TRENCHING FOR CABLE LAYING WORKS ON AS AND WHEN

Table of Contents

1. ABRREVIATIONS & DEFINITIONS 2
1.1 Abbreviations 2
1.2 Standards and Specifications 2
2. BACKGROUND 2
3. SCOPE OF WORKS 2
4. MAIN OBJECTIVES 3
5. SITE AND EXISTING SERVICES 3
6. HEALTH & SAFETY SPECIFICATIONS 5
7. TECHNICAL SCOPE AND SPECIFICATIONS 5
7.1 Manual Trenching Works for Cable Laying 5
ANNEXURE A 11

Table of Figures

Figure 1 - Western Cape Region Metro Network 4
Figure 2 - Typical trench at 1200mm 8
Figure 3 : Trenching at 800mm 9
Figure 4 : Trenching at 500mm 10

Table of Tables

Table 1 – Abbreviations 2
Table 2 – Relevant Standards and Specifications 2
Table 3 – Area (phase) of works 3

1. ABRREVIATIONS & DEFINITIONS

1.1 Abbreviations

ABBREVIATIONS	DEFINITIONS
AR	Apparatus Room
BOQ	Bills of Quantities
CSE	Chief Signal Engineer
LV	Low Voltage
PRASA	Passenger Rail Agency of South Africa
RES	Regional Engineer (Signals)
SANS/SABS	South African National (Bureau of) Standards
SER	Signal Equipment Room
TFR	Transnet Freight Rail
UTC	Under Track Crossing
WC/WCR	Western Cape / Western Cape Region

Table 1 – Abbreviations

1.2 Standards and Specifications

Standard	Description
SANS 10142	The wiring of premises – Part 1: *Low-voltage installations*
CSE 1154_001_CAT_E48	*Environmental specification for spoornet railway signalling systems*
CSE 504	*Specification for outdoor signalling work*

Table 2 – Relevant Standards and Specifications

2. BACKGROUND

PRASA Western Cape Region makes use of a modern electronic interlocking system for safe movements of trains on the northern corridor. The new interlocking system was supplied and commissioned across the Region.
The newly system has signalling trackside equipment connected to it via cables. The cables and assets are underground but are prone to theft and vandalism.
With the system being non-functional for more than a year and with COVID-19 lockdown restrictions, acts of vandalism on the outdoor signalling infrastructure has risen as no monitoring was visible from the RM&TCC (CTC), therefore leaving the system extremely vulnerable.

3. SCOPE OF WORKS

The system comprises of a signalling infrastructure equipped with assets such as cables, signals, point machines and axle counters along the track.

With the above being said, this RFQ calls for the procurement of manual trenching for cable laying along the rail corridors, cable laying, closing trenches as per the said technical scope along the rail corridors on an As and When required basis.

The works for this bid includes:

This specification covers the criteria to be covered when trenching for the laying of railway signalling cables by hand for Metrorail

- Cable trench survey.
- Trenching required for cable installation.
- Under track crossing (UTC).
- Readymix concrete required to prevent cable theft.
- Closing and compacting of trenches.

4. MAIN OBJECTIVES

Utilize manual labour or the requested services is to restore train operation services areas where cable theft and vandalism has occurred on the signalling system by trenching, lay cables and closing thereof.

5. SITE AND EXISTING SERVICES

The sites are across the Western Cape Region along the rail corridors as of those depicted in figure 1 above.

MAITLAND		
Type of Works	**Location**	**Stations**
Trenching - Opening trenches - Lay cables - Close trenches	Western Cape Region	ALL

