Celebrating municipal engineering excellence

Redhouse Chelsea Interchange and Arterial Roads

The biennial IMESA/CESA Excellence Awards gives recognition to well-engineered civil engineering projects for infrastructure.

ENTRANTS FOR THE awards must portray the art and science of civil engineering for infrastructure to the general public and indicate how the profession finds answers to challenges. **IMIESA** recognises the outstanding entrants in this year's awards.

CATEGORY: Roads and Stormwater

WINNER

Redhouse Chelsea Interchange and Arterial Roads

Implementing agent: Sanral
Consultant: Aecom
Contractor: Basil Read

Aecom began work on a proposal to design a road network to service the expansion of the western areas in Port Elizabeth (PE) and alleviate existing congestion in 2006 – the Redhouse Chelsea Arterial. The proposed network would underpin the Nelson Mandela Bay Municipality's (NMBM) long-term plans to expand the western areas in order to meet a growing demand for residential and commercial growth in the greater PE area.

The Redhouse Chelsea Arterial project was fast-tracked by the development of the 92 000 m^2 regional Bay West Mall planned for completion by March 2015. With the proposed interchange on the N2 able to provide direct access into the area, the commercial development became significantly more viable than before. A special purpose vehicle, Bay West City, was set up to implement the project.

Aecom was appointed for the design, management and supervision of the project, which included the management of an extensive environmental approval process, as the site is situated in an extremely sensitive environmental biosphere containing a number of red-listed plant species. As part of this process, the layout of the road network went through many design iterations before an agreement was reached with the local authorities. This was the primary driver behind the extended design process for this road network, as the solution had to have the least invasive impact upon the natural habitat.

The final road layout consisted of a new interchange on the N2 with two bridges with 4 km of ramps; the Cyclopia bridge over an environmentally sensitive area; two river bridges over the upper Baakens River; a major, three-barrel culvert servicing outfalls from three major detention ponds; and 6 km of arterial roads with a maze of intersections and services. The project also included the provision of several bulk services including water, sewerage and telecommunications for the Bay West City precinct and street lighting for all the roads, including a portion of the N2.

Work commenced on 6 January 2014, with Basil Read appointed as the principal contractor. The contract consists of two major milestones:

1. Phases 1 and 2 to complete unrestrictive access and services for the mall.
2. Phase 3 to complete the arterial from the N2 to Cape Road.

Due to the delay in the start of construction, the contractor proposed the use of precast members for the construction of the bridges. The main beams for the N2 bridges (weighing up to 70 tonnes) were manufactured

Redhouse Chelsea Interchange and Arterial Roads

in Gauteng, and driven down utilising bespoke transportation equipment. The remainder of the precast members were constructed on-site.

The project proceeded with great gusto. A significant penalty for late completion of Phases 1 and 2, coupled with the great embarrassment of opening the mall with no access, incentivised early completion. Ultimately, Phases 1 and 2 were completed on time, and Phase 3 was completed ahead of schedule.

2ND PLACE

Construction of a new underpass for the proposed Riverfields Boulevard under the R21

See winner of the Structures and Buildings category.

3RD PLACE

Phola Park Stormwater Upgrade

Local authority: City of Cape Town
Main contractor: WF Constructions

The Phola Park Stormwater Upgrade evolved from a small-scale intervention to improve water quality to a full-scale intervention after extensive community participation.

The construction component of the project was implemented during the 2015/16 financial year – beginning on 18 August 2015 and substantially completed by 7 April 2016.

The original intention was to improve the quality of the stormwater while simultaneously improving the living conditions of the residents adjacent to the channel.

The interaction with the local community and "walk-arounds" resulted in a number of interim and long-term interventions, such as regular cleaning of the stormwater channel. A trial run was planned to test the feasibility of dosing the channel with bio-enzymes to improve water quality.

The upgrading of the open unlined system to a lined system, including silt and litter traps, was considered. Low-flow diversions of stormwater to the sewerage network were also investigated.

The Solid Waste Removal Department increased its service by providing a door-to-door bag service of two bags per dwelling per week, service containers twice per week and investigating the feasibility of rolling out green bins to Phola Park. It also committed to increase the number of drop-off facilities to reduce wind-blown pollution as well as committed to maintaining the walkway.

