

SECTION NO.12
PROVISIONAL SUMS

SECTION NO.12
PROVISIONAL SUMS

The bidder is referred to the relevant clauses in the KZN Department of Health Standard Preambles to all Trades Rev 3 - January 2009 (available on request), to the Architectural and Structural/Civil Engineering specifications documents, to the drawings (which are to be read in conjunction with the architectural specification), and to all general and project-specific specifications as contained in the complete Bid Documents. Bidders are thus urged to study these documents as rates will be deemed to be inclusive of all requirements as included in same. Further, should any discrepancy be noted between these Bills of Quantities and the Specifications, the Specifications shall take precedence.

Further to the above, Bidders are to note that the latest edition of SANS 10400, current at the time of the tender will form part of the specifications to this contract and as such, pricing shall be deemed to include for complete conformance in all respects to the requirements of SANS 10400.

SUPPLEMENTARY PREAMBLES

Working at Heights:

Bidders are to note that the work to be undertaken will require all necessary scaffolding, due to the heights of the structures to be constructed/altered. Bidders are to therefore price accordingly as rates will be deemed to include for same and no further claims in regard to all necessary scaffolding in the completion of the scope of works will be entertained.

Labour Intensive

Bidders are to note well that specific items within these Bills of Quantities have been designated as LABOUR INTENSIVE by the addition of the words "Labour Intensive" at the end of the description for the said item. Where items have been designated as being LABOUR INTENSIVE as described, pricing shall be deemed to include for the carrying out to completion of said item on site by means and methods that rely predominantly on manual labour. As such, no claims shall be entertained regarding any additional time or monetary costs incurred by the use of LABOUR INTENSIVE methods. Further, the Contractor is to note that contravention of the above i.e. use of mechanised, or other systems to carry out LABOUR INTENSIVE work as hereinafter designated, will be viewed and dealt with in an extremely serious light by the Client, as it remains a national imperative to develop, employ and provide skills through the Expanded Public Works Programme.

General

Work for which budgetary allowances are provided will be measured and valued in accordance with clause 32 of the Principal Building Agreement and deducted in whole or in part if not required without any compensation for loss or profit on the said allowances

Carried To Section Summary

R

Section No. 12
 Bill No. 1
 Provisional Sums

Amount

Prime cost amounts and provisional sums are net. Prime cost amounts include for delivery to site of all articles concerned. Provisional sums are for material and equipment supplied and installed complete by firms of specialists

Profit

Where stated, the contractor may allow for profit if required

General attendance on nominated/selected subcontractors

The item 'Attendance' which follows each provisional sum for nominated/selected subcontractors' work, shall be deemed to cover all the contractor's costs incurred in providing free of charge to the nominated/selected subcontractors, the following:

- 1 The services as set out in clause B9.1 of the Preliminaries
- 2 Making good in all trades and cleaning down and removal of rubbish on completion

Special attendance on nominated/selected subcontractors

Where stated special attendance will be described in detail in the Schedule for Variables in the Preliminaries for the services as set out in clause B9.2

NEW BOREHOLE

1	Provide the sum of R 450 000.00 (Four Hundred and Fifty Thousand Rand) for Design, Supply and Installation for a new borehole complete	Prov Sum	450 000	00
2	Profit	Item		
3	Attendance	Item		

FABRIC COVERED CARPORTS

4	Provide the sum of R 170 000 (One Hundred and Seventy Thousand Rand) for connection fees for fabric covered carports.	Prov Sum	170 000	00
5	Profit	Item		
6	Attendance	Item		

LANDSCAPING

7	Provide the sum of R 200 000.00 (Two Hundred Thousand Rand) for landscaping.	Prov Sum	200 000	00
8	Profit	Item		
9	Attendance	Item		

Carried To Section Summary

R

Section No. 12
 Bill No. 1
 Provisional Sums

Amount

ELEVATED WATER STORAGE TANK

10 Provide the sum of R 1 000 000.00 (One Million Rand) for connection fees for elevated water storage tank.

Prov
Sum

1 000 000 00

11 Profit

Item

12 Attendance

Item

Carried To Section Summary

R

Section No. 12
Bill No. 1
Provisional Sums

Amount

SECTION NO.12

PROVISIONAL SUMS

SECTION SUMMARY

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Section No. 12
SECTION SUMMARY

