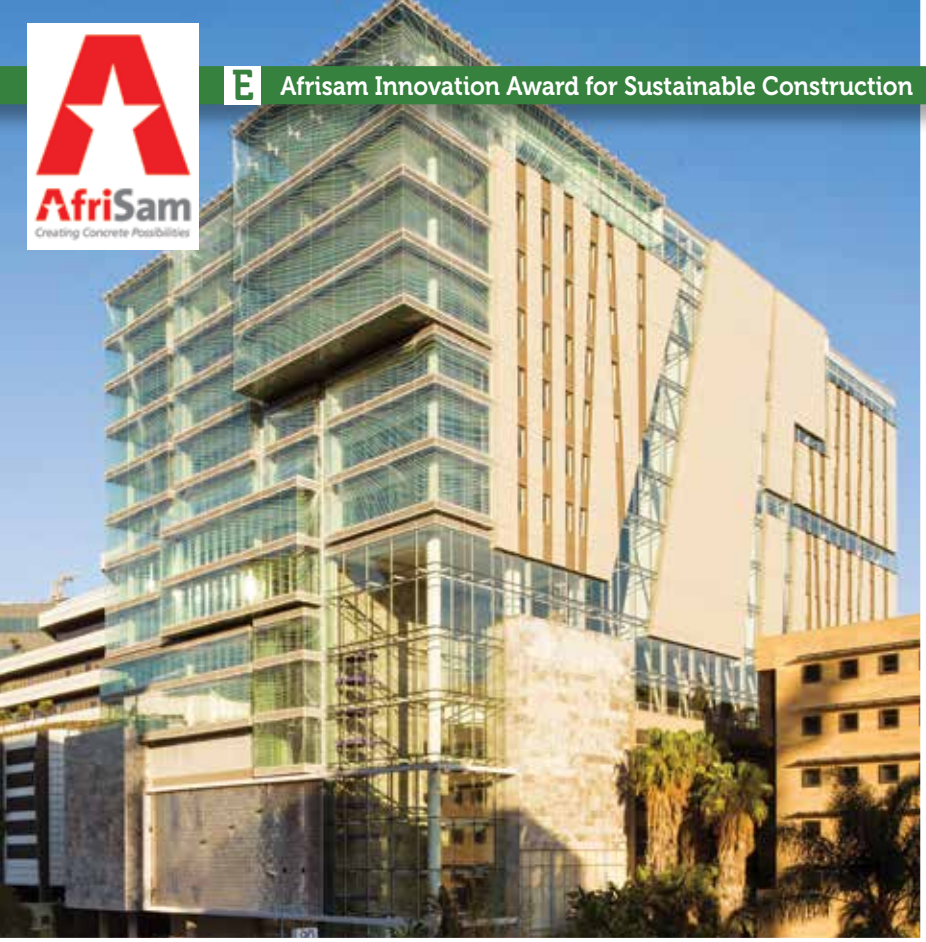

The 90 Grayston Drive building is a 21 level office block development with 11 parking levels, one atrium level and nine offices. It is a multi-functional building with 19 343 m^2 of office space and 946 parking bays.

The building was designed to have a unique and aesthetically pleasing façade which makes it stand out above the neighbouring buildings in Sandton. The external façade cubes and rectangles on the façade are a series of cantilevers that are protruding in and outside of the building envelope.

The building was designed to have very little impact on the environment. This led the designers to opt for the use of ammonia chillers for air conditioning and rain water harvesting for flushing toilets.

The building has been designed to have a double façade based on the exploration and testing by Le Corbusier in the 20th Century. The two glass skins form a 900 mm cavity and they are positioned so that air flows naturally between them. This continuous natural flow of air in the façade cavity improves the energy performance of the building in all seasons. The double façade system also provides more insulation than conventional types.

The architects, Grosskopff Lombart Huyberechts & Associates opted for a new look on the façades called 'fritting'. This is essentially a high resolution decorative glazing with continuous lines flowing throughout all the panels of glass.

The building is fitted with 'intelligent blinds' which follow the sun throughout the day. The façade is fitted with sensors that track the movement of the sun and guide the blinds to provide optimum protection from the heat and glare so the interior stays comfortable in all weather conditions.

In a drive to minimise the energy footprint, the elevators were fitted with an advanced, high speed elevator management system which swiftly delivers the passengers to their chosen stop while conserving energy.

90 Grayston has been designed for optimal power efficiency. The building draws 1 700 kVA from the council supply and is backed-up by two synchronised diesel generators providing 100% standby power. The diesel generators are fed by a bulk diesel tank that allows 24 hours standby power without being refilled.

A cast resin transformer located on the roof supplies the mechanical cooling chillers, minimising maintenance and increasing electrical efficiency. The lighting is integrated with motion sensors fitted in the parking areas, common areas and rest rooms to activate lighting when these areas are in use.

The water system has been designed to use water wisely and reduce waste to the barest minimum. The building will harvest rain water into tanks that can store up to 70 cubic metres, which will be used primarily for toilet flushing.

The project structure programme was essentially 21 levels in 16 months. This appeared to be a daunting task until the entire project team started to re-engineer the building to achieve programme.