The Department of Water and Sanitation provided additional toilet facilities and upgraded the layout of the existing toilet facilities. It also agreed to allow the diversion of contaminated low-flow stormwater into the sewerage system to improve water quality.

It was decided to opt for a closed stormwater system which would improve water quality and reduce maintenance cost while improving safety and the general living conditions of the residents.

The project was funded by means of a Mayoral Fund that was intended for upliftment projects in informal or disadvantaged communities. The total cost of the project amounted to R6.7 million.

CATEGORY: Structures and Buildings

WINNER

Construction of a new underpass for the proposed Riverfields Boulevard under the R21

Developer: ELS Development (previously Tridevco)
Architect/urban designer: Gapp
Civil and structural engineer: VIP Consulting Engineers
Electrical engineers: N3 Section – Aecom; Riverfield – CPE
Civil contractor: Civilcon
Owner: Sanral/Ekurhuleni Metropolitan Municipality

Traffic studies determined that, in order to connect township development on both sides of the R21, a link needed to be constructed consisting of two dual-lane carriageways.

The choice between underpass and overpass was extensively investigated, and it was decided that an underpass would be

Phola Park Stormwater Upgrade

Riverfields Boulevard

preferable. This was due to a variety of reasons, including topography and founding characteristics.

In order to accommodate the two carriageways and two cycle lanes, a four-span structure of symmetrical configuration would be required. The main spans are 14.05 m, and the two end spans 9.3 m. Both decks are 25 m wide to accommodate the five 3.7 m lanes, with shoulders, barriers and a pedestrian lane for each carriageway. The decks are continuous over three sets of combined column piers, designed as a solid reinforced concrete slab with thickness varying from 700 mm abutments and mid spans, to 1 100 mm over the piers. The piers are made up of six columns, each having a diameter of 800 mm, and are fixed to the slab. The end spans are supported on elastomeric bearings at the abutments.

The deck was constructed with reinforced concrete, which would allow the use of asphaltic joints at the interface with the existing road, avoiding the "thump" associated with other joints. Both decks were cast in a single operation (1 050 m³) to ensure no cold joints and cracks. The bridges were designed to the standards TMH7 for NA, NB36 and NC.30x5x40 loads.

The total cost of the project was roughly R48 million, which translates into a rate of about R19 200 per square metre of deck. Taking into account that the traffic accommodation on its own amounted to approximately R9.5 million and the works associated with the cycle tract another R1.3 million, this is very reasonable. The construction period was 16 months and the result very satisfying.

2ND PLACE

Tsakane Extension 22 Sewage Pump Station

Consultant: VIP Consulting
Municipality: Ekurhuleni Metropolitan Municipality

The Gauteng Department of Human Settlements undertook to develop 3 790 erven, 3 721 of which are zoned residential, in an area adjoining existing Tsakane. The area had no bulk or link services and a waterborne sanitation system was required. This could not be connected to the existing gravity draining sewers and a pump station was indicated.

The pump station had to be designed for a capacity of 55 ℓ/s (200 kℓ/hour) with standby capacity and had to be constructed in such a way that continued operation, even in the event of power failures, could be ensured.

Clearly visible from the R550, the pump station building was given special attention

Tsakane Extension 22 Sewage Pump Station

to present a pleasing architectural appearance. To comply with safety regulations and to ensure security, the whole of the building is covered with reinforced concrete roof slabs.

The layout of the station consists of the following:

Inlet pipe

This pipe is fitted with an isolating valve to allow maintenance of the inlet channels. Overflow during maintenance is directed into the overflow pond.

Inlet feeder line

The feeder pipeline is constructed of 450 mm diameter mild steel pipe sections, which have been externally coated with a 250 µm Copon coat and internally coated with a bituminous Carboline coating for protection against the natural elements.

Inlet screens

Two screens in parallel channels serve to prevent undue oversize matter from entering into the wet sump, and subsequently into the pumps.

Flow measuring flume

The screens are followed by a venture flume in which flow is measured and logged.

Wet sumps

Flow is directed into two parallel wet sumps. These are interconnected but this connection may be closed when only one of the two needs to be operated.

Dry sump

Adjoining the wet sumps, a pump room (dry sump) is situated with floors at about the same level as the wet sump. Two pumps, with equal capacity and which operate on a "switch-on, switch-over" basis, draw water from their own designated sump.

