a world class African city

	REFERENCE	REV
TITLE **STANDARD FOR TOWNSHIP RETICULATION SERVICES**	**CP_TSSTAN _ 209**	**0**
	DATE: **July 2025**	
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FOREWORD

The study committee was appointed by the Strategic Infrastructure Development, which, comprised of the following members:

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INTRODUCTION

City Power has embarked on a major process to upgrade, refurbish and maintain its network infrastructure on an as and when required basis. The labour contracts for the maintenance of service connections and metering are therefore required.

1. SCOPE

This standard covers City Power's requirements for the services of competent Service Providers to provide labour resources for the metering and service connections. All materials shall be supplied by City Power.

City Power reserves the right to utilize the successful Service Provider(s) to undertake a limited amount of work anywhere within City Power's area of electricity supply. It is therefore not a requirement that all contracts or contractual values shall be exhausted in full during the term of contract.

Details of the scope of work shall be indicated at the time the work instruction is issued.

All equipment pre-commissioning testing shall be carried out as per relevant standards and specifications shall be witnessed and signed off by City Power personnel.

2. NORMATIVE REFERENCE

The following documents contain provisions that, through reference in the text, constitute requirements of this standard. At the time of publication, the editions indicated were valid. All standards and specifications are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the documents listed below.

2.1 Specifications

Document number	Document title
CP_TSSTAN_009	City Power's Township Electrical Reticulation Standard for Underground Systems
CP_TSSTAN_033	City Power's Operating Safety Precaution Standard
CP_TSSTAN_035	Standard for the planning of public lighting infrastructure
CP_TSSTAN_042	Standard for Technical requirements for labour contracts for systems rated up to and including 22 kV.
CP_TSSTAN_043	City Power's work standing instruction for the acquisition and payment procedures for Service Providers or service providers.
CP_TSSTAN_108	Electrification Standard
CP_TSSTAN_133	Standard for meter check and final reading
CP_TSSPEC_001	Medium Voltage (MV) Cables
CP_TSSPEC_002	Low Voltage (LV) Cables
CP_TSSPEC_005	Miniature Substations (MSS)
CP_TSSPEC_006	Ring Main Units (RMU) for MSS
CP_TSSPEC_008	2 and 4 way CMKs
CP_TSSPEC_010	LV ABC with neutral supporting conductor
CP_TSSPEC_011	Discharge Lamps
CP_TSSPEC_012	Photo Electric Control Units
CP_TSSPEC_013	Glass Reinforced Polyester Poles
CP_TSSPEC_231	Energy efficient street lighting Luminaires
CP_TSSPEC_015	Post top luminaires
CP_TSSPEC_016	Contactors
CP_TSSPEC_017	Miniature Circuit Breakers (MCB)
CP_TSSPEC_018	LV Moulded Case Circuit Breakers (MCCB)
CP_TSSPEC_019	Split concentric single phase aerial service cable
CP_TSSPEC_020	Current carrying connectors and joints for LV ABC

Document number	Document title
CP_TSSPEC_021	Cable ties for use with ABC
CP_TSSPEC_022	Crimped Lugs and Ferrules
CP_TSSPEC_023	Mechanical Torque Shear Connectors
CP_TSSPEC_024	Fittings for use with LV ABC
CP_TSSPEC_025	Free standing 11kV metering kiosks
CP_TSSPEC_027	Concrete Plinths
CP_TSSPEC_028	Earth leakage units
CP_TSSPEC_029	Adjustable Cable Clamps
CP_TSSPEC_030	Metal Cable Glands
CP_TSSPEC_031	LV surge protection devices
CP_TSSPEC_033	Steel distribution poles
CP_TSSPEC_034	Pilot cables
CP_TSSPEC_035	11kV metal clad switchgear
CP_TSSPEC_038	Pole mounted SDB
CP_TSSPEC_039	Free Standing RMU
CP_TSSPEC_040	Earth Fault Indicators
CP_TSSPEC_041	Single and three phase meter cabinets
CP_TSSPEC_042	Load management relay box
CP_TSSPEC_043	Meter cabinets for SPLV service connections
CP_TSSPEC_045	PVC Sleeves
CP_TSSPEC_046	PVC Adhesive Tapes
CP_TSSPEC_047	Insulating putty and self-fusing tape
CP_TSSPEC_051	Fittings for use with single phase aerial service cable
CP_TSSPEC_052	Concrete poles
CP_TSSPEC_053	MV joints and terminations
CP_TSSPEC_054	LV joints
CP_TSSPEC_055	Exothermic welding
CP_TSSPEC_056	Earth rods

Document number	Document title
CP_TSSPEC_057	Neutral blocks
CP_TSSPEC_058	MV ABC
CP_TSSPEC_059	Nylon cable glands
CP_TSSPEC_061	Bare overhead aluminum conductors
CP_TSSPEC_062	Copper busbars
CP_TSSPEC_063	Electronic single and three phase meters
CP_TSSPEC_064	MV metering CT's
CP_TSSPEC_065	LV CT's
CP_TSSPEC_066	MV rackable VT's
CP_TSSPEC_068	LV fuses
CP_TSSPEC_069	Master padlocks
CP_TSSPEC_070	MV fuses
CP_TSSPEC_071	Timers
CP_TSSPEC_072	Streetlight SDB's
CP_TSSPEC_073	Control gear
CP_TSSPEC_075	Hardware
CP_TSSPEC_076	Galvanised cable clamps
CP_TSSPEC_077	Ground mounted distribution transformers
CP_TSSPEC_078	Notices, danger and warning signs
CP_TSSPEC_080	Pole fittings for use with LV ABC & ASC
CP_TSSPEC_081	Thermal indicator stickers
CP_TSSPEC_082	LV panels for vandal resistant 27 way steel SDB's
CP_TSSPEC_083	Danger and warning tapes
CP_TSSPEC_084	Cable route markers
CP_TSSPEC_085	Stays and associated components
CP_TSSPEC_086	LV Distribution Fuse Cabinet
CP_TSSPEC_087	Single and three phase prepayment meters

Document number	Document title
CP_TSSPEC_088	Portable notice, danger and warning signs
CP_TSSPEC_091	Disposal of waste
CP_TSSPEC_092	Stainless steel strapping
CP_TSSPEC_093	LV fuse switch disconnector pillars
CP_TSSPEC_094	LV MCCB cabinet
CP_TSSPEC_096	Pole mounted distribution transformer
CP_TSSPEC_099	High mast inspection
CP_TSSPEC_101	End connectors and insulating sleeves
CP_TSSPEC_103	Small power distribution boards (ready boards)
CP_TSSPEC_104	MV insulators
CP_TSSPEC_106	Electronic maximum demand meters
CP_TSSPEC_108	Portable earthing
CP_TSSPEC_111	Insulating rods for use with portable earthing equipment
CP_TSSPEC_116	Insulating oil
CP_TSSPEC_122	MV proximity tester
CP_TSSPEC_123	MV phase comparator
CP_TSSPEC_127	Insulating gloves
CP_TSSPEC_130	Steel 27 way SDB's (high risk areas)
CP_TSSPEC_134	Flexible protective sleeves for underground use
CP_TSSPEC_136	Termination kits for LV cables
CP_TSSPEC_138	Pole mounted auto recloser
CP_TSSPEC_139	Pole mounted sectionaliser
CP_TSSPEC_146	11kV BMK
CP_TSSPEC_150	Protective sleeve for fibre optic cables
CP_TSSPEC_164	New ground mounted transformers
CP_TSSPEC_168	1600A LV distribution fuse cabinet
CP_TSSPEC_208	Low voltage service protective distribution kiosk
CP_TSSPEC_232	Energy mix technologies equipments
CP_TSSPEC_271	split concentric tinned copper and coated steel 10mm² cable