This process yielded changes to the slabs from conventional reinforced concrete slabs to post tensioned slabs, to reduce the amount of reinforcement steel to be handled. This led to 90 Grayston Drive being amongst the few buildings with Post Tensioned slabs throughout all levels. ▲

Project information

- Company entering: WBHO Construction
- Project start date: 29 October 2012
- Project end date: 31 October 2014
- Client: Redefine Properties
- Project team: 90 Grayston Drive Team
- Main contractor: WBHO Construction
- Architect: GLH Architects
- Principal agent: Betts Townsend
- Quantity surveyor: MLC Quantity Surveyors
- Consulting engineer: Sutherland
- Project value: R280-million

Also entered Category A2

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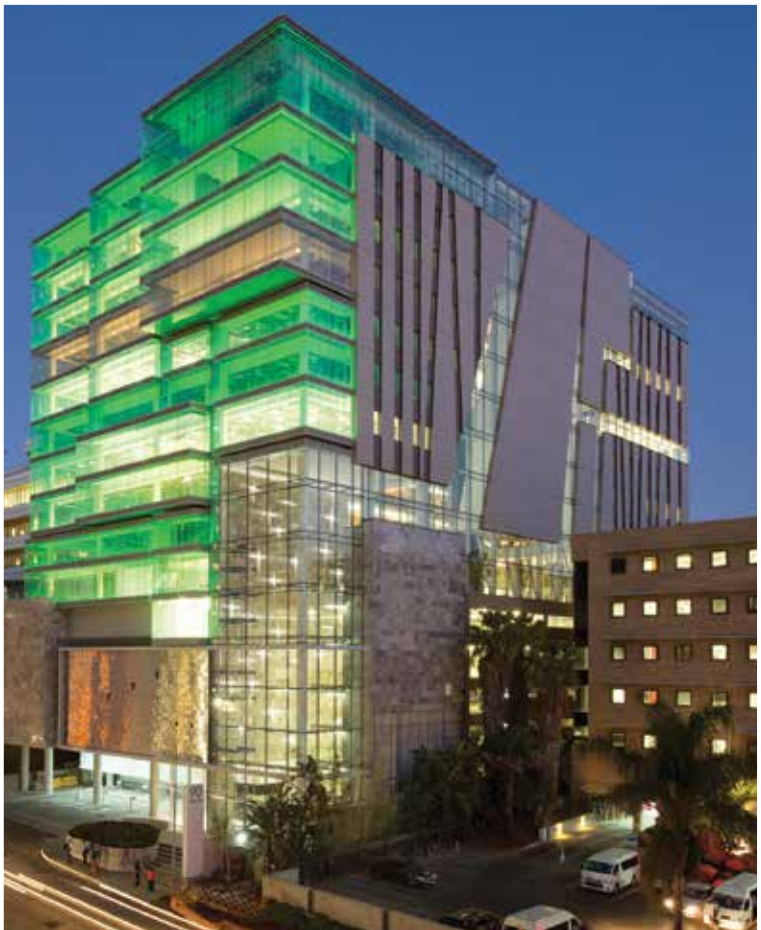

Tukssport High School and Residences, University of Pretoria Campus

Preserving historical and botanical treasures were among the major challenges Pretoria building contractors, J.C. van der Linde & Venter Projects, successfully coped with to complete a R49-million contract for the construction of the new TuksSport High School and residences on the University of Pretoria Sports Campus in Hatfield.

TuksSport High School is a new independent co-ed school, catering for about 260 learners from Grade 8 to 12. The specialised high school, which opened on 20 July 2015, forms part of the UP High Performance Centre. It allows current and potential high sports performers to receive sports coaching and training while still continuing their schooling.

The new facility – funded by the The Athletics Foundation Trust – is located on a University of Pretoria Veterinary Science Faculty Experimental Farm (Proefplaas) site, historically a quarantine camp for new livestock or game before the animals were taken to dedicated camps.

Among the major challenges the contractors, J.C. van der Linde & Venter Projects, faced on this contract were the historical and environmental values attached to the site. The contractors had to preserve some extremely rare trees on site – which created fairly formidable access problems – and also had to ensure that specified historical structures on the terrain were not damaged during the building process.

Structures such as the old Proefplaas' quarantined animals concrete drinking troughs, had to be preserved – and were in fact incorporated in the design by architects, Neo Dimensions.

The trees on the site are mainly old exotic trees species from the remnants of a UP arboretum. Eight particularly precious trees were identified which included three different species of South African yellowwood trees. Only at the National Botanical Gardens at Kirstenbosch are all four indigenous yellowwood species found. So the experimental farm's three yellowwoods, in particular, had to form part of the design, building and provision of services.

J.C. van der Linde & Venter Projects had to ensure that these precious trees were not damaged or threatened by the robust building operations and heavy vehicles traditionally found on any construction site.

J.C. van der Linde & Venter Projects also had to provide an open-air amphitheatre, accommodating 260 students.

Environmental concerns were important in the Neo Dimensions Architects design which the contractors had to follow.

For example, the north façade of the residence block features different bedrooms on each level that protrude, or are recessed, from the façade to create natural sun control over the bedroom windows. Additional steel louvres were provided to the protruding bedrooms with their vertical window design.

All sanitary ware was specified and supplied as water-saving elements.

Coping with the presence on site – in particularly strategic positions – of intrusive objects such as towering trees, as well as relatively small but equally intrusive structures such as historical drinking troughs, is never welcomed by any building contractor.

Nevertheless, J.C. van der Linde & Venter Projects managed to meet all stipulated schedules. Work started on the project in August 2014 and handover took place – on schedule – in July 2015. ▲

Project information

- Company entering: J.C. van der Linde & Venter Projects
- Project start date: 13 August 2014
- Project end date: 9 July 205
- Client: University of Pretoria
- Main contractor: J.C. van der Linde & Venter Projects
- Architect: Neo Dimensions Architects
- Project manager: University of Pretoria and Neo Dimensions Architects
- Quantity surveyor: GK Projects
- Structural engineer: DG Consulting Engineers
- Electrical and mechanical engineer: Plantech
- Landscape architect: University of Pretoria

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