Automation

An emergency generator, set with capacity of 10 hours at 60% flow demand, is able to start up when power supply fails. The station has been designed to operate with the minimum input from personnel and to moderate, as far as is possible, the effect of stoppages due to power outages.

3RD PLACE

Redhouse Chelsea Interchange and Arterial Roads

See winner of the Roads and Stormwater category.

CATEGORY: Water and Wastewater

WINNER

Ashley Drive Break Pressure Tank

Local authority: eThekwini Municipality
Consultants: Royal HaskoningDHV, Naidu Consulting and Knight Piésold Consulting Joint Venture
Main contractor: Icon Construction
Subcontractors: SSE and Electron

The Ashley Drive Break Pressure Tank (BPT), located in Hillcrest, Durban, has a unique functionality in South Africa. It is designed from first principles to safely operate the Western Aqueduct, which is eThekwini Municipality's largest water conveyance project.

The primary function of the BPT is to limit water pressures in the Western Aqueduct to 25 bar between Ashley Drive and Wyebank. The pressure in the aqueduct has to be "broken" at various points so that the potentially destructive energy in the pipeline can be safely and economically controlled.

Under normal, steady-state, conditions the aqueduct works like a well-behaved, lazy river. However, when there is any change, such as an increase or a decrease

Ashley Drive Break Pressure Tank


Construction of the Northern Areas Sewer – Phase 2

in water demand, the inlet to the BPT must react. If the reaction is too fast or too slow, potentially catastrophic conditions will arise, namely overpressure in the upstream pipe or overflow from the tank.

In conventional BPTs, the water level fluctuates between full and a preset, lower limit. The inlet valve is either open or closed. If the tank is full at the time the water demand slows or stops, the inlet valve may not close quickly enough to prevent the BPT from overflowing.

In the Ashley Drive BPT, the inlet valve is constantly adjusted (modulated) via a PLC so that the water level fluctuates around 50% of the tank's depth. The BPT thus has sufficient water volume and air space to allow the inlet valve to open or close slowly.

The Ashley Drive BPT's operating system was devised by the design team in Durban from first principles, since there is no known similar modulating system for large BPTs in South Africa or, indeed, the world.

Despite the design engineers' best efforts to prevent overflow at the inlet valves, the BPT can overflow due to loss of power to the PLC, or some other malfunction, which was not acceptable to the client.

Three hydraulically actuated, automatic globe valves are provided as backup to close sequentially if the water starts to approach the overflow level. Even before the globe valves start to close, an alarm will have been sent, by telemetry, to the water department's control room and maintenance staff will be dispatched to attend to the fault condition.

The PLC exercises the globe valves periodically to prevent the working parts from seizing due to corrosion and chemical deposits from the water, and then not operating when called upon to act.

Approximately 2.14 MW of power can be generated as electrical energy from the flowing water when the scheme reaches its full capacity of 400 Mℓ/day. The electrical energy can be used for the electrical needs of the BPT, or it can be injected into the local distribution grid.

Space has been reserved within the confines of the BPT site for the construction and management of a future hydropower installation.

The Ashley Drive BPT is an excellent example of the art and science of civil engineering being brought together to control and tame the potentially destructive and lethal water energy in the Western Aqueduct pipeline.

It is a technical showcase of civil and municipal engineering, requiring unique and innovative solutions to protect the pipeline – and the public – from flooding that can occur if the pipe bursts due to overpressure or if the tank overflows.

The municipal engineers' involvement, experience and management skills bring together a multitude of engineering disciplines to complete an installation comparable with the best in the world.

2ND PLACE

Construction of the Northern Areas Sewer – Phase 2

Local authority: City of Cape Town
Consultant: AECOM
Main contractor: CSV Construction
Subcontractors: Wepex, Tuboseal and TT Innovations

The Northern Areas Sewer (NAS) is a major collector sewer currently serving an approximately 4 100 ha area of the northern suburbs of Cape Town. The sewer is approximately 9 km in length, starting in Parow and terminating at the Langa Pump Station, adjacent to the Old Athlone Power Station.