Table 3 – Area (phase) of works

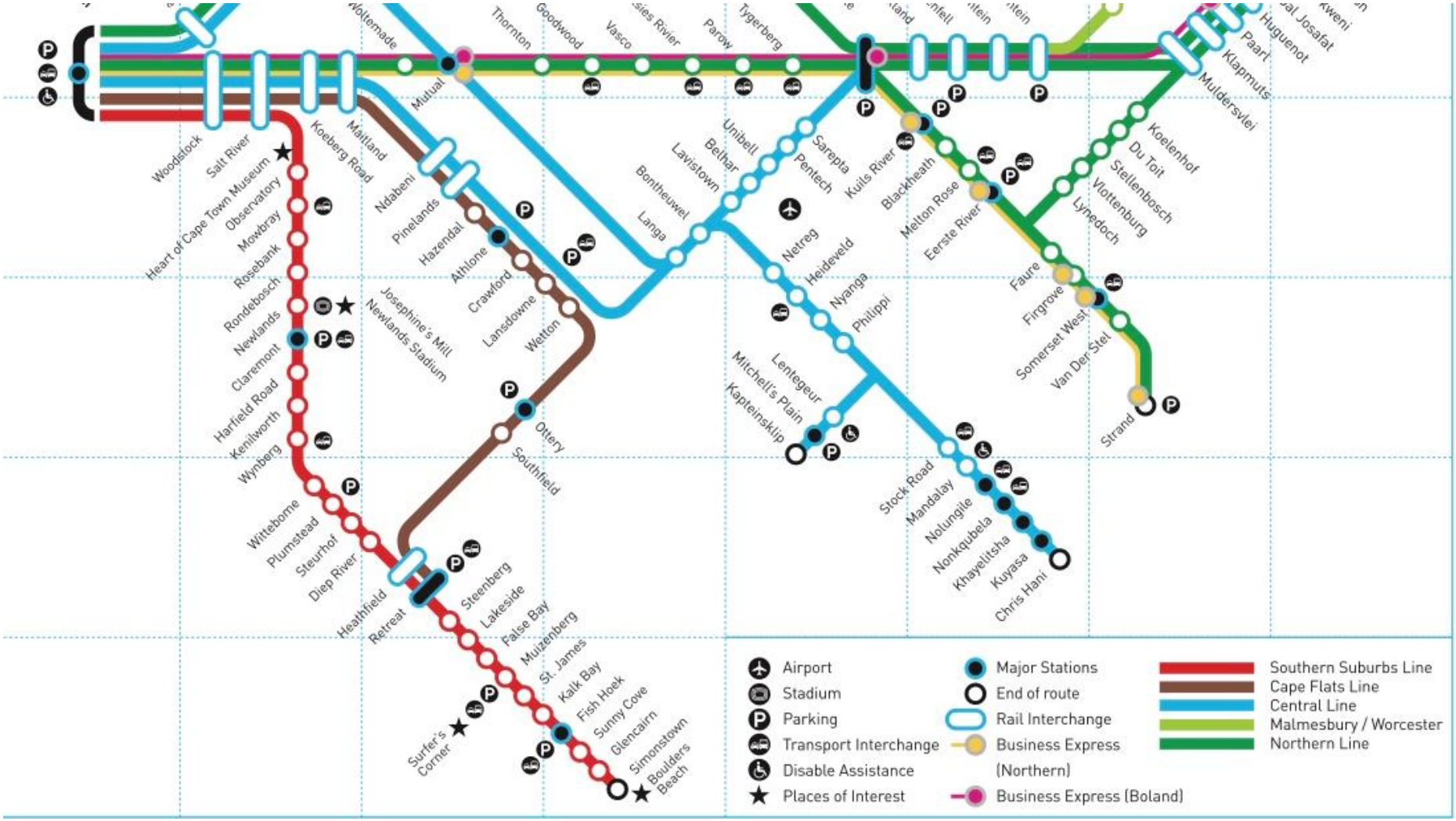

Figure 1 - Western Cape Region Metro Network

6. HEALTH & SAFETY SPECIFICATIONS

Most of the activities pertaining to the works will be executed on, over, under or adjacent to railway lines and near High Voltage equipment.

Trains will be operated on the railway lines while work is in progress. The contractor shall at all times perform the work in such a manner that the tracks are safe for the passage of trains.

The contractor shall at all times be responsible for the safety of his personnel on the site of the works while paying special attention to the danger of them being over-run by passing trains. The contractor is required to appoint a full time safety coordinator on-site who shall be responsible for safety on-site and liaise with PRASA on the various safety related matter occurring on-site.