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NYAVINI CLINIC: CONSTRUCTION OF A NEW OUTLIER CLINIC AND STAFF RESIDENCES

FINAL SUMMARY PAGE

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4	ELECTRICAL INSTALLATION including Main Contractors profit and attendance (See separate document) (Value Added Tax excluded)			
5	MECHANICAL INSTALLATION including Main Contractors profit and attendance (See separate document) (Value Added Tax excluded)			
	Sub Total (A)			
	ADD: 0.5% Sub Total (A) for Contractor Skills Development Goal (CSDG)			
	Allow the sum of R4 800 000.00 (Four Million, Eight Hundred Thousand Rand) for escalation to be adjusted in accordance with the contract		4 800 000.00	
	Sub Total before VAT			
	ADD VAT @ 15%			
	Carried to Form of Offer and Acceptance			
	FINAL SUMMARY CARRIED TO FORM OF OFFER AND ACCEPTANCE			
		R		

ELECTRICAL BILL OF QUANTITIES

Total to be transferred to Final Summary,Page FS1, excl VAT

NYAVINI SMALL CLINIC**ELECTRICAL INSTALLATION : CLINIC BUILDINGS****PROVISIONAL BILLS OF QUANTITIES : BILL No.1****SECTION A**

Item	Description		Qty	Unit	Rate	Amount
1.1	Distribution Boards Supply, installation and commissioning of Kiosk, Distribution Boards, including making off all wire connections (external wiring, conduit, armoured cable and terminations given elsewhere). Special note, the accessories are inclusive on the quoted price					
1.1.1	DB Block A	Supply	1	No.		
		Install	1	No.		
1.1.2	DB Block B	Supply	1	No.		
		Install	1	No.		
1.1.3	DB Block C	Supply	1	No.		
		Install	1	No.		
1.1.4	DB Block F	Supply	1	No.		
		Install	1	No.		
1.1.5	DB Block G	Supply	1	No.		
		Install	1	No.		
1.1.6	DB Block H	Supply	1	No.		
		Install	1	No.		
1.1.7	DB Block I	Supply	8	No.		
		Install	8	No.		
1.2	Security System Installation of Camera Sytem equipment and All Access Control Systems as specified of the Detailed Specification.					
1.2.1	360 Degree resolution CCTV Camera	Supply	21	No.		
		Install	21	No.		
1.2.2	Double Door Access Controller Panel	Supply	14	No.		
		Install	14	No.		
1.2.3	Fingerprint Keypad Reader-Standalone	Supply	14	No.		
		Install	14	No.		
1.2.4	Magnetic Lock 544 KG Holding Force	Supply	14	No.		
		Install	14	No.		
1.2.5	Emergency Door Release Call Point (Breaker Glass)	Supply	14	No.		
		Install	14	No.		
1.2.6	CCTV Monitor Screen	Supply	3	No.		
		Install	3	No.		
Total for Bill No. 1 : Carried Forward to Summary Page						