Document number	Document title
CP_TSSPEC_202	Copper cladded steel for earthing
CP_TSSPEC_259	Specification for Outage And Workforce Management System
CP_TSSPEC_260	Specification for control and monitoring of protective distribution KIOSK
CP_TSSPEC_316	Specification for single and three phase meters
OHS Act 1993	Occupational Health and Safety Act (Act 85 of 1993)
SANS 10198	The selection, handling and installation of electric power cables of rating not exceeding 33kV - Parts 1 to 14.
SANS 1200 D	Standardized specification for civil engineering construction Section D: Earthworks
SANS 1195	Busbars
SANS 1411-2	Materials of insulated electric cables and flexible cords - Part 2: Polyvinyl chloride (PVC)
SANS 1507	Electric cables with extruded solid dielectric insulation for fixed installations (300/500V to 1900/3000V)
SANS 60947-7-1	Low-voltage switchgear and control gear Part 7: Ancillary equipment Section 1: Terminal blocks for copper conductors
IEC 60898	Electrical accessories/circuit breakers for over current protection for household and similar installations
SANS/IEC 62055-31:	Electricity metering — Payment systems Part 31: Particular requirements — Static payment meters for active energy (classes 1 and 2)
SANS 1524-1:	Electricity payment systems Part 1: Payment meters
SANS 1799,	Watt-hour meters – AC electronic meters for active energy.
SANS 9001:	Quality Systems – Model For Quality Assurance In Design/Development, Production, Installation And Servicing.
SANS/IEC 62056-21:	Electricity metering — Data exchange for meter reading, tariff and load control Part 21: Direct local data exchange
SANS IEC 61036	Alternating-current static watt-hour meters for active energy (Classes 1 and 2).
NRS 057:2009:	Code of practice for electricity metering
NRS 055:2011	Revenue Protection
NRS 096:	Electricity metering – Ancillary specifications – Part 1: The sealing of electricity meters.

2.2 Drawings

Reference	Title
CP_TSDRAW_001	MV XLPE single core heat shrink terminations
CP_TSDRAW_002	LV through wall busbar stubs in distribution chambers
CP_TSDRAW_003	CP6 type A meter cabinet for cluster development
CP_TSDRAW_004	Steel streetlight and distribution poles
CP_TSDRAW_005	Lighting bracket
CP_TSDRAW_006	Lighting bracket mounting arrangement
CP_TSDRAW_007	SDB 2 way CMK
CP_TSDRAW_008	SDB 4 way CMK
CP_TSDRAW_011	SDB 27 way steel
CP_TSDRAW_012	Standard notices, warning and danger signs
CP_TSDRAW_013	Wall and plinth mounted meter cabinets (CP1)
CP_TSDRAW_014	Wall and plinth mounted meter cabinet (CP3)
CP_TSDRAW_015	Typical arrangement of the consumer's medium and low voltage chambers (Sheets 1 to 7)
CP_TSDRAW_016	Standard symbols for area electrification (Sheet 1 of 1)
CP_TSDRAW_017	4 kN pre-stressed concrete pole
CP_TSDRAW_018	10 kN pre-stressed concrete pole
CP_TSDRAW_019	20 kN pre-stressed concrete pole
CP_TSDRAW_024	8 kN pre-stressed concrete pole
CP_TSDRAW_026	CP5 Load Management Relay Box
CP_TSDRAW_030	CP7 Typical details for metering and switch receptacle for SPLV boxes
CP_TSDRAW_036	MSS Earthing for MV system with continuous earthing conductor to source substation
CP_TSDRAW_048	Plinth details for type A long MSS
CP_TSDRAW_049	Free standing 11 kV metering unit

CP_TSSDRAW_063	9 way pole mounted low voltage distribution protective kiosk
CP_TSSDRAW_064	6 way ground mounted low voltage distribution protective kiosk
CP_TSSDRAW_065	9 way ground mounted low voltage distribution protective kiosk
CP_TSSDRAW_066	18 way ground mounted low voltage distribution protective kiosk
CP_TSSDRAW_068 SHEET 1	R.A.T meter wiring
CP_TSSDRAW_068 SHEET 2	R.A.T meter wiring

2.3 Inspection Checklists

Reference	**Title**
CP_TSCHECK_026	Commissioning checklist for MV chamber (civil)
CP_TSCHECK_026	MSS Pre-commissioning planning checklist
CP_TSCHECK_026	Commissioning checklist for cable Installation
CP_TSCHECK_026	Commissioning checklist for outdoor RMU

2.4 Other applicable documents

City Power Operating Regulations

The Standard System of Measurement of Civil Planning Engineering quantities for South Africa and Namibia

Johannesburg Roads Agency (Pty) Ltd: Public Roads and miscellaneous by-laws

Any other Acts/Regulations/policies as applicable to the Industry

3. GENERAL REQUIREMENTS FOR LABOUR CONTRACTS

3.1 General Statutory and technical requirements

The compulsory requirements of the OHS Act of 1993 shall be complied with at all times when installing electrical equipment for City Power. Where clarity is required on subjects covered by this standard, the requirements of the OHS Act of 1993 shall be adhered to.

The technical requirements of SANS 0198 Parts 1 to 14 shall be adhered to, unless otherwise approved in writing by City Power. Any technical concessions to this standard shall be approved by the Technical Evaluation Committee before the successful Service Provider(s) is informed in writing.

The safety of all personnel performing work for City Power shall be a key deliverable and adherence to City Power's Safety Operating Precaution Standard CP_TSSTAN_033 is compulsory at all times.

The electrical equipment standards and specifications of City Power's Township Electrical Reticulation Standard for Underground Systems CP_TSSTAN_009 shall be adhered to when installing electrical equipment for City Power. Any technical concessions to this standard shall be approved by SABS 0198 before the successful Service Provider(s) is informed in writing.

All equipment shall comply with the relevant specifications as detailed in this standard and, if no City Power specification exists the SANS specification shall apply.

Generally, no equipment or cables shall be installed in common trenches where other services have been installed i.e. Telkom service and Water mains

The work standing instruction for the acquisition and payment procedures for Service Providers or service

Provider CP_TSSTAN_043 shall be applied when the services of a Service Provider or service provider is required with in City Power.

The City of Johannesburg Metropolitan Municipality: Public Road and miscellaneous BY-LAWS shall be complied with when working in the road reserves of the City of Johannesburg.

3.2 Extent of work

The service provider shall take cognisance of the fact that this is an “as and when” contract and City Power cannot guarantee the extent of work to be carried out nor the amount of money to be spent.

Quantities given are provisional and are given only for the purpose of tender evaluation. The service provider shall be paid on actual work carried out at the agreed rates.

The estimated quantities have been obtained by summating various small and large individual projects and the service provider shall gear its operations and costs to enable it to undertake the said work at various sites.

3.3 City Power’s Responsibilities.

3.3.1 City Power’s resources shall oversee and approve workmanship, ensure compliance and authorize payments.

3.3.2 City Power shall further provide identity cards, flyers, notices and drawings, seals and sealing wire to the Service Provider.