The following generic (Standard) PRASA specifications are applicable to this contract:

6.1 E7/1: Specification for works on, over, under or adjacent to Railway lines and near High Voltage equipment. (Also referred to as the SPK7/1 specification).

6.2 E.4E Transnet (Jan 2004 - As adapted for PRASA): Safety

6.3 Arrangements and procedural compliance with the Occupational Health and Safety Act (Act 85 of 1993) and applicable Regulations. (Also referred to as the E4E specification)

NOTE: <u>COVID – 19 Measures</u>

The contractor shall implement measures required in terms of Covid-19 regulations. No separate payment will be made for such measures, as the Contractor shall allow for this in his/her rates tendered for the works.

7. TECHNICAL SCOPE AND SPECIFICATIONS

7.1 Manual Trenching Works for Cable Laying

7.1.1 <u>Trenching Works Between Stations</u>

Cables will be laid directly in the ground on Metrorail properties between the fence line and track formation. The exact location for required trenches will be pointed out onsite inspections and shown on various line plans.

- Approved detailed cable route plans will be provided by PRASA
- The necessary trained flagman will be available for the protection of staff
- Typical Tools & Plant to be used

  Tools
  - Picks
  - Ballast forks
  - Shovels

- Wheelbarrow

Plant

- Plate compactor
- Soil screener of 5mm
- Concrete mixer
- Bush cutter
- Water Pump

The base and side of all trenches must be suitably leveled before commencement of cable laying. Trenches dug in rocky environments must be free from jagged rocks to avoid puncturing the sheath.

Any damaged caused by the Contractor to buildings, made-up surfaces, water mains, etc., must be restored at the Contractor's own cost.

Cable trenching will be executed close to rail proximities, but it will be required for extension of existing trenches.

.

Cable trenches will not be left open for more than 24 Hours.

7.1.2 Trenching Works Between Stations

- The backfilling of trenches must be consolidated, and the surface made good to conform to the original standard of the rail reserve.
- Ballasts material must be left clean and undisturbed. The ballast material will be protected by laying a canvass or plastic sheeting material. In the event that ballast material fall into the trench, the ballast will be removed and the ballast restored onto the track.
- Cables are be laid at the following minimum depths when trenching <3m from the centre of the rail, which allows for the 3 different options :
  The Technical Officer will determine the best option to be used on site based on various conditions e.g. Limited space to trench, ground conditions, obstacles in trenching paths, limited access to site, etc.
- Once the trench is dug and the cable is laid, the trench will be filled and compacted as determined by the Technical Officer or the Engineering Technician:

7.1.3 Trenching At Stations

- Trenching will be required for certain portions near platforms where in special cases cables will be suspended further onto platforms, this will be a decision of the Technical Officer
- Ballast to be removed until ground surface is visible to install pipe for cables where after the installation of the pipe, the ballasts to be restored

- No trenches to be left opened unless it is barricaded
- The safety and free access of passengers must be always assured

7.1.4 Under Track Crossings

- Special attention is drawn that all UTC (under track crossing) must be done under the supervision of Perway Track Supervisor
- The maximum depth for excavation underneath the track approved by the Perway Engineer is 1m from top of rail
- Excavations to be monitored all times by a competent Perway representative
- All trenches will be open and closed in a single operation

7.1.5 Trenching Options

Option 1 : Trenching at 1200mm

All trenching shall be of a standard 400mm wide x 1200mm deep unless other options are called for various other reasons which will be determined on site with the Technical Officer.

