

Fibre optic infrastructure 1 000 km installed in a year

An ambitious project by FibreCo Telecommunications to install approximately 1 000 km of fibre optic infrastructure in 12 months has proved successful due to effective planning and resourcing from the very early stages, as well as an inclusive problem-solving approach by the implementing team.

Conceptualised in 2009 to facilitate affordable and reliable high-speed internet access for South African citizens and businesses, this will be the country's largest open-access long-distance fibre optic network, which will allow operators, public and private enterprises direct access to their own optical fibre infrastructure.

Fibre optic networks offer unrivalled stability and are capable of transmitting large quantities of data at significantly higher speeds than any other medium.

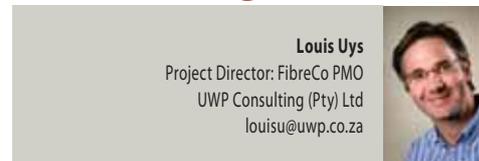
FibreCo's fibre optic infrastructure will help to transform the country's telecommunications landscape.

UWP Consulting has been involved since the planning started in 2010 and was appointed as the employer's representative to manage the construction phase, which commenced in February 2012.

The FibreCo project included 12 repeater sites, three point of presence (POP) sites and commissioning of all associated transmission equipment from Johannesburg to Bloemfontein along the N1 freeway, and from Bloemfontein to East London along the N6 freeway.

PLANNING

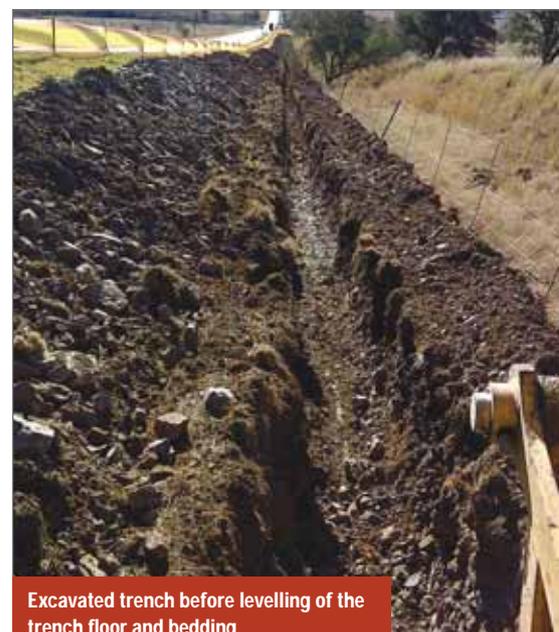
From the outset it was clear that an "out of the box" approach would be required to make the project a success. A single-minded and focused team was needed



to achieve the stringent timeline, and FibreCo opted for a partnership approach with its consultants.

UWP Consulting (civil engineering and project management) and SRK Consulting (environmental) were appointed at the very early stages and virtually all business and planning information was shared with them. As a result a close-knit team was formed that worked relentlessly with the same goal in mind.

The project was divided into different life cycle stages (planning, implementation, operation and



maintenance/closure), and detailed programmes and risk analyses of each stage were performed.

All possible risks were identified up front and mitigation strategies for each risk were agreed. From the outset risk meetings were held frequently and the risks were re-evaluated and strategies adjusted as required.

The single biggest challenge was the geographic spread of the works, which was located over several provinces, through numerous local authorities and along several regions of infrastructure owners.

The required construction approvals had to be obtained from various provincial and regional offices of the same government department or authority. In order to guarantee the most effective approval processes, various meetings were held together with the different national, provincial and regional representatives. This helped to ensure alignment of the approval process and preparation of submissions in an agreed and acceptable format.

SRK was tasked to obtain the Environmental Impact Assessment (EIA) and Department of Water Affairs approvals, while UWP was responsible for planning and addressing construction-related issues, wayleave approvals and the tender process.

Long lead times were involved in obtaining the Record of Decision (ROD) on the EIA from the Department of Environmental Affairs, authorisation for crossing water bodies from the Department of Water Affairs, and wayleaves from the different authorities. Sufficient allowances were made for these lead times in the overall project implementation plan.

GEOTECHNICAL STUDY

One of the major construction risks of a trenched linear project is the volume of rock that will be encountered along the routes and how this will impact cost and time.

A detailed geotechnical study was undertaken, including a desktop evaluation based on available information, followed by in-depth on-site investigations. The geotechnical study was performed by a team of six specialised firms, each with individual knowledge of different parts of the project route. The team was headed by ARQ Consulting.

This process resulted in 80% to 85% accuracy of the quantity estimates included in the tender process, and the findings of the investigation were shared with all the prospective contractors involved in the tender process.

Detailed submissions for the approvals of crossing of water bodies were prepared. In total 937 water cross-

ings were identified, which resulted in 703 general authorisations and 234 water use licences issued by the Department of Water Affairs over an 18 month period.