Item	Description		Qty	Unit	Rate
1.3	<u>Ancillary Distribution Boards and Outlets</u> Supply and installation of the following metal Ancillary Distribution				
1.3.1	Telephone Distribution Board (450mm x 450mm).	Supply	1	No.	
		Install	1	No.	
1.3.2	Data Distribution Board (450mm x 450mm)	Supply	1	No.	
		Install	1	No.	
1.3.3	Data, Telephone and Ancillary Coverplates	Supply	66	No.	
		Install	66	No.	
1.4	<u>Cable Sleeves</u> Supply and Installation of Cable Sleeves as specified, in trenches or cast				
1.4.1	110mm Ø Flexible Cable Sleeve	Supply	155	m	
		Install	155	m	
1.4.2	EXTRA ON upvc piping for: 100mm Diameter long radius bend		23	m3	
1.5	<u>Conduit</u> Supply and installation of PVC conduit. Lengths given shall be taken as measured horizontal and vertical runs between conduit terminations. Rates quoted shall allow for wastage, offcuts, couplings, cuttings, bending, jointing socket and tees chased or installed in concrete and roofspaces				
1.5.1	20mm Conduit	Supply	2964	m	
		Install	2964	m	
1.5.2	25mm Conduit	Supply	2205	m	
		Install	2205	m	
1.6	<u>Conduit Boxes and Ends</u> Terminate and connect one pair of conduit ends including supply and installation of 1, 2, 3 or 4 way box on surface or in brickwork. (excluding coverplates), including holes for conduit.				
1.6.1	20mm Conduit (75mm Ø) Round Box	Supply	577	No.	
		Install	577	No.	
1.6.2	20mm Conduit (50 × 100mm) Galvanized Box	Supply	136	No.	
		Install	136	No.	
1.6.3	25mm Conduit (100 x 100mm) Galvanized Box	Supply	284	No.	
		Install	284	No.	
1.7	<u>Conductors</u> Supply and installation of PVC insulated copper conductors drawn into conduit or wiring channel in groups of 2, 3, 4, etc. with the required colour coding, but excluding any wiring connections.				
1.7.1	2,5 mm ² PVC Conductors	Supply	5365	m	
		Install	5365	m	
1.7.2	2,5 Earth conductors	Supply	2683	m	
		Install	2683	m	
1.7.3	4 x 2 PVC Wall Box	Supply	70	No.	
		Install	70	No.	
Total for Bill No. 1 : Carried Forward to Summary Page					

Item	Description	Qty	Unit	Rate	Amount
1.7.4	4-Way Box PVC	Supply Install	75 75	No. No.	
1.7.5	4 mm ² PVC Conductors	Supply Install	4281 4281	m m	
1.7.6	4 mm ² PVC Conductors Earth	Supply Install	2142 2142	m m	
1.7.7	4 x 4 PVC Wall Box	Supply Install	151 151	No. No.	
1.8	<u>Light Switches</u> Supply, fitting and electrical connection of a Legrand type flush or surface mounted 16A switch in 100 x 50 excluding box (for flush type) and conduit connections, but including cover plates.				
1.8.1	16A 1 Lever 1 Way	Supply Install	68 68	No. No.	
1.8.2	16A 2 Lever 1 Way	Supply Install	26 26	No. No.	
1.8.3	16A 1 Lever 2 Way	Supply Install	34 34	No. No.	
1.9	<u>Luminaires</u> Mounting, fixing and electrically connecting the following luminaires, complete with lamps as specified in Section E of the Detailed Specification.				
1.9.1	Type A2 2 x 18w T8 Tubes, 2480 Lumens, rated to IP65 & 3 Hour Maintaned Emergency back-Up.	Supply Install	8 8	No. No.	
1.9.2	Type F 72w 600 x 1200 x 600 LED Panel Surface Mount Non-Dimmable, 3400lm, 5000k, as per Beka	Supply Install	155 155	No. No.	
1.9.3	Type G 1 x 18w LED Bulkhead IP65	Supply Install	198 198	No. No.	
1.9.4	Type O1 80w, Shadow Less Operating Lamp, with 5 Reflectors ceiling mounted 4000k +/-5000k, 240v/50Hz	Supply Install	2 2	No. No.	
1.10	<u>Daylight Switch</u> Supply and installation of approved daylight switch.				
1.10.1	Daylight Switch	Supply Install	5 5	No. No.	
Total for Bill No. 1 : Carried Forward to Summary Page					