- 200mm fine sand layer
- 700mm or 1000mm backfill
- Installation of Electrical Warning Tape
- Please see figure below

NOTE : 300mm cement backfill is not compulsory. The cement will be requested upon PRASA's risk assessment

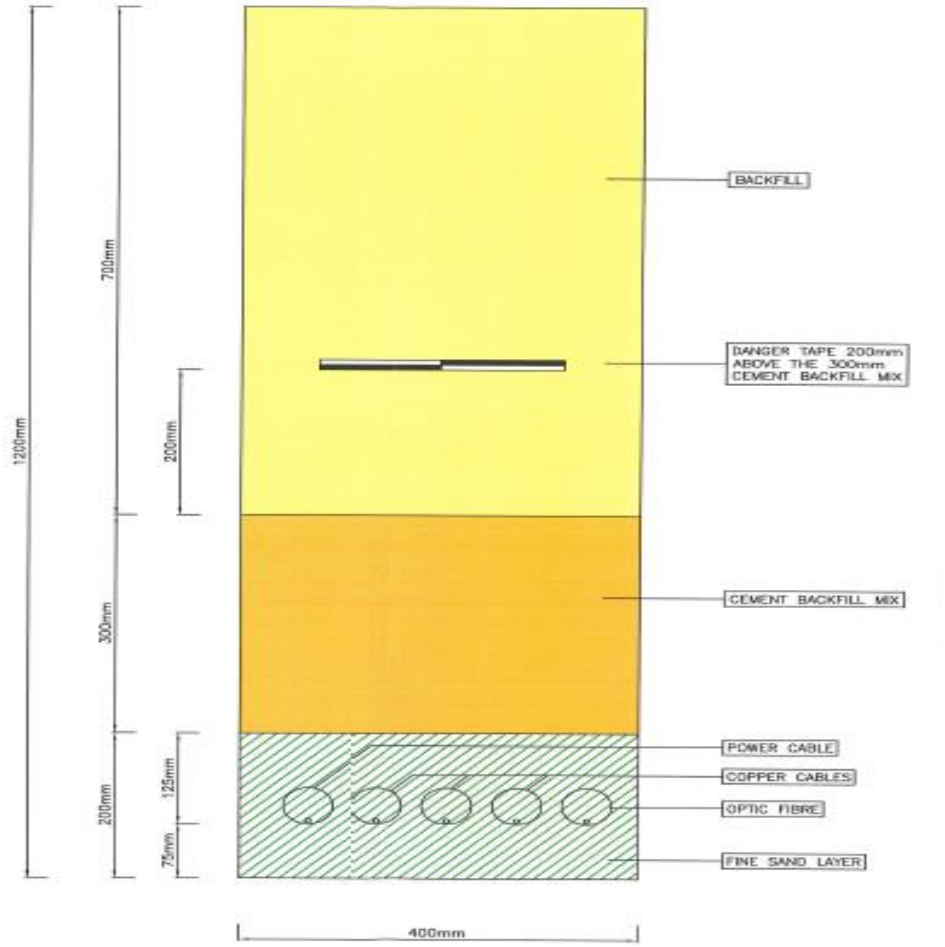

Figure 2 - Typical trench at 1200mm

Option 2 : Trenching at 800mm

If there is a limited space to trench then trenching at depth of 800mm may be considered to prevent:

- Disturbing the track foundation
- Placing backfill material on ballast
- The method chosen will also be dependent on the site accessibility and site conditions e.g access to lay slabs

NOTE : The 300mm backfill is not compulsory to have 6% cement

- 100 mm soft soil
- 400mm or 700mm backfill
- 50mm concrete slabs on top of backfill (To be free issued by PRASA, Contractor to price rate in BoQ if PRASA are unable to supply)
- Installation of electrical warning tape
- See figure below that demonstrates this option