The old NAS was originally commissioned in 1951. And, although most of the sewer was still in a relatively good condition considering its age, in the early 1990s, it became evident that the NAS no longer had sufficient capacity to service the existing catchment area. Furthermore, critical developments, such as Wingfield and the Conradie Hospital, which would tie into the NAS, had to be delayed until the system was upgraded.

Phase 1 of the upgrade consisted of the replacement of the first 3.8 km of the bulk sewer in 2000 and 2001. The Northern Areas Sewer Phase 2 (NAS2) entailed the replacement of the remaining portion of the original NAS from Jakes Gerwel Drive to the Langa Pump Station, which would increase the capacity of the system from approximately 600 ℓ/s to 3 000 ℓ/s.

In terms of service life, the aim of the NAS2 project was to provide the City of Cape Town (CCT) with at least 50 years of low-maintenance service; however, considering the high-durability materials used for the project and the quality of the construction work, it is anticipated that this sewer will continue offering uninterrupted service to the CCT for the next 80 to 100 years.

CSV Construction undertook the construction of the NAS2, which involved the construction of a 5.2 km concrete gravity sewer with a diameter ranging from 1 350 mm at the upstream end to 1 650 mm at the downstream end. The depth of installation of the NAS2 typically varied between 4 m and 7 m.

In addition to the construction of the new outfall sewer, manholes were constructed at approximately 90 m intervals, and also at changes to the vertical and horizontal alignment of the sewer, to allow for access for operations and maintenance. Ultimately, 70 in situ cast concrete manhole structures were constructed as part of this project, as well as 10 smaller precast concrete manhole structures.

Sheet piling

Instead of traditional open-cut excavation with the necessary dewatering along most of the route, the contractor proposed that shoring, in the form of steel sheet piles, would be installed using vibrating hammer technology, which would limit the width of excavation to a narrow trench.

Silent piling

In order to prevent the 40-year-old, existing 132 kV cables from failing, the decision was made to install the sheet piles by means of "silent" (vibration-free) piling technology, which uses a "press-in" method.

This method of installing sheet piles was used successfully for about 450 m adjacent to the cables, as well as in other areas where the vibrations from the high-frequency vibrating hammer were considered to pose a risk to nearby structures and services.

Pipe jacking

Eight pipe jacks were undertaken at road and rail crossings, including five 1 460 mm diameter pipe jacks and three 1 680 mm diameter pipe jacks.

Cured-in-place pipe (CIPP)

Since the new NAS2 does not follow the same route as the old NAS, a portion of the sewer catchment area will still be serviced by a 1 040 m section of the old 762 mm diameter NAS. This sewer is still in a relatively good condition, despite its age; however, in order to provide for another 50 year service life, the sewer was rehabilitated using the CIPP trenchless technology method.

The CIPP technology was used to rehabilitate a total of 1 040 m of sewer over a period of less than one month, with minimal impact on the nearby residents and businesses.

The construction of the NAS2 reached practical completion in October 2015, within budget and on programme, despite many complex technical challenges.

3RD PLACE

Phola Park Stormwater Upgrade

See winner of the Roads and Stormwater category.

CATEGORY: Environmental

WINNER

Bellville Waste Management Facility

Local authority: City of Cape Town
Consultant: Mott MacDonald Africa
Main contractor: Haw and Inglis

Arising from a looming airspace crisis due to an increasing waste stream generated by a growing Cape Town, plus pending closure of the Bellville South Waste Disposal Facility, the City of Cape Town embarked on the development of the Bellville Waste Management Facility (BWMF) as an innovative, sustainable and high-tech facility focusing on waste management and minimisation.

The BWMF includes a transfer station, a waste drop-off facility (both domestic and household hazardous waste) and a future potential materials recovery facility (MRF). The new facility includes an administration office building, waste handling, weighbridge, security and workshop buildings with a floor area of approximately 8 630 m², on a site with an area of 120 000 m².

The project was divided into two phases: Phase 1 – the conceptual investigation, and Phase 2 – the design and construction of the BWMF.

The real innovation came from the conceptual phase, which involved comprehensive research into waste tonnages and technologies for the

Bellville Waste Management Facility

refuse transfer station (RTS) and MRF using waste generation models and waste categorisation studies. Technical study tours were conducted in the UK and Europe to investigate alternative technologies for the RTS and MRF.