Item	Description		Qty	Unit	Rate	Amount
1.11	<u>Powerskirting</u> Supply and install Le Grand 2 compartment powerskirting with covers . Colour will be specified by architect					
1.11.1	2 Compartment Power skirting	Supply	110	m		
		Install	110	m		
1.11.2	Elbows Internal/External	Supply	11	No.		
		Install	11	No.		
1.11.3	End Caps	Supply	52	No.		
		Install	52	No.		
1.11.4	Cover Joiner Clips	Supply	70	No.		
		Install	70	No.		
1.11.5	16A SSO's c/w cover on Powerskirting	Supply	18	No.		
		Install	18	No.		
1.11.6	16A SSO's c/w cover on Powerskirting	Supply	18	No.		
		Install	18	No.		
1.11.7	RJ11 Connector with cradle/ cover and mod blank	Supply	23	m		
		Install	23	m		
1.11.8	RJ45 Connector with cradle/ cover mod blank	Supply	38	m		
		Install	38	m		
1.12	<u>Socket Outlets</u> Supply, fitting and electrical connection of flush or surface mounted Legrand type switched socket in either 100 x 100, 100 x 50, round box or wiring channel, <u>excluding</u> box (for flush type) and conduit connections, but including cover plate.					
1.12.1	5A Single SSO c/w coverplate.Legrand type.	Supply	262	No.		
		Install	262	No.		
1.12.2	16A Double SSO c/w coverplate.Legrand type.	Supply	115	No.		
		Install	115	No.		
1.12.3	16A Dedicated Double SSO c/w coverplate.Legrand type.	Supply	20	No.		
		Install	20	No.		
1.12.4	16A UPS Single SSO c/w coverplate.Legrand type.	Supply	3	No.		
		Install	3	No.		
1.12.5	Medical Gas Outlets	Supply	6	No.		
		Install	6	No.		
1.12.6	16A SSO for Powerskirting	Supply	125	m		
		Install	125	m		
1.13	<u>Bedhead Trunking</u>					
1.13.1	The adaptable HU10-01 is a wall mounted horizontal bedhead service system, which includes customized electrical and medical gas outlets to suit the clients' unique requirements and as specified with all the services on the drawings.	Supply	3	No		
		Install	3	No		
Total for Bill No. 1 : Carried Forward to Summary Page						

Item	Description		Qty	Unit	Rate	Amount
1.14	Isolators Supply, fitting and electrical connection of flush or surface mounted Metal Clad Isolators in either 100 x 100, 100 x 50, round box or wiring channel, <u>excluding</u> box (for flush type) and conduit connections, but including cover plate. For more details please refer to the specific drawings					
1.14.1	20A Double2 Pole Flush waterproof Isolator for HVAC	Supply	24	No.		
		Install	24	No.		
1.14.2	32A Double-Pole waterproof Isolator internal equipment	Supply	28	No.		
		Install	28	No.		
1.14.3	20A 4 Pole Flush waterproof Isolator	Supply	2	No.		
		Install	2	No.		
1.14.4	60A 2 stove Isolator	Supply	8	No.		
		Install	8	No.		
1.15	<u>Electrical connection of appliances and installations.</u>					
1.15.1	Total Airconditioning Plant (Internal/External Units): Single and three phase	Connect	28	No.		
1.15.2	Hand dryers/stoves, hydroboils	Connect	10	No.		
1.16	<u>Telephone Installation</u> Supply and installation of the following items for the Telephone Installation					
1.16.1	25mm PVC Conduit	Supply	10	m		
		Install	10	m		
1.16.2	25mm PVC Conduit end	Supply	5	No.		
		Install	5	No.		
1.16.3	25mm PVC Conduit box	Supply	5	No.		
		Install	5	No.		
1.17	<u>Data Installation</u> Supply and installation of the following items for the Data installation					
1.17.1	25mm PVC Conduit	Supply	130	m		
		Install	130	m		
1.17.2	25mm PVC Conduit end	Supply	25	No.		
		Install	25	No.		
1.17.3	25mm PVC Conduit box	Supply	25	No.		
		Install	25	No.		
1.18	<u>Nurse Call System</u> Supply and installation of approved Nurse Call System.					
1.18.1	Nurse call Panel	Supply	1	No.		
		Install	1	No.		
Total for Bill No. 1 : Carried Forward to Summary Page						

Item	Description		Qty	Unit	Rate	Amount
1.18.2	Nurse call Push Button	Supply	3	No.		
		Install	3	No.		
1.18.3	Emergency call Push Button	Supply	3	No.		
		Install	3	No.		
1.18.4	Nurse call Light	Supply	2	No.		
		Install	2	No.		
1.18.5	PA System	Supply	1	No.		
		Install	1	No.		
1.18.6	Microphone	Supply	1	No.		
		Install	1	No.		
1.18.7	Loud Speaker	Supply	10	No.		
		Install	10	No.		
Total for Bill No. 1 : Carried Forward to Summary Page						