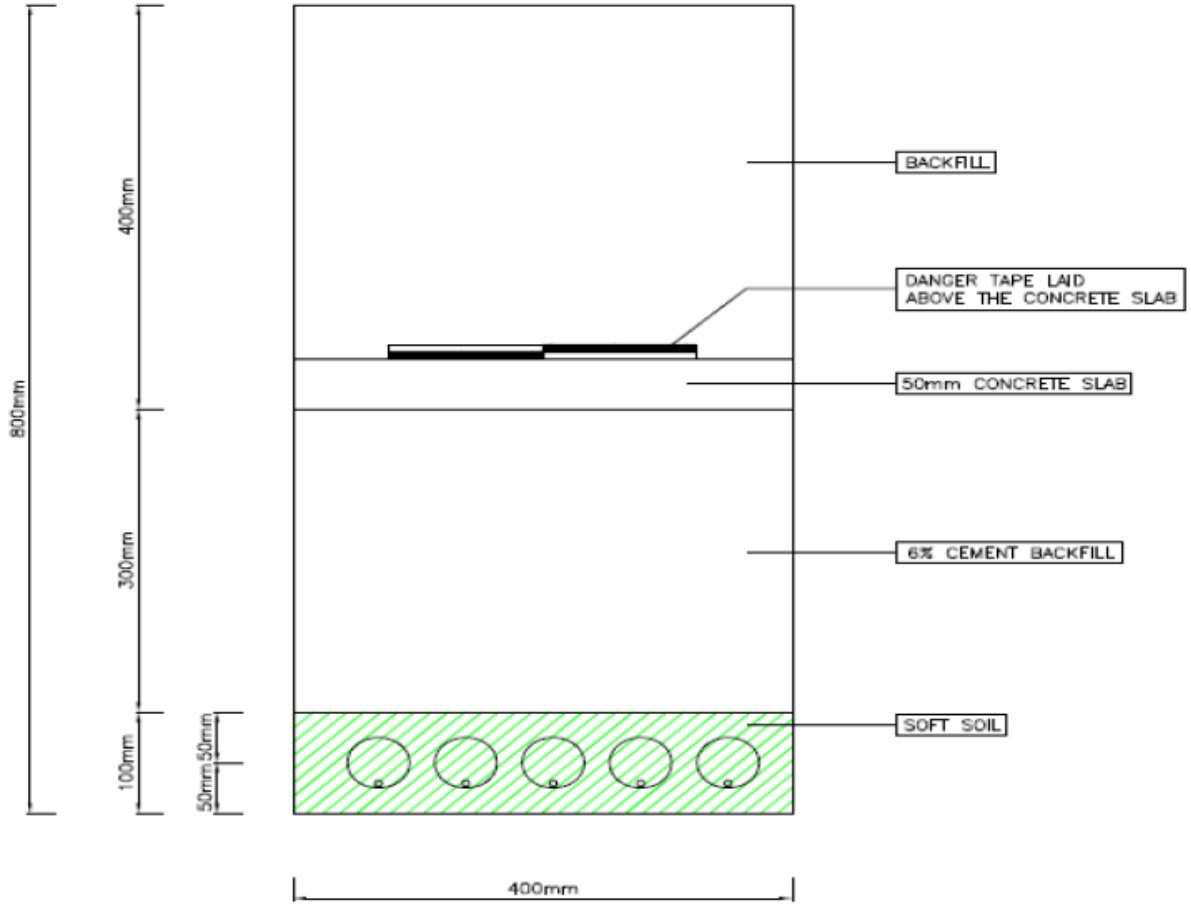

Figure 3 : Trenching at 800mm

Option 3 : Trenching at 500mm

- In the event that only a depth of 500mm is attainable due to safety consideration and where the trench is less than 3m from center of the track, or the trench is on an embankment or rocky environment, the following method should be applied
- Ready mix concrete to be considered for specified meters of trench determined by the Technical Officer on site. The concrete should be 50kg of 42.5N grade strength ready mix off the shelve bags
- Installation of electrical warning tape
- See figure below that demonstrates this option