Waste generation and characterisation studies formed a significant part of the conceptual explorative studies. Critical investigation into waste generation models and assumptions, waste generation reduction rates, and projections for BWMF, including reduction and the impact of separation at source schemes on waste stream composition, were conducted.

Sustainable design assumptions and approaches guided the investigations for sustainable interventions and financially viable integrated waste management. This included an investigation into the viability of an MRF, the recovery rates and probable income from dry recyclables. A supplementary carbon emissions reduction report was prepared and the possible income generation from carbon credit trading determined.

A comprehensive report of all investigations compiled with numerous recommendations was drafted. Only three recommendations were taken forward, namely: the provision of a modern public drop-off centre (recycling and HH hazardous), a facility for chipping of garden greens only, and RTS, which makes provision for transfer of waste to Vissershok Landfill site.

Somarela Thothi Water-loss Reduction Partnership

The construction phase was carried out in two stages:

Stage 1: Removal of existing services and buildings; removal of sewage sludge from, and infill of, sludge ponds; site earthworks; and foundation improvements. The sludge was taken to approved farms on the west coast and used for soil improvement, having been tested for its suitability prior to disposal.

Stage 2: Alterations to Peter Barlow intersection; upgrading of Rotterdam Road; rerouting of two key services; and construction of the new BWMF.

The BWMF is an innovative solution and is designed to address the complex social, environmental and financial issues of waste management in the City of Cape Town. It is the largest refuse transfer station in South Africa. At its peak, it will receive up to 1 500 tonnes of domestic waste per day.

The project spanned over eight years, from the planning phase in 2008, until completion in October 2015, within budget and according to schedule.

2ND PLACE

Phola Park Stormwater Upgrade

See winner of the Roads and Stormwater category.

3RD PLACE

Somarela Thothi Water-loss Reduction Partnership

Local authority: Partnership between Water Utilities Corporation – Botswana, Deutsche Gesellschaft für Internationale Zusammenarbeit, and FNBB Foundation

Consultant: WRP Engineering

Subcontractor: Core Environmental Solutions

Project Somarela Thothi was initiated in March 2015 to reduce water losses and improve water use efficiency in the Greater Gaborone water supply area.

Water rationing was initially introduced in March 2013, but had relatively little impact on the overall water demand. In 2014/15, the supply was curtailed by 17% compared to the 2013/14 baseline due to more aggressive rationing, compounded by vandalism, pump failures, leaks, pipeline material problems and power failures. In June 2015, the Gaborone and Bokaa dams failed completely, causing a further reduction of 16%.

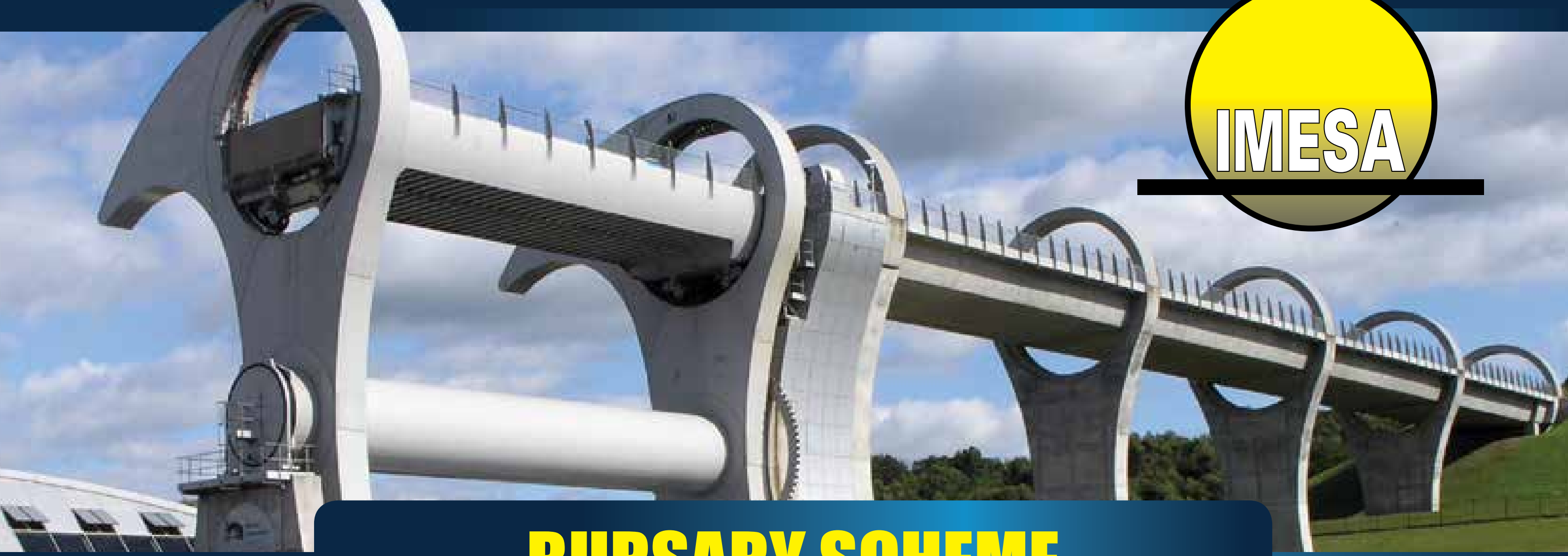
To address the water supply situation in the Greater Gaborone supply area, a partnership was established between FNBB Foundation, Water Utilities Corporation and the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH with support from the Southern African Development Community (SADC) and the Limpopo Watercourse Commission (LIMCOM) as well as UK Aid and AUS Aid.