3.3.3 Information stickers detailing inspection information such as City Power's contact details, date of installation and etc., shall be supplied by City Power.

3.3.4 New and replacement meters including peripherals shall be provided by City Power as free issue subject to approval by the relevant Metering Department.

3.3.5 City Power shall ensure that stock of material is kept.

3.3.6 Replaced meters shall be returned to City Power for reverse logistics and asset retirement processes.

3.4 Service Provider’s Responsibilities

3.4.1 The Service Provider shall install new equipment in areas that are without existing installations.

3.4.2 The Service Provider shall install/ replace the equipment in accordance with the above-mentioned standards.

3.4.3 The Service Provider shall inspect existing connections and take corrective action where necessary (i.e. repair or replace).

3.4.4 Existing installations that do not comply with good practice or where the meters, network, and public lighting infrastructure have been tampered with shall be reported. Wiring shall be

repaired, meters, public lights and network infrastructure shall be replaced and sealed where necessary.

3.4.5 The service provide shall capture readings before replacing the meters.

3.4.6 Replaced meters shall be returned to City Power for the purpose of reconciling invoiced replacements and for possible repair and re-cycling.

3.4.7 The Service Provider shall provide the following:

a) Skills and labour
b) Transport to and from target areas
c) All tools and appropriate test equipment
d) Wiring, ferrules and terminals

3.4.8 Any sundry tool required to perform installation and maintenance of meters, connections, public lighting and associated equipment.

3.4.9 The Service Provider shall have more than one team and each team shall be comprised of at least two resources being an installer and a labourer.

3.4.10 The Service Provider shall not claim overtime or additional costs after rates have been accepted by City Power as it shall be generally understood that the related costs shall be factored into the pricing.

3.4.11 It is further intended that an Electrician (single phase tester minimum requirement) shall sign off on installations.

3.4.12 The Service Provider shall be held responsible for loss or damage to the new equipment from the time they are issued until they are installed and the handover documents have been signed off by all the various stakeholders.

3.4.13 The Service Provider shall capture data using the work force management tool and any other management tool requested by City Power.

3.4.14 The Service Provider shall ensure that each meter is adequately sealed and all relevant information is captured before leaving the premises.

3.4.15 The Service Provider shall ensure availability of resources for call outs during and after office hours as per service level agreement.

3.4.16 The Service Provider shall provide and operate all the necessary test instruments and equipment to perform all tests.

3.4.17 The Service Provider shall be responsible for all safety precautions prior commencement of duties which includes risk assessment and testing.

3.4.18 Up to date certificates of accuracy for the testing apparatus by recognized regulatory bodies shall be provided as and when required.

3.4.19 The service provider shall ensure a safe state of all distribution kiosks by leaving them securely closed prior to leaving site.

3.4.20 All defects of deficiencies found during an inspection shall be repaired or corrected by a qualified person at no cost to City Power.

3.4.21 Under no circumstances shall any service provider or his workmen perform any function that he or she is not authorized to perform. In any case of doubt the matter shall be referred to the Supervisor, or Operations Manager.

3.4.22 Service provider's staff shall not retaliate when subjected to abuse by an irate customer. In the event of any abuse this shall be referred to the Operations Manager or Supervisor.

3.5 Service Provider employee and subcontractor details

The service provider shall provide a detailed business profile. If subcontractors are utilized by the service provider, then the subcontractor's business profile shall also be provided.

No service provider shall be allowed to use any sub-contractor without the knowledge of City Power.

The service provider shall provide the following employee and subcontractor details;

a) A detailed list of all employees and subcontractors (electrically skilled staff),
b) A detailed list of qualifications and experience of all employees and subcontractors who shall perform work on City Power's electrical distribution network,
c) A detailed list of each person's expertise for the above list of employees and subcontractors, i.e. MV jointing certification or cable laying certification etc. and,
d) A list of previous project references, i.e. contact persons, work completed, etc.

NOTE:

1. The successful service provider shall ensure that the above information which has been supplied to City Power is continually updated on a monthly basis to ensure that City Power's record keeping is accurate and correct.

2. No service provider shall be allowed to use any sub-contractor without the knowledge (provided in writing prior to commencement of any works) of City Power.

3.6 Service Provider's fleet, specialized tooling and premises details

The service provider shall provide fleet, specialized tooling and premises details currently owned by the Service provider's business and owned by the subcontractor respectively if applicable;

a) A detailed list of all roadworthy vehicles (make, model, registration number, purpose of vehicle),
b) A detailed list of all specialized tooling (make, model, serial number, purpose of specialized tool),
c) A detailed list of address(s) premises (location, capability, number of staff at each premise).

City Power shall not lease any City Power vehicles or specialized tooling to any service provider. The successful service provider shall be fully equipped to perform the work awarded to him by City Power. If the service provider(s) arrives on site and is not equipped to perform the work awarded to him by City Power, he shall have his labour contract terminated by City Power.

3.7 Service provider workmanship guarantees

The service provider shall be liable for workmanship guarantees for a period of 12 months once the electrical equipment has been commissioned. If in this time period, it is proved by City Power that poor workmanship was the cause of the power failure; the 10% contract (based on a 3-year projected budgeted allocation) retention fee shall be used by City Power to repair the poor workmanship, and a noncompliance certificate shall be issued to the service provider by City Power.

3.8 Work to be undertaken

Service providers and subcontractors shall only undertake work on City Power's electrical network if they are in possession of an approved wayleave from the Johannesburg Road Agency (JRA).

Any service provider caught working within City Power's area of supply without an approved wayleave or governance approvals, shall be fined R5000 by City Power or an amount or fine imposed by the relevant authority, whichever is higher. The service provider shall also be liable for any fines imposed on them by other MOE's and if any services are damaged they shall have to pay for the repair of these services. The fines and repairs shall be paid for by the service provider at no cost to City Power.

3.9 Issuing material

All material shall be issued free by City Power with the exceptions of spares as covered under the network accessories specifications available on request from the City Power.

Any service provider caught installing non-City Power issued material shall have their contract with City Power terminated.

All excess material not installed on the job shall be returned to City Power's warehouse with relevant documentation (i.e. Material Issue slip and Warehouse Credit Requisition form).

4. General

4.1. Service Connection

4.1.1. All service connection infrastructure inspections shall be conducted in accordance with NRS 034 and the manufacturer's recommended procedures. The inspection frequency shall be communicated by City Power and shall not be limited to either the manufacturer's recommended intervals or the equipment failure or faults.

4.1.2. All maintenance and repairs shall be executed by competent or qualified personnel in line with stipulated response times.

4.1.3. All tools required for installation shall be supplied by and remain the property of the service provider.

4.1.4. Network equipment shall be suitably accommodated and protected and readily accessible to officials of the Service Provider at all reasonable times.

4.2. Pre Installation/ Replacement Checks

4.2.1. At the completion of the installation/ replacement and prior to the commencement of the commissioning tests the Service Provider shall inspect all hardware and verify that all the tasks have been completed in accordance with the installation specifications.

4.2.2. All hardware devices (e.g.: breakers) have been installed at the right locations.

4.2.3. Electrical and communications cables have been appropriately sized and secured to protect against operational damage and ensure stability for continuous use.

4.2.4. Connections have been correctly terminated and insulated to ensure satisfactory connectivity and protection against faults and interference.