NYAVINI SMALL CLINIC

ELECTRICAL INSTALLATION : CLINIC BUILDINGS

SECTION A

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	Total for Electrical Bill of Quantities					

NYAVINI SMALL CLINIC**ELECTRICAL INSTALLATION : SEMI - DETACHED ONE BEDROOM UNIT NO.2****PROVISIONAL BILLS OF QUANTITIES : BILL No.2****SECTION A**

Item	Description	Qty	Unit	Rate	Amount
2.1	Distribution Boards Supply, installation and commissioning of Kiosk, Distribution Boards, including making off all wire connections (external wiring, conduit, armoured cable and terminations given elsewhere). Special note, the accessories are inclusive on the quoted price				
2.1.1	Distribution Board	Supply 8 Install 8	No. No.		
2.2	Cables Supply, delivery and laying of PVC/SWA/PVC ECC Aluminium cables as specified, excluding terminations and cable supports. Lengths given shall be taken as measured lengths to cable runs from terminal to terminal and rates quoted shall include for off-cuts.				
2.2.1	25mm ² 4C Aluminium Cable PVC Mains 600/1000V	Supply 120 Install 120	m m		
2.3	Cable Terminations Including the supply and fitting of Pratley Cable gland, shroud, making off the cable and fitting the gland to gland plates, switchgear or equipment including final connections of cable tails with lugs onto board terminals and including earth in ECC cable.				
2.3.1	25mm ² 4C Aluminium Cable PVC Mains 600/1000V	Supply 16 Install 16	No. No.		
2.4	Cable Sleeves Supply and Installation of Cable Sleeves as specified, in trenches or cast in concrete, excluding trenching or backfilling.				
2.4.1	110mm Ø Flexible Cable Sleeve	Supply 60 Install 60	m m		
2.5	Excavations Excavations 400mm wide x 600mm deep				
2.5.1	In trenches for cables and sleeves	60	m ³		
2.5.2	extra over soft excavation intermediate	30	m ³		
2.5.3	extra over soft excavation in hard rock	15	m ³		
2.6	Conduit Supply and installation of PVC conduit. Lengths given shall be taken as measured horizontal and vertical runs between conduit terminations. Rates quoted shall allow for wastage, offcuts, couplings, cuttings, bending, jointing socket and tees.				
2.6.1	20mm Conduit	Supply 800 Install 800	m m		
2.6.2	25mm Conduit	Supply 400 Install 400	m m		
Total for Bill No. 2 : Carried Forward to Summary Page					

Item	Description		Qty	Unit	Rate
2.7	<u>Conduit Boxes and Ends</u> Terminate and connect one pair of conduit ends including supply and installation of 1, 2, 3 or 4 way box on surface or in brickwork. (excluding coverplates), including holes for conduit.				
2.7.1	20mm Conduit (75mm Ø) Round Box	Supply	124	No.	
		Install	124	No.	
2.7.2	20mm Conduit (50 × 100mm) Galvanized Box	Supply	36	No.	
		Install	36	No.	
2.7.3	25mm Conduit (100 x 100mm) Galvanized Box	Supply	80	No.	
		Install	80	No.	
2.8	<u>Conduit Ends</u> Terminate and connect one pair of conduit ends including lock nuts, bushes,				
2.8.1	20mm uPVC Conduit	Supply	40	No.	
		Install	40	No.	
2.8.2	25mm uPVC Conduit	Supply	10	No.	
		Install	10	No.	
2.9	<u>Conductors</u> Supply and installation of PVC insulated copper conductors drawn into				
2.9.1	2,5 mm² PVC Conductors Red	Supply	800	m	
		Install	800	m	
2.9.2	2,5 mm² PVC Conductors Black	Supply	800	m	
		Install	800	m	
2.9.3	2,5 mm² PVC Conductors Pink	Supply	800	m	
		Install	800	m	
2.9.4	2,5 mm² PVC Conductors earth	Supply	800	m	
		Install	800	m	
2.9.5	4 x 2 PVC Wall Box	Supply	32	No.	
		Install	32	No.	
2.9.6	Hospital Saddle	Supply	60	No.	
		Install	60	No.	
2.9.7	4-Way Box PVC	Supply	60	No.	
		Install	60	No.	
2.9.8	4 mm² PVC Conductors Blue	Supply	400	m	
		Install	400	m	
2.9.9	4 mm² PVC Conductors Brown	Supply	400	m	
		Install	400	m	
2.9.10	2,5 mm² PVC Conductors Earth	Supply	400	m	
		Install	400	m	
2.9.11	Adaptors 25mm	Supply	10	No.	
		Install	10	No.	
2.9.12	4 x 4 PVC Wall Box	Supply	16	No.	
		Install	16	No.	
2.9.13	Coupling 25mm	Supply	10	No.	
		Install	10	No.	
Total for Bill No. 2 : Carried Forward to Summary Page					