Social interventions

Community awareness is an integral part of any water conservation and water demand management project. A total of 543 508 community members benefitted indirectly from the project through awareness activities while 21 035 community members benefitted directly through door-to-door, outreach and workshop activities.

Technical interventions

Twenty-seven district metered areas (DMAs) were identified and analysed as part of the project and an operations and a maintenance manual was prepared for each DMA. Implementing the DMAs was a challenge as the water supply system is not operated



BURSARY SCHEME

Institute of municipal engineering of Southern Africa (IMESA)

(IMESA) offers a bursary scheme for full-time studies in the field of Civil Engineering. Other engineering disciplines may be considered only at the discretion of the Executive Council of IMESA.

The aims of the scheme are:

- To provide financial assistance to students who would otherwise not have been able to afford to study
- To recognise the achievements of students and prospective students who are dependants of IMESA members

IMESA

For more information contact us on:

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Applications for 2018 will open in June 2017.

Closing date for applications is 15 September 2017.

according to the master plan, but dictated by the availability of water resources and electricity. This was aggravated by the failure of the Gaborone and Bokaa dams and lack of network maintenance.

A total of 22 major leaks were identified, of which 19 were repaired during the project. Pressure management was identified as one of the most cost-effective measures to reduce water losses, burst frequencies and inefficient water use; it also prolongs the design life of the distribution network. Some 58% of the population is now benefitting from improved bulk metering and sectorisation while 33% is benefitting directly from the pressure management initiatives.

CATEGORY: Community Upliftment

WINNER

Construction of Nomzamo Public Transport Facility

Local authority: City of Cape Town
Consultant: SMEC SA
Main contractor: RT Enterprises
Subcontractors: N.A. Roofing and BNC

The new Nomzamo Public Transport Facility (PTF) provides a significant improvement to the public space compared to the original informal taxi rank it replaced.

The PTF plays a major role in providing public transport for the inhabitants of Nomzamo to employment, business and shopping opportunities. It also provides an essential transport link for workers, shoppers and other commuter categories to the rail network, enabling them to access the wider Cape metropolitan area and the Western Cape. The facility currently serves in excess of 3 000 passengers per day.

Roughly five years ago, a temporary upgrade of the informal taxi rank was conducted and the existing gravel patch was given a rudimentary asphalt surfacing. Unbeknown at the time, the operating surface plus thin gravel layer was underlain by a deep saturated clay layer. The road pavement, therefore, had insufficient structural capacity to carry the traffic load of the 115 minibus taxis, which were holding and loading on the facility.

There was also a lack of taxi management and control within the PTF, with minibus-taxis operating in all directions and parking wherever they found a space. They parked on sidewalks, in roadways and also took over the brick-paved parking area outside the Nomzamo Business Centre, which was meant to serve only the business centre. The consequence was that the asphalt surfacing of the informal taxi rank and the brick paving in the business centre parking area deteriorated rapidly into potholes.