4.2.5. All devices have been provided with adequate protection against moisture and other environmental conditions

4.2.6. Communication network cables have been correctly connected to the designated points.

4.2.7. Associated equipment such as power supplies and switches have been connected correctly and secured appropriately.

4.2.8. Drawings have been updated accordingly.

4.2.9. Proper grounding or earthing on all devices.

4.3. Commissioning Check

4.3.1. The Service Provider shall be responsible for the configuration of any additional equipment that are added or replaced on the network.

4.3.2. They shall be responsible for the commissioning of the new equipment. The Service Provider shall be an active participant in testing and commissioning with City Power.

4.4. Preventative Maintenance

4.4.1. A large part of keeping a company running efficiently and profitably is ensuring that all equipment is functioning optimally. To do so, routine preventative maintenance needs to be conducted in accordance with the relevant regulatory standards.

4.4.2. Preventative maintenance shall be performed in accordance with relevant standards as stated in this document, to extend the life of assets and increase equipment uptime, as well as increasing performance and efficiency.

4.4.3. It is performed while the equipment is still working so that it does not break down unexpectedly

4.4.4. The service provider should ensure safety by wearing appropriate personal protective equipment such as glasses and gloves, etc.

4.4.5. Equipment shall be installed in a level and perpendicular manner in accordance with the manufacturer's specifications.

4.4.6. The overall condition of equipment shall be inspected which includes Terminals, seals, glass, and insulation.

4.4.7. Exposed non-current carrying metal parts of fixed equipment, metal boxes, cabinets, and fittings which are not electrically connected to grounded equipment, shall be grounded as required by the relevant code of practice.

4.4.8. The terminals of the meter shall be arranged so that the possibility of short circuits when removing or replacing the cover, or making connections and adjusting the meter is minimized.

4.4.9. The main circuit breaker or main switch and fuses and their auxiliary equipment shall be installed in a position near the entrance of the property being supplied and is intended to constitute the main control and means of cut-off

4.4.10. Check for ground faults; verify customer being billed is the only customer service by each meter. Verify that common use areas such as streetlights are not wired into the load side of the customer circuit.

4.4.11. Any associated photographs, diagrams, GPS coordinates and etc, shall be uploaded via the workforce management tool

5 CABLES

5.1 Excavation, backfilling, compaction and reinstatement

The Electrical service provider shall be responsible for all earth works necessary to complete the electrical reticulation as specified. Unless otherwise specified, measurement of earth works shall be done according to "The Standard System of Measurement of Civil Planning Engineering quantities for South Africa and Namibia".

The service provider shall familiarise itself with the requirements as indicated in the Johannesburg Roads Agency (Pty) Ltd: Public Roads and miscellaneous by-laws. All conditions stipulated in this specification are to apply irrespective of whether the excavations are in the road reserve or not. The service provider shall ensure that it understands the full context of the codes of practice so that the administration costs of applying the codes can be built into the rates as tendered in the Bill of Rates.

Because it is not possible to estimate the financial transactions required for the Codes, the service provider shall be required to retain all receipts and all costs shall be reimbursed by adding them to Contract Progress Payments.

5.2 Removal of rock

Rock encountered in trenches is to be removed with the use of mechanical rock breakers such as a pneumatic hammer and wedge. The use of explosives shall only be considered under special circumstances and blasting may only be undertaken with the written permission from City Power’s relevant General Manager and provided all regulatory explosive and blasting permits and licenses have been obtained.

Rock encountered in pole holes is to be removed with the use of either mechanical rock breakers such as pneumatic hammers or a rock drill with a minimum diameter of 450 mm.

The removal of rocks, that have been loosened by means of machinery, shall however be done by means of manual labour, employing the use of tools such as shovels or similar, whenever and wherever this is deemed technically practicable and safe.

5.3 Classification of material to be excavated

The classification of material in which excavations have to be carried out shall be classified as covered by the SANS 1200 D standardized classifications.

The material in which excavations have to be carried out shall be classified as follows:

a) "Hard material" shall be held to be under-composed boulders each exceeding a nominal diameter of 1 m and solid rock in bulk or banks or ledges, the practicable excavation of which would necessitate the use of explosives and/or drilling and wedging. Hard material can only be excavated by either pneumatic tools or by a "back actor" with a special mechanical ripper attached to it. Hard material shall include soil with loose boulders greater than 0, 5 m^3 after excavation.

b) "Soft material" shall be held to be material more easily excavated and not falling into categories of "hard material" such as gravel, earth, turf, scale, sand, silt and clay.

5.4 Dimensions of cable trenches

All trenches shall be subject to and not limited to the following:

a) The service provider shall be responsible for all trench excavation.
b) The service provider shall, before trenching commences, familiarize himself with the routes and site conditions, and the procedure and order of doing work shall be planned in conjunction with the general construction programme for other services and building requirements.
c) The service provider shall be held responsible for any damage to the existing services brought to his attention by the relevant authorities and shall be responsible for the cost of repairs at no cost to City Power.
d) The service provider shall take all necessary precautions and provide the necessary warning signs and/or lights to ensure that the public and /or employees on site are not endangered.
e) The service provider shall ensure that the excavations shall not endanger existing structures and roads.

Trenching shall be in accordance with SANS 10198. All cable trenching shall be in strict accordance with City Power standard CP_TSSTAN_009 and other relevant standards and guidelines. All trenches are to be a minimum of 400 mm wide and shall be excavated to the following depths below natural ground level:

Medium Voltage cables : 1000mm below final road level.

Low Voltage cables : 600mm below final road level.

Medium Voltage cable spacing : 150mm apart from each other.

Sleeved Road Crossings : To install the sleeves at a depth of 1 000 mm below the lower gutter level

The normal volumetric rates per linear metre of trench to meet these requirements are:

Low Voltage Cables : 0, 30 m^3

Road Crossings : ± 0, 55 m^3

Should the service provider be required to excavate to a depth of greater than 1 000 mm, the width of such excavation as well as the appropriate shoring requirements shall be in accordance with the Occupational Health and Safety Act (Act 85 of 1993).

5.5 Installation of cables

All cables shall be laid in accordance with the requirements of SANS 10198 and CP_TSSTAN_009.

Aluminium XLPE insulated MV cable shall be installed for all new projects. PILC are not to be used, XLPC to PILC transition joints may only be used for joining new cables to existing networks. Cable jointers shall be trained and certified to joint and terminate on both types of cables.

The service provider to ensure compliance shall inspect all trenches prior to installation. A cable inspection prior to the closing of the trench. An inspection to ensure the 75mm layer has been filled and compacted correctly. Final inspection once the trench has been backfilled and compacted where the compaction certificates can be handed over.

Cable shall only be laid in trenches having smooth flat bottom surfaces. Where these surfaces are irregular they shall first be smoothed off before installing the cables. Where cables are installed in trenches cut in rock, a 75 mm layer of fine sieved earth shall be placed on the bottom of the trench to serve as bedding for the cable. Maximum size of sieve mesh for sieved earth is 10 mm x 10 mm.

After the cable has been installed it shall be covered with a 75 mm layer of hand compacted, fine riddled earth. Regardless of whether the trench has been cut in rock or not, the cable shall be covered with a 75 mm layer.

Bedding and covering shall consist of sifted sand of plaster sand quality for all cables. The bedding and covering shall be approved by the Clerk of Works or relevant City Power official. Where only low voltage cables are installed, bedding can be sifted from the excavated material.