Item	Description	Qty	Unit	Rate	Amount
2.10	<u>Light Switches</u> Supply, fitting and electrical connection of a Legrand type flush or surface mounted 16A switch in 100 x 50 excluding box (for flush type) and conduit connections, but including cover plates.				
2.10.1	16A 1 Lever 1 Way	Supply Install	32 32	No. No.	
2.10.2	16A 1 Lever 2 Way	Supply Install	4 4	No. No.	
2.11	<u>Luminaires</u> Mounting, fixing and electrically connecting the following luminaires, complete with lamps as specified in Section E of the Detailed Specification.				
2.11.1	Type A1+ 1500mm 45w IP65 Polycarbonates LED battern 4750lm, 4000k	Supply Install	8 8	No. No.	
2.11.2	Type C1 10w Decorative LED	Supply Install	32 32	No. No.	
2.11.3	Type J1 20w LED Bulkhead, Beka series 30 Die Cast Aluminium Base and Black ring, 2000lm	Supply Install	28 28	No. No.	
2.11.4	Type J2 13w Bulkhead LED Round	Supply Install	48 48	No. No.	
2.12	<u>Daylight Switch</u> Supply and installation of approved daylight switch.				
2.12.1	Daylight Switch	Supply Install	8 8	No. No.	
2.13	<u>Socket Outlets</u> Supply, fitting and electrical connection of flush or surface mounted Legrand type switched socket in either 100 x 100, 100 x 50, round box or wiring channel, <u>excluding</u> box (for flush type) and conduit connections, but including cover plate.				
2.13.1	16A Double SSO c/w coverplate. Legrand type.	Supply Install	64 64	No. No.	
2.14	<u>Isolators</u> Supply, fitting and electrical connection of flush or surface mounted Metal Clad Isolators in either 100 x 100, 100 x 50, round box or wiring channel, <u>excluding</u> box (for flush type) and conduit connections, but including cover plate. For more details please refer to the specific drawings				
2.14.1	32A Double-Pole waterproof Isolator internal equipment	Supply Install	8 8	No. No.	
2.14.2	60A 2 stove Isolator	Supply Install	8 8	No. No.	
Total for Bill No. 2 : Carried Forward to Summary Page					

NYAVINI SMALL CLINIC

ELECTRICAL INSTALLATION : SEMI - DETACHED ONE BEDROOM UNIT NO.2

SECTION A

SUMMARY PAGE						
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	Total for Electrical Bill of Quantities					