Nomzamo Public Transport Facility

The original taxi rank lacked commuter facilities for seating, shelter, lighting, security, trading and food. The way in which the facility has been planned and designed as a community meeting place and urban forecourt is an example of how a community can be uplifted through appropriate planning and design.

Having identified the need for the informal minibus taxi rank to be urgently upgraded in 2012, the City of Cape Town appointed SMEC South Africa in January 2013 to carry out the planning, design and construction of the Nomzamo PTF.

The main objective of the project was to improve the commuter experience and to provide shelter and a dignified facility. The intention was also to stimulate the economic development of the area because it is adjacent to the business centre and is a growing business node.

The aim was to include provision for buildings with offices, meeting room and ablutions; landscaping and tree planting; paving repairs to the parking area outside the business centre; green principles; and opportunities for informal traders.

The new facility was planned to accommodate the minibus taxi movements in the most efficient manner. The commuter was treated as the number one priority in terms of comfort and safety, to reduce conflicts between pedestrians and moving minibus taxis. Pedestrian crossings were provided at strategic points, widened and clutter-free sidewalks were introduced, walls and bollards were erected to prevent vehicles encroaching on sidewalks and pedestrian areas, and benches and walls were provided for seating.

The project brief included a requirement that green principles should be investigated for implementation in the project. These included a hybrid system for power supply and lighting with photovoltaic panels and a connection to the normal power system, and rainwater harvesting for use in the wash bay and for flushing toilets.

Following negotiations with the local councillor and the community, local community members were employed to carry out the face brickwork and other building operations that were successfully completed to a very high standard.

2ND PLACE

Tyityane Senior Primary School

Local authority: O.R. Tambo District Municipality
Consultants: GIBB Consulting Engineers, MDA Architects, Imvelo Quantity Surveyors and Amanz' abantu Services
Main contractor: Max-Wenzie Civils

A new senior primary school was recently completed for the community of Tyityane, in the Eastern Cape, near Port St Johns in the Libode Educational District. The school was constructed through the Accelerated Schools

Engineering a brighter future for the children of ***Tyityane***

The site

Tyityane is in the Eastern Cape, near Port St. Johns in the Libode Educational District

Construction

Construction started in May 2014 and practical completion was achieved in September 2015

Tyityane School

The completed Tyityane School boasts a science lab, nutrition centre and first rate classrooms

Proud Partners and Suppliers to the Tyityane School:

Imvelo Quantity Surveyors

Amanz' abantu services (pty) ltd

MAX-WEZIE CIVIL & BUILDING CONTRACTORS

DBSA Development Bank of Southern Africa

GIBB ENGINEERING & ARCHITECTURE


Tyityane Senior Primary School

Infrastructure Development Initiative (ASIDI) of the Department of Basic Education (DBE) and implemented by the Development Bank of Southern Africa (DBSA). The new school will provide the opportunity for high-quality education to the approximately 377 learners who previously had to make do with a rudimentary mud school.

Prior to construction, the site for the school was located on a highly impacted site covered with grass. The site lies on a conical hill with steep slopes towards the west and south-west and the site had limited space for all the proposed new school infrastructure.

Further challenges included designing and building a school on a site with limited space, labour relations, environmental challenges, water and electricity supply, logistics and materials supply to this very remote area, and further specific site challenges such as graves on the building site.

Following the practical completion of construction in September 2015, the community in this remote, rural corner of the Eastern Cape now boasts a school with state-of-the-art infrastructure and facilities that include:

- an administration block
- a new media centre
- a science laboratory
- 3 x 3 classroom blocks, 2 x 2 classroom blocks and head of department office
- a double grade R classroom
- a nutrition centre and ablution blocks.

In completing this project, a number of innovative, technical solutions were adopted. Among these are raft foundations, which are used on rocky ground instead of more conventional strip foundations, and maximum use of natural lighting through efficient and extensive use of skylights. Rainwater collection tanks with pumped storage augment the unreliable municipal water supply and vetiver grass is used to polish grey-water effluent.

The learners of Tyityane will now enjoy facilities that rival any school in South Africa and the new school will go a long way to meeting the goal of quality education for children.

3RD PLACE

Phola Park Stormwater Upgrade

See winner of the Roads and Stormwater category. 3S