Where medium and low voltage cables are to be installed in a common trench, they shall each be installed in accordance with the above requirements but the low voltage cables are to be installed 400 mm above the medium voltage cables.

At road crossings all cables are to cross at a common depth i.e. 1 000 mm below road surface and the low voltage cables shall therefore be ramped up and down each side of these crossing points accordingly.

All cables shall be installed in straight lines as far as possible and excessive distortion or weaving in the cable length shall not be accepted.

Trenches shall be excavated so that the laid cable(s) is (are) laid in the positions shown on the drawings and shall be 1 000 mm from all stand boundaries.

All cables feeding overhead line circuits shall be secured to the pole by means of 20 mm stainless steel tape or wrapped with the appropriate material as at intervals not exceeding 1, 0 metre.

Where the cable needs to be placed inside concrete for cable theft prevention, concrete shall be in accordance with the City Power guideline for burying cables in concrete.

5.6 Medium Voltage Cables

All medium voltage cables shall comply with specification CP_TSSPEC_001 and only aluminum cables shall be used.

A sub-ring distributor shall consist of no more than 6 load centres.

5.6.1 Low Voltage Cables (underground)

All low voltage cables shall comply with specification CP_TSSPEC_002.

For main underground LV distributors supplying low voltage distribution boxes or CMK’s 120 mm² x 4-core PVC aluminum equivalence cables shall be installed.

5.6.2 LV Aerial Bundled Conductor

All LV aerial bundled conductor shall comply with CP_TSSPEC_010, shall be suspended from concrete poles complying with CP_TSSPEC_52. Installation of ABC shall be in accordance with SANS 10198-14

Table 1 : ABC for use at City Power

Items	Description	Application
2	3 x 50 mm² phase cores plus 1 x 25 mm² street lighting core plus 1 x 54,6 mm² neutral / earth supporting conductor (aluminum alloy & insulated)	Electrification
3	3 x 95 mm² phase cores plus 1 x 25 mm² street lighting core plus 1 x 54,6 mm² neutral / earth supporting conductor (aluminum alloy & insulated)	Electrification
4	3 x 120 mm^2 phase cores plus 1 x 25 mm^2 street lighting core plus 1 x 70 mm^2 neutral / earth supporting conductor (aluminum alloy & insulated)	Conversion from bare overhead system

LV ABC shall be installed in accordance with manufacturer's instructions.

6 Sleeves

6.1 Sleeves installed at road crossings

At all road crossings, the service provider shall install sleeve pipes, where these do not exist, prior to any cable being installed, at the City Power approved rates.

The service provider shall then install the cable through the buried sleeve pipes at the following rates:

1) The rate for the installation of cable laid in an open trench per metre installed, plus the rate per metre of sleeve pipe that the cable is drawn through, irrespective of the length of the cable pulled through the sleeve pipe.
2) A blanked-off spare sleeve shall also be installed per road crossing at the applicable approved rate.

6.2 Backfilling

Cable trenches shall be backfilled and compacted in 150 mm layers after the cables have been covered. Rocks removed from excavations shall not be used for backfilling. Only suitable backfilling material shall be used. Suitable backfilling for all excavations shall be soil with a rock content of not more than 40%. The size of the rocks in the suitable backfilling shall not exceed a nominal diameter of 100 mm (the rock shall be able to go through a mesh with square holes of 100 mm x 100 mm). The Clerk of Works or relevant City Power official shall decide if material is suitable for backfilling or not and their decision shall be final.

The backfill shall be compacted to a minimum density of 98% of MOD AASHTO such that no subsidence shall occur. The service provider shall be held responsible for repairing subsiding trenches at no cost to City Power.

Rocks or solids which shall not pass through a 100 mm diameter ring removed from excavations shall not be used for backfilling. The cost of removal and disposal of such spoil and the supply and delivery to site of bedding soil is to be measured separately. The tenderer shall price these items accordingly in the price schedule contained in Annex B.

All backfilling and compaction work shall be by means of manual labour, employing the use of handheld tools, whenever and wherever this is deemed technically practicable and safe.

6.3 Dumping site

The service provider shall be responsible to make the necessary arrangements for dumping all rubbish at an official local government dumping site. No dumping of rubbish shall be permitted on site.

All trees, plants, rubbish and structures which are found on the cable route shall be removed by the service provider and shall be dumped at the approved dumping site.

All surplus excavated material which is not suitable for backfilling shall be removed by the service provider and dumped at the approved dumping site.

If the service provider’s staff have left the work site in an unacceptable state, a fine of R 50 000-00 shall be levied per location per project.

6.4 Cable marker tape

Continuous lengths of cable marker tape shall be laid 200 mm below natural ground level in all LV cable trenches and for MV cable 700mm below the natural ground level.

6.5 Inspection

Cable trenches shall be approved by City Power's representative assigned to the job before any cables are installed and the installation of the cables shall be approved before backfilling is commenced.

6.6 Reinstatement of paving, gardens etc.

In order to preserve good relations with the public, the service provider shall minimise disturbances of gardens, driveways or pavements. Soil, lawns and gardens shall be reinstated by the service provider and payment for this shall be agreed upon with City Power. The service provider shall inform City Power's representative assigned to the job of all paving, tarmac, brickwork etc. which has been disturbed in the execution of the work prior to the reinstatement of these items by the service provider.

6.7 Barricading

All excavations performed by the service provider shall be barricaded at all times, in accordance with the OHS Act (Act 85 of 1993). The barricading shall be approved by City Power's representative for each job.

6.8 Sealing of cable ends

All cable ends shall be sealed by means of heat shrink cable end caps until the permanent terminations can be made.

6.9 Road crossings

Where cables cross roads, cable protective pipes shall be installed for electrical services.

These pipes shall:

1) have a minimum internal diameter of 110 mm for low voltage cables and 160mm for medium voltage cables;
2) be of the High Density Polyethylene type complying with CP_TSSPEC_045;
3) be installed at a depth of 1,0 m below the finished road level;
4) be identified by means of an "E" not less than 100 mm high, embossed into the curb;
5) extend 0,5 m beyond the curb line at either end;
6) be equipped with suitable draw-wires and be plugged at either end; and

7) be protected against mechanical damage once installed.

A road crossing shall be repaired within 3 working days and backfilling shall be done on a daily basis until the road is permanently repaired.

The following apply to existing tar roads:

a) the edges of the road crossing shall be machine cut; and
b) material shall be backfilled in road crossings to 200 mm below the road surface. The backfilling material shall be a gravel soil with a maximum P.I. of 12 and mixed with 5% cement by volume. Backfilling shall be done in maximum 150 mm layers compacted to a minimum density of 95% MOD AASHTO at optimum moisture content. The maximum size crusher run (25 mm) shall be mixed with 5% cement by volume and compacted to 98% MOD AASHTO density to 50 mm below road surface. The surface of the compacted crusher run and all side surfaces shall be sprayed with “30% stable grade emulsion” at a rate of 1 litre/m² as a tack coat. When tack coat has set, a layer of 50 mm thick “cold mix” with a 5, 5% binder content that has been cut with a flux (all manufacturer’s recommended specification) should be compacted with a BOMAG 90 or similar to road level.

6.10 Concrete cable slabs (if required)

Concrete slabs shall be installed over the cables for protection. After the 75 mm layer of sifted sand has been installed over the cables, these concrete slabs shall be installed in an approved fashion.

Concrete cable slabs shall be at least 90MPa, 300 mm long x 300 mm wide x 50 mm deep and shall have internal reinforcement.