Wayleave applications were sent to more than 150 authorities and over 2 500 drawings were produced for submission. Each wayleave application had to be followed up personally, resulting in numerous meetings and phone calls.

Most of the works took place in the SANRAL road reserve and therefore SANRAL's construction approvals were key to this project. UWP Consulting's working relationships with SANRAL and the provincial road authorities were extremely helpful during this process.

TENDER PROCESS

The tender process to identify and appoint a technology partner with the appropriate construction and telecommunication transmission technology



Prefabricated shelters were deployed for the repeater sites to achieve consistent quality



More than 1 700 local labourers were involved in the project



Adverse weather conditions had to be overcome in the Eastern Cape

capabilities commenced in November 2010. ZTE Corporation was appointed as the EPC (engineer, procure and construct) contractor, supported by four main sub-contractors and 18 smaller sub-contractors.

IMPLEMENTATION

Construction commenced in February 2012. During the very early stages of construction it became apparent that, although the conventional strict lines of contract management are beneficial, a partnership and proactive problem-solving relationship with ZTE would have to be adopted to make the project a success. Achieving a working balance between a contractual and “partnership” relationship with the contractor proved challenging and many hours were dedicated by management on both sides to accomplish this. FibreCo was extremely supportive in this process.

Weekly project meetings were held with the contractor’s management team. These were problem-solving and proactive decision-making sessions rather than strictly contractual meetings.

The only construction strategy that would result in completion within the tight deadline was to work simultaneously along the entire site with as many working fronts as possible.

Where the geographical spread of the project posed challenges, it worked to the advantage of this construction strategy, as sufficient work space was available for the deployment of over 40 simultaneous active working fronts along the route. At the peak of construction more than 1 700 workers were on site simultaneously.

During the implementation of the project, 156 039 man-days were generated and 1 248 310 hours were worked by local labour. On average 589 local labourers were on site every day.

UWP Consulting established and ran a full-time project management office in Johannesburg, as well as supervised the construction process. In association with UWP, specialised services were provided by SiVEST for project controls, MCorp for the implementation and quality control of the optic fibre cables

and transmission equipment, SRK as the environmental control officer, and Nema Consulting as the occupational health and safety representative.

UNIQUE CHALLENGES

The management and control of over 40 simultaneous active working fronts with more than 1 700 site personnel along 1 000 km posed unique challenges with regard to:

- Occupational health and safety control
- Environmental control
- Quality control
- Issue and updating of construction drawings
- Compilation and acceptance of daily site diaries
- Daily reporting on construction progress and activities measured against the planned progress and activities
- Communication between the project management office and site personnel
- Matching plant availability with the work to be performed
- Alignment of project requirements and available resources.

One of the many requirements to address these challenges was to establish a communication system between the project management office in Johannesburg and the site. This had to be up-to-date, consistent, transparent and acceptable to both contractor and employer.

A web-based site diary system named *Contract Communicator* was selected and this resulted in consolidated and validated information from site being available to both the contractor and PMO (Project Management Office) on a daily basis. Quick and accurate decisions based on this information were possible.

All contractual documentation, including drawings, letters, minutes of meetings, site instructions, monthly reports, etc, were issued and filed on a web-based project management system known as *Project Place*. This had the advantage that all the site personnel had access to the latest documentation and that revision control could be managed from the project management office.

To avoid delays, changes to the way-leaves, due to construction difficulties,

were handled on a day-to-day basis. The PMO had a dedicated engineering team in place to deal with these issues.

A rigorous quality assurance plan was implemented on site. All the holding points were checked and signed off by the contractor and UWP. More than a million quality assurance forms were completed and signed during the course of construction.

Extensions of time were granted for the late approval of water use licences, a truck drivers' strike and port interruptions during 2012. The civil works were substantially completed within the time and budget allowed, and within specification, while a slight overrun was experienced in the testing and commissioning of the transmission equipment.

CONCLUSION

The project is considered a landmark for fibre optic projects in southern Africa, and its success can be ascribed to:

- the fact that FibreCo took a holistic view towards the requirements for implementation;

- thorough planning and stringent control of the construction process by a dedicated team; and
- an inclusive problem-solving approach rather than parties opposing one another. □

KEY PLAYERS

Employer FibreCo Telecommunications (Proprietary) Ltd

Contractor ZTE Corporation

Sub-Contractors Sizwe, Baran, Stefanutti Stocks

Construction Management Consultant

UWP Consulting (Pty) Ltd, in association with:

SIVEST (project controls)

MCORP (telecommunication specialists)

Nemai Consulting (OHS)

Environmental Control Officer

SRK Consulting

Project duration

February 2012 to June 2013

Number of local labourers employed over 1 700

Number of man days 156 039

Source:

http://www.saice.org.za/downloads/monthly_publications/2013/2013-Civil-Engineering-July/#/0