NYAVINI SMALL CLINIC

ELECTRICAL INSTALLATION : EXTERNAL WORKS

BILLS OF QUANTITIES : BILL No.3

SECTION A

Item	Description	Qty	Unit	Rate	Amount
3.1	<u>ELECTRICAL WORK</u> <u>CPAP WORKGROUP NO 160 UNLESS OTHERWISE STATED</u> <u>PREAMBLES</u> Refer to the attached Specifications for the Electrical Installation. The Tenderer must at all times read the Bills of Quantities in conjunction with the specification and drawings prior to pricing this section. Items 1-4 below applies to the entire electrical installation for the school.				
3.1.1	<u>General Earthing</u> Earthing and bonding of cold and hot water pipes and all other metal to comply with regulations.	1	Item		
3.2	<u>Commissioning and Testing</u> Allow for testing, balancing and commissioning the whole of the electrical installation as laid down in the specification and for re-testing as may be required after the making good of all defective work to the satisfaction of the Department and the Engineer.	1	Item		
3.3	<u>P & G's</u>	1	Item		
3.4	<u>Contingency Amount</u> A contingency amount has been allowed for expenditure as directed by the Electrical Engineer	1	Item	R 50 000,00	R 50 000,00
3.5	<u>As Built Drawings</u> Provision for the drawings showing all site cable routes, conduit routes, draw boxes and positions of outlets, etc.	1	Item		
3.6	<u>Labelling and Marking</u> Allow for marking and labelling of all equipment, cables, plugs, light switches etc.	1	Item		
3.7	<u>Provisional Sum</u>				
3.7.1	Allow for a Connection with the Back-up Generator of 150KVA	1	Item	R 516 400,00	R 516 400,00
3.7.2	Allowance for Profit.....%				
3.7.3	Allowance for Attendance.....%				
3.9	<u>New Kiosk</u> Supply and Installation and commissioning of the Kiosk, including making off all wire connections (external wiring, conduit, armoured cable and terminations given elsewhere).				
3.9.1	Kiosk K1	Supply Install	1 1	No. No.	
3.9.2	Kiosk K2	Supply Install	1 1	No. No.	
3.10	<u>Guarantee and Maintenance</u> Guarantee and maintenance for the complete installation of Electrical Installation including fittings, materials and workmanship for a period of TWELVE MONTHS after date of completion and handover.	1	Item		
3.10.1	<u>Eskom Connection fee</u> Provisional sum : Payment of Eskom Connection . (Inclusive of Transformer, Deposit etc) on receiving of the official Eskom quote Plus Profit and Attendance	1	Sum		R 350 000,00
3.11	<u>CERTIFICATE OF COMPLIANCE</u> Provision for the Certificate of Compliance to be issued on completion of the project.	4	Item		
Total for Bill No. 3 : Carried Forward to Summary Page					

Item	Description	Qty	Unit	Rate
3.12	Cables Supply, delivery and laying of PVC/SWA/PVC ECC Aluminium cables as specified, excluding terminations and cable supports. Lengths given shall be taken as measured lengths to cable runs from terminal to terminal and rates quoted shall include for off-cuts.			
	Aluminium			
3.12.1	95 mm ² 4 core Al PVC/SWA ECC/PVC 1,1/0,6kV	Supply Install	120 120	m m
3.12.2	50 mm ² 4 core Al PVC/SWA ECC/PVC 1,1/0,6kV	Supply Install	90 90	m m
	Copper			
3.12.3	4mm ² 3-Core cable.	Supply Install	m m	635 635
3.12.4	10mm ² 2-Core cable.	Supply Install	m m	362 362
3.12.5	10mm ² 4-Core cable.	Supply Install	m m	103 103
3.12.6	16mm ² 4-Core cable.	Supply Install	m m	110 110
3.13	Cable Terminations Including the supply and fitting of Pratley Cable gland, shroud, making off the cable and fitting the gland to gland plates, switchgear or equipment including final connections of cable tails with lugs onto board terminals and including earth in ECC cable.			
3.13.1	95 mm ² 4 core Al PVC SWA {VC 1,1/0,6kV	Supply Install	4 4	No. No.
3.13.2	50 mm ² 4 core Al PVC SWA PVC 1,1/0,6kV	Supply Install	2 2	No. No.
3.13.3	4mm ² 3-Core cable.	Supply Install	60 60	No. No.
3.13.4	10mm ² 2-Core cable.	Supply Install	20 20	No. No.
3.13.5	10mm ² 4-Core cable.	Supply Install	10 10	No. No.
3.13.6	16mm ² 4-Core cable.	Supply Install	4 4	No. No.
3.14	Wireway Installation (for Electrical Supply Cables) 114mm Wide Medium Duty Galvanized Return Flange Cable Tray. Mounted Underside of Ceiling Complete with all Accessories. Covers, 90° Bends, T-Junctions and rnd Caps etc.			
3.14.1	114mm Cable Tray complete	Supply Install	120 120	m m
3.16	EXCAVATIONS CPAP WORKGROUP NO 104 UNLESS OTHERWISE			
3.16.1	Excavations other than bulk in soft excavation not exceeding 2m deep for: Allowance is to be made for the installation of cable markers and warning sheets			
3.16.2	In trenches for cables and sleeves		195	m ³
Total for Bill No. 3 : Carried Forward to Summary Page				