6.11 Low voltage and supervisory cables

Only aluminum cables with a cross sectional area shall be used except below 16 mm²

Main Low Voltage Feeder Cables **:** 185 mm^2 and 95 mm^2 x 4 core copper XLPE insulated steel wire armoured cable.

Low Voltage Cables **:** shall be in accordance with CP_TSSPEC_002

7 Jointing

7.1 Medium and low voltage joints

Prior to jointing of MV cables a moisture test shall be carried out in accordance with CP_TSPROC_003.

All medium voltage joints accessories shall comply with CP_TSSPEC_053 and shall be designed to prohibit the migration of water and cable compounds.

All low voltage joints shall comply with CP_TSSPEC_054 and shall be clear polyurethane filled box type.

Mechanical torque shear connectors that comply with CP_TSSPEC_023 shall be installed on all cable sizes greater than 35 mm2 and less than 400mm2.

All joints shall be so located as to be clear of cable entries to load centres, intersections and roadways. No joints shall be performed before the clerk of works or project coordinator has approved their positioning.

Cable runs shall be installed with the minimum number of joints. The position of all joints shall be recorded on the as built drawings and on GIS.

All MV joints shall be marked with the relevant artisan information on the ID tag provided in accordance with CP_TSSPEC_053. At no stage shall the manufacturer's recommended bending radii be exceeded.

Only artisans trained and certified in accordance with City Power requirements shall be allowed to carry out MV cable jointing.

7.2 Location of joints

All MV and LV joint locations shall be clearly indicated on the "as-built" drawings submitted to the GIS department once the job is complete.

7.3 Termination of cables

Note: Only mechanical torque shear connectors shall be installed on main (distributor) LV power cables as per CP_TSPROC_030.

Crimping connectors as per CP_TSSPEC_022 shall be used for cables up to 35mm² conductor, or mechanical torque shear connectors as per CO_TSSPEC_023 for cables greater than 35mm².

7.4 Medium and low voltage terminations

Prior to termination of MV cables a moisture test shall be carried out in accordance with CP_TSPROC_003.

All medium voltage terminations accessories shall comply with CP_TSSPEC_053. MV terminations onto switchgear shall be executed in accordance with CP_TSPROC_028.

All MV terminations shall be marked with the relevant artisan information on the ID tag provided in accordance with CP_TSSPEC_053. At no stage shall the manufacturers recommended bending radii be exceeded.

Only artisans trained and certified in accordance with City Power requirements shall be allowed to carry out MV cable termination.

All low voltage terminations shall comply with CP-TSSPEC_054. On type ‘C’ bushings, only fully insulated separable connectors shall be used. No putty and tape or empire tape shall be utilized due to the design of the bushings.

LV cable crutches on cables terminated on pole tops shall be sealed with an appropriately sized heat shrink boot in accordance with CP_TSSPEC_136. All LV cables inside enclosures except inside Public lighting poles shall be glanded with the appropriate size LV gland.

Cable terminations inside Public lighting poles and high masts shall be made without glands. All steel wire armouring shall be collectively bound to the cable(s) with an 11.5mm line tap and then lugged to the earth stud. The crutch shall be sealed with a heat shrink boot. Neutral and phase conductors shall be looped with end connectors and insulating sleeves. A PEN conductor shall be installed between the neutral and the earth conductors.

7.5 Inspection of joints and terminations

The service provider shall notify City Power’s representative assigned to the job prior to executing any jointing or termination of cables so that arrangements may be made for inspections to be carried out during and on completion of these operations. Under no circumstances may a joint hole be backfilled until clearance is given by City Power’s representative.

7.6 Installation/ Replacement

MSS or similar structure to be installed within the designated area (5m x 2,5m) with the major axis parallel and adjacent to the roadway boundary and on the City Power customer's stand boundary.

When installed on servitudes the MSS is to be positioned as indicated by the City Power Official assigned to the job.

When installed on pavements the distance between the back of the MSS and the stand boundary shall be 150 mm or as directed by the City Power Official.

Where it is apparent to the service provider that the installation of an item of equipment in the position indicated on the relevant plans shall obstruct or interfere with an existing service, driveway or other item, he shall refer this matter back to the City Power Official for attention and possible relocation of the item.

The concrete foundations are to be constructed as indicated or by means of precast base foundation (Drawing 32496) and the top of the concrete foundation shall be 150 mm above finished ground level irrespective of the fall of the ground.

7.7 Internal topping

To render the equipment vermin proof after all the cables have been installed, terminated and connected, the bottoms of the medium and low voltage compartments shall be filled with river sand and topped with a layer of 4 to 1 river sand/cement mix with a minimum thickness of 25 mm. The surface of this topping layer is to be steel floated.

7.8 Low voltage control pillar boxes

Only low voltage distribution boxes (protective structures) complying with CP_TSSPEC_208 shall be used.

Where it is apparent to the service provider that the installation/ replacement of an item of equipment in the position indicated on the relevant plans shall obstruct or interfere with an existing service, driveway or other item he shall refer this matter back to the City Power Official for attention and possible relocation of the item.

The service provider shall be required to install various sizes of MCBs and MCCBs in Miniature Substations, Transformer Substations, distribution boxes, Central Metering Kiosks (CMKs) and customer boundary meter boxes. All cables connected in the box shall be designated with the house and stand number.

8 Installation of stays and poles

8.1 Steel Poles

The removed soil shall be backfilled and compacted as detailed in CP_TSSTAN_036.

Poles shall be erected vertically and with the luminaires over the roadway at right angles to the pavement.

Poles shall be installed 2m away from the edge of the road surface if no kerb is present. Poles shall be installed between 1m to 1,5m if a mountable kerb is present and between 0,5m to 1m if an un-mountable kerb is present. Poles shall be installed 5 m away from the edge of the road surface next to Provincial Roads.

Table 2 : Steel pole

STEEL STREET LIGHT POLES		**PLANTING DEPTH BELOW NGL**
(15 m + 2 m STUB)	Hinged Pole	2m
(15 m + 2 m STUB)	Straight Pole	2m
11,5	Straight Pole	1,5m
9,2	Straight Pole	1,2m
9,2	Curved Pole	1,2m
7,2	Straight Pole	1,2m
11,5	Curved Pole	1,5m
5	Straight Pole	1m

8.2 Un-stayed terminal structures

For un-stayed or free-standing terminal structures, the pole shall be planted in an orientation where the resultant conductor loading acts perpendicular to the narrow face of the pole, as illustrated by poles A and E in Drawing no. 32288 (sheet 5).

8.3 Intermediate structures with no deviation angle

The poles shall be planted in an orientation where the resultant traverse wind loading on the conductors and pole acts perpendicular to the narrow face of the pole as illustrated by pole D in Drawing no. 32288 (sheet 5).

8.4 Intermediate structures with deviation angle

The poles shall be planted in an orientation where the resultant loading of the conductors acts perpendicular to the narrow face of the pole, as shown by poles B and C in Drawing no. 32288 (sheet 5).

8.5 Soil Classification

A standard 8 kg Dynamic Cone Penetrometer (DCP) is to be used to test the consistency of the soil. The instrument consists of a metal rod with a cone-shaped end with an anvil onto which a fixed weight falls through a set distance onto the anvil. The force of the blow shall cause the rod to penetrate the soil. The number of blows required for the rod to penetrate to a distance of 100 mm into the soil indicates the consistency of the soil.