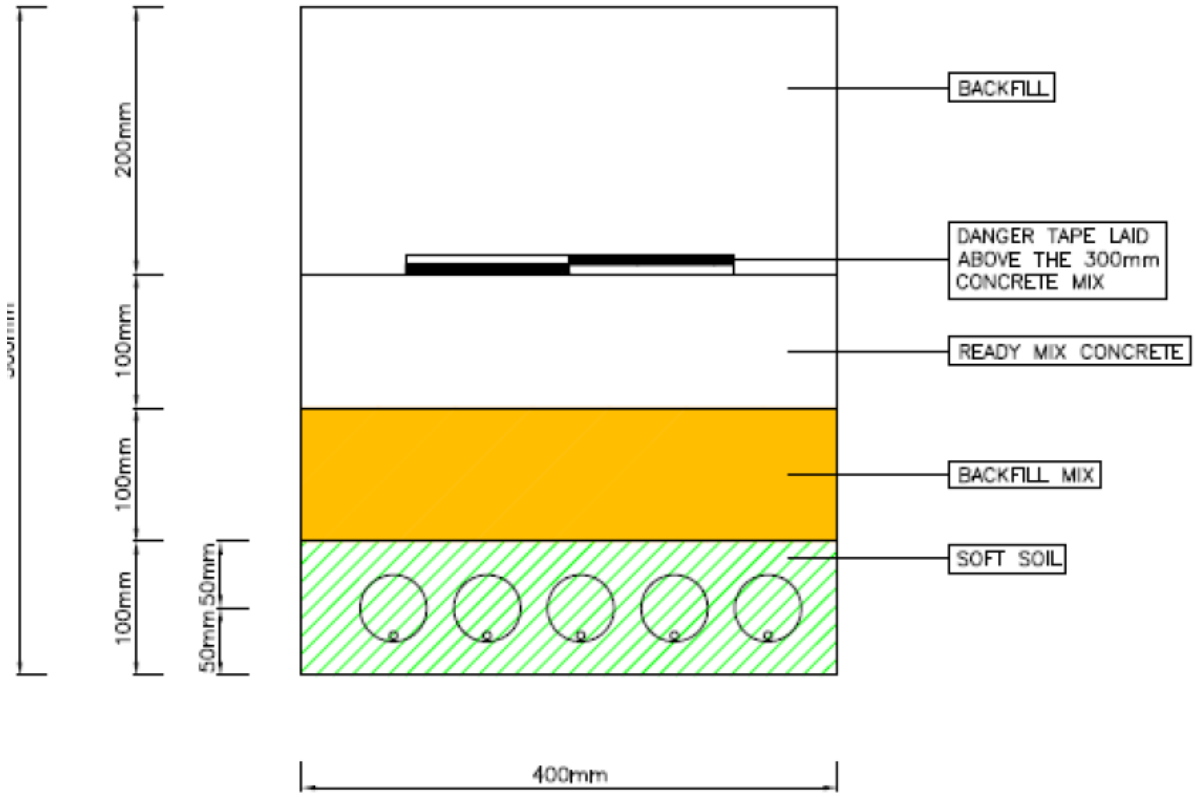

Figure 4 : Trenching at 500mm

See enclosed annexure B '*Bills of Quantities'* for detailed price information that has to be completed by the bidder.

ANNEXURE A

BILLS OF QUANTITIES (BOQ)

Bills of Quantities : Estimated Quantities

LABOUR REQUIRED FOR TRENCHING FOR CABLE INSTALLATION - rev0

ITEM nr.	ITEM DESCRIPTION	UoM	Estimated Quantities	RATE	TOTAL
A. Labour Manual Trenching for Cable Laying					
	OPTION 1				
A1.1)	Opening and closing of standard trenches at 1.2m deep x 0.4m wide including danger tape.	m	1000		R -
A1.2)	Compacting for above item (1.1) if required	m	1000		R -
	OPTION 2				
A2.1)	Opening & closing of trenches at 0.8m x 0.4m wide including danger tape.	m	600		R -
A2.2)	Concrete slabs to be free-issued	each			RATE ONLY
A2.3)	Compacting for above item (2.1) if required	m	600		R -
	OPTION 3				
A3.1)	Opening and closing of trenches at 0.5m deep x 0.4m wide including danger tape.	m	400		R -
A3.2)	Concrete ready mix cement bags to cover	each			RATE ONLY
A3.3)	Compacting for above item (3.1) if required	m	400		R -
A4)	Cable laying per metre in addition to the options above if and when required	m	1000		R -
B. Other (Bidder to specify)					
B1)	.....				
B2)	.....				
				Sub-Total	**R -**
				VAT @15%	**R -**
				TOTAL	**R -**

NB! The above estimated quantities are for price comparative reasons only and serves as no indication that this is the actual quantities that will be used throughout the contract.