Item	Description	Qty	Unit	Rate	
3.16.3	Extra over "soft excavation" for excavation in intermediate excavations	40	m ³		
3.16.4	Extra over "soft excavation" for excavation in hard rock excavations	40	m ³		
3.16.5	Filling obtained from excavations and/or prescribed stock piles on site compacted to 95%				
3.16.6	Backfilling of trenches Risk of collapse of excavations other than bulk	195	m ³		
3.16.7	Sides of trenches and hole excavations not exceeding 1.5m deep Manholes Supply and installation of manholes as shown on the drawings. Refer to Clause B6	42	m ³		
3.16.8	600 x 600mm Concrete Manholes Cable Markers Allow to supply and install cable markers	2	No.		
3.16.9	PVC warning marking tape	815	m		
3.16.10	Concrete cable route markers	32	No.		
3.17	Security System Installation of Camera Sytem equipment and All Access Control Systems as specified of the Detailed Specification.				
3.17.1	360 Degree resolution CCTV Camera	Supply Install	2 2	No. No.	
3.11	Luminaires Supply and install and electrically connecting the following luminaires, complete with lamps. Refer to Clause C2 of Part 3.				
3.11.1	Type B1.1 2 x 36w Fluorescent Fitting T8 with Prismatic Diffuser	Supply Install	5 5	No. No.	
3.11.2	Type P1.1 LED Post top Luminaire Manufactured from Powder coated die - cats, 36w Pending Height.	Supply Install	23 23	No. No.	
3.11.3	7m Pole for P1.1	Supply Install	23 23	No. No.	
3.11.4	Type BO1 18w or 25w, LM 6 Die cast Aluminium / Plastic	Supply Install	6 6	No. No.	
3.11.5	Type A1+ 2 x 18 w Vapor Proof Double Tube LED Fitting	Supply Install	5 5	No. No.	
3.12	Daylight Switch Supply and installation of approved daylight switch.				
3.12.1	Daylight Switch	Supply Install	3 3	No. No.	
Total for Bill No. 3 : Carried Forward to Summary Page					

NYAVINI SMALL CLINIC

ELECTRICAL INSTALLATION : EXTERNAL WORKS

BILLS OF QUANTITIES : BILL No.3

SECTION A

SUMMARY PAGE

<u>SUMMARY PAGE</u>						
Amounts brought forward from:						Amounts (R)
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	3.3					
	Total for Electrical Bill of Quantities					

NYAVINI SMALL CLINIC

LIGHTNING PROTECTION

BILL OF QUANTITIES : BILL No.4

Note: All rates for items contained in this Bill shall be computed excluding the applicable Value Added Tax. The Contractor shall include in the rates for any work or anything in the Conditions of Contract or Specification or shown on the Drawings not included elsewhere in the Bills of Quantities and for which he considers charges are required.

Allowance for Complete Lightning Protection Installation of all the Ideal Clinics.
The Lightning Protection installation is to be undertaken by a specialist and is required to provide two soil resistivity tests, one at the beginning of the project and one at completion. The first test is to be conducted within 14 days of the contractor being appointed. The Lightning Protection installer is to provide a Test Certificate in accordance with SANS 10313. The contractor to note that all conduit provisions for the Lightning Protection installation are to be recessed and provided by the Electrical Sub-Contractor.

Item	Description	Qty	Unit	Rate	Amount
1.	<u>Down Conductors</u> Supply and fixing on surface in an approved manner of aluminium conductor including all fixing accessories, such as insulating sleeves and stand-off brackets, but not including terminations. Rates quoted