The DCP test should be applied at the following depths during the hole excavation and an average figure derived at for the hole. Start the test at a depth of 0, 5 m below ground level and record the number of blows for every successive 100 mm, up to a maximum of 1, 5 m below NGL. The average of this reading is then taken as the soil consistency over 100 mm. The results can be recorded in the PENETROMETER TEST RECORD sheet provided. Soil consistency can be determined with the aid of Table 4 below.

Table 3 : Soil Classification

CONSISTENCY	DCP (blows/100 mm)
Soft	< 2
Firm	2 – 7
Stiff	> 7

8.6 Soil Stabilisation

The soil from all the pole holes shall be stabilised by means of the addition of cement at a minimum ratio of 10:1. That is, one bag cement to be mixed with all the soil removed from the hole. Please note that the cement, soil and appropriate amount of water are to be mixed outside of the hole. It should be noted that baulking would still be required as per Table 5 below.

8.7 Baulking of Concrete Poles

Where concrete poles are to be used as free structures, baulking may be required. This is done by means of securing one or more 1.2 m concrete lintels to the pole base as shown in Drawing no. 32288 (sheet 6).

The number of lintels and additional cement required over and above that required for stabilisation would be set out in Table 5 below.

Table 4 : Baulking of Concrete Poles

Type of Soil						
Pole Size	Soft		Firm		Stiff	
	No. Lintels	No of cement bags at pole base	No. of Lintels	No of cement bags at pole base	No. of Lintels	No of cement bags at pole base
7,0 m / 4 kN	0	0	0	0	0	0
7,0 m / 10 kN	1	0,5	1	0,5	1	0,5
7,3 m / 20 kN	3	1	2	1	1	0,5
9,0m/ 7kn	1	1	0	0	0	0
9,0 m / 4 kN	1	0,5	0	0	0	0
9,3 m / 17.5 kN	3	1	2	1	1	0,5
10,0 m / 8 kN	1	0,5	1	0,5	1	0,5

PLEASE NOTE:

I. All lintels shall be required at 1/3 below natural ground level in the standard hole position provided in the pole.

II. The appropriate amount of cement required, as tabulated in Table 5 above, shall be mixed with the first 300 mm of soil at the base of the pole over and above any other soil stabilisation that may be required and described in item 5.5 above.

III. Where 7m/4kN poles are installed in soil classified as “Stiff”, the bag of cement required for stabilising the soil described above may be omitted at the discretion of the Engineer.

IV. Where the soil is classified as soft, the engineer is to be notified prior to any installation.

V. A 7 m pole that requires no baulking shall require an excavation of approximately 0,87 cubic meters of soil.

8.8 Raking Back of Terminal Poles

In order to accommodate the dynamic compensation of the earth, all strain poles shall be raked back such that the narrow face, furthest from the conductor, is perpendicular to the ground.

8.9 Backfilling and Compaction of Pole Holes

Rocks removed from excavations shall not be used for backfilling.

When backfilling the holes, ensure that the backfill material is slightly damp. A test of dampness can be done by squeezing the soil in your hand. When the hand is opened the soil should remain in the squeezed state. This shall indicate the optimum moisture content for good soil compaction.

Layers of backfill shall at no time exceed 150mm per layer. Each layer shall be compacted with a mechanical compactor or with a hand stamper with a mass of at least 25kg. Should hand compaction be decided on, then a minimum of 30 blows shall be applied to each 150mm layer of soil around the pole. The distance of drop for the hand stamper shall be more than 400mm per blow.

This method shall be repeated until the hole is filled up to natural ground level.

The backfill shall be compacted to a minimum density of 93% of MOD AASHTO as specified in SANS 1200 D.

Mechanical compaction is preferred as certain areas contain soil where hand compaction shall not achieve the minimum required level of compaction.

9 Staywire Assemblies

All stays and struts shall be in accordance with CP_TSSPEC_085.

9.1 Stays

Refer to the detail drawing in this regard for further details.

Under no circumstances shall the stay rod be bent!

The base plate shall be covered with large stones there after backfilling can be done in stages of 150mm each with thorough compaction of the soil at each stage. Where necessary, the stay shall be concreted in with 6:3:1 concrete mix.

Strain insulators shall be provided in all stay wires.

All stays shall be adjustable with adjusting nuts and threaded rods, where applicable.

LV stays shall be M16 size, where applicable.

9.2 Struts

Strut poles shall be used only where no other option exists. It is preferred that free-standing poles together with the necessary baulking be used as described previously under “Installation of Concrete Poles”.

Where strut poles are approved, these shall be complete with an anti-climbing device consisting of two-strand double spiked barbed wire wrapped around the structure approximately 2500 mm from the ground to prevent the climbing of poles. The barbed wire shall be fixed in an approved manner and shall stretch over at least 1000 mm pole length.

10 Servitudes

10.1 General

TSS doors shall face the road reserve. Clear access shall be available for the insertion and removal of City Power equipment. Doors shall be 2438 mm high and 1830 mm wide.

The servitude shall run parallel to the road from which access is to be obtained.

BMU, outdoor kiosk enclosed RMU’s or miniature substations shall be installed on servitudes with the major axis parallel to and on the roadway stand boundary.

Dimensions of servitudes shall be in accordance with Table 5.

Table 5 : Depth and width of servitudes

Equipment type	**Relevant layout drawing**	**Depth**	**Width**
Transformer Substation	CP_TSDRAW_015	6000 mm	7000 mm
Bulk Metering unit	NA	2500 mm	5000 mm
Miniature Substation	NA	2500 mm	5000 mm
Outdoor kiosk enclosed RMU	NA	2500 mm	5000

10.2 Location of services within road reserves

The location of services within road reserves shall comply with the approved drawings. Cognisance is taken of the fact that road reserves may not exist in some of the areas being electrified and aerial services are therefore the preferred option.

All cables shall be laid on either the North or West sides of the road reserves with respect to the direction of the road, at a distance of 1 metre from the stand boundary.

Depth of cables and dimension of trenches shall be in accordance with Table 6.

Table 6 : Depth and width of cable trenches

Cable type	**Depth below final road level**	**Minimum width**	**Spacing between cables**
MV cables	1500 mm	500 mm	150 mm
LV cables	1000 mm	500 mm	150 mm
SL cables	800 mm	500 mm	150 mm

Where medium and low voltage cables are to be installed in a common trench they shall each be installed in accordance with the above requirements. The low voltage cables would be installed 500 mm above the medium voltage cables.

Minimum trench width is 400 mm. It is permissible to exceed this dimension if justified by the number of cables.

The minimum requirements of SANS 10198 shall be complied with, when back filling cable trenches.

At road crossings, both medium and low voltage cables shall be laid at a depth of 1 metre, below the road surface. These cables shall be laid in 110/ 160mm mm diameter by 6m long black corrugated PVC sleeves and the exact number of pipes to be laid shall be approved by the planning engineer, as spare pipes may be required for future network extensions.

Sleeves shall protrude 500 mm beyond the kerb line. All laid sleeves shall have a draw wire and a suitable sealer plug at both ends.

The location of laid sleeves shall not be marked instead the location should be registered on GIS.

11 Luminaires for general street lighting

All luminaires for general street lighting shall comply with specification CP_TSSPEC_231.

12 LV Fuse Assembly unit

The ABC overhead conductor shall be protected by a suitably rated fuse switch disconnector (sometimes referred to as a fuse unit). The unit shall consist of three fuse carriers mounted on an L bracket which shall be bolted to the pole. Bandit strapping is not acceptable as a means of securing a fuse switch disconnector.

The unit shall utilize standard NH fuses.

13 SYSTEM EARTHING

The substation MV system earthing and the LV neutral system earthing may be combined, provided that their overall resistance to the general mass of the earth does not exceed one ohm (1 Ω).

If the overall resistance to earth exceeds 1 Ω, the MV earth electrode and LV neutral earth electrode shall be kept separate. The Service Provider shall install the complete earthing system at the locations as detailed on the various layout drawings and the standard SANS 0292 assembly drawings. On completion of the earthing installation, the earth resistance shall be measured and additional earthing shall be provided if required to SANS 0199.

The maximum allowable resistance of the MV transformer electrode is 30 ohms for 11kV. This limit shall ensure that no dangerous voltages are experienced on the LV neutral and that the LV neutral surge arrestor energy absorption limits are maintained in the event of a MV line to transformer tank fault.

Maximum earth resistance values at the transformer LV electrode are given in the table below for various transformer primary voltages as per SANS 0292.

Table 7 : Maximum earth resistance values at the transformer LV electrode

1	**2**
Transformer Primary Voltage [kV]	**Maximum MV earth resistance value [Ohm]**
6,6	15
11	30
22	70

Note: The resistance values given in column 2 are based on the following assumptions:

1) That medium-voltage earth fault protection is set at 40 % of primary current,
2) That a factor of safety of approximately four is used to ensure acceptable protection operation under,
3) Seasonal variations in soil resistivity, and
4) Variations in the effectiveness of the medium voltage source earthing.

13.1 MV network earthing

The MV earth shall be via the lead sheath of the MV cable from the main step down substation (88kV/11kV). This main earth shall be connected to the main earth bar of the MSS or TSS.

13.2 LV network earthing

LV earthing shall be in accordance with the TN-C-S Earthing System as described in the latest revision of the SANS_ 0292.

The neutral core of the low voltage conductor or Protective Earth conductor is to be earthed at the following points for the TN-C-S system at or close to the star point of the transformer.

The armour wires of all LV cables shall be glanded and the gland plate shall be connected to the Neutral bar.

14 PRE-COMMISIONING TESTING

Prior to commencement of any work, upon completion of the installation and prior to handing it over, the Service Provider shall be required to test the low voltage installation and prove that it is in good order.

14.1 Low voltage cables and switchgear

Phase to earth : 2 kV ac for 1 minute or 3 kV DC for 1 minute.

Phase to phase : 2 kV ac for 1 minute or 3 kV DC for 1 minute.

The above tests shall be carried out with internal wiring to poles, phase and neutral disconnected.

A 500-volt insulation resistance test shall be carried out on the internal phase conductor to earth before the internal wiring to each pole is reconnected to the main circuit.

An earth loop impedance test shall be carried out at the last pole of each circuit and branch circuit for street lighting circuits and at the last point of all other low voltage circuits.

Continuity of the neutral/ earth system shall be tested. Voltage level tests shall be carried out.

Records of each test shall be taken by the Service Provider and handed to the Clerk of Works or City Power Official during the commissioning period.

14.2 Testing apparatus

The Service Provider shall provide and operate all the necessary test plant and equipment to perform the above-mentioned tests. The Service Provider shall also be responsible for all safety precautions during testing and provide up to date certificates of accuracy for the testing apparatus from an independent standards authority when required by the Clerk of Works or City Power Official. Where possible City Power shall provide, free of charge, a single phase 230 V 50 Hz supply for test purposes but where this is not feasible the Service Provider shall be responsible for providing the necessary portable generating plant for this purpose.

15 SKILLS

The Service Provider shall utilise staff who are qualified electricians i.e. have passed a recognised trade test. In addition, the Service Provider shall be registered with the Department of Labour. At any stage during the contract term, City Power may request details of all qualified electricians that are employed by the Service Provider. The Service Provider should also run regular in-house training courses for all of their staff to ensure the proper skilled staff are utilized on this contract.

All jointers utilized to do medium voltage joints and terminations shall be registered with City Power. They shall also be trained and certified by a reputable supplier of cable accessories. A valid jointer accreditation certificate shall be produced at tendering stages for all jointers and when so required during the contract in the field. City Power shall also conduct in house training for all jointers during the course of the contract.

The training attended by the jointer shall be E-SETA accredited and shall be accordance with SANS 10198. The jointer shall be trained on both PILC and XLPE cable systems. All cable accessories installed shall be in accordance’s with NRS 012 and NRS 053 requirements.

The jointer shall be equipped with all the necessary tools as per the training received when working on City Power’s network.

If poor workmanship can be proved before the end of the guarantee, the jointer shall replace the affected joint or termination at their cost.

Failure to perform a presence of moisture test on a PILC cable prior to jointing or terminating should also be regarded as poor workmanship and the above clause shall apply.

The jointer shall always put their name on the finished joint or terminations as per the installation instruction of the respective cable accessory.

16 CONTRACT LIABILITIES

The contactor shall take note of the following:

- Any damage to City Power's or any customer property
- Damage to City Power's or any other Services

That they shall be held liable to rectify or fix such damage at reasonable time frames given by the relevant City Power Official. Failing to comply with this shall lead to City Power acquiring services of another service provider and payment of such being the responsibility of original Service Provider.

17 TRANSPORTATION OF CITY POWER EQUIPMENT

The Service Provider shall ensure that the transportation of all equipment and free issued material complies with all Transportation and Safety Standards. City Power officials including City Power Manager: Logistics & Warehouse has a right to refuse entry or loading of City Power equipment and material to unsafe transportation and or Service Provider's trucks. Security Risk Management shall ensure that compliance takes place before the Service Provider enters City Power premises.

18 DISPUTE RESOLUTION

If at any stage a disagreement exists between the Relevant Manager or his representative and the Service Provider, the matter shall be reported to the Contracts Manager for resolution and a way forward. If the matter requires further mediation, a mediator shall be mutually agreed upon to mediate and the decision of this party shall be final. The details of dispute resolution shall be covered on the actual contract between City Power (Legal Department) and appointed Service Provider.

19 QUALITY MANAGEMENT

A quality management system shall be set up in order to assure quality work during development, production and servicing of the City Power Infrastructure. Guidance on the requirements for a quality management system may be found in the following standards: ISO 9001:2015. The details shall be subject to agreement between City Power and supplier.

20 HEALTH AND SAFETY

A health and safety plan shall be set up in order to ensure proper management and compliance of the meters and service connections during installation, operation, maintenance and decommissioning phases. Guidance on the requirements of a health and safety plan shall be found in OHSAS 18001:2007 standards. The details shall be subject to agreement between City Power and the Supplier.

21 ENVIRONMENTAL MANAGEMENT

An environmental management plan shall be set up in order to ensure the proper environmental management and compliance of the City Power Infrastructure during their entire life cycle (i.e. during design, development, production, installation, operation and maintenance, decommissioning as well as disposal phases). Guidance on the requirements for an environmental management system shall be found in ISO 14001:2015 standards. The details shall be subject to agreement between City Power and the Supplier. This is to ensure that the asset created conforms to environmental standards and City Power SHEQ Policy.

ANNEX A - BIBLIOGRAPHY

None

ANNEX B - REVISION INFORMATION

DATE	REV. NO.	NOTES
July 2025	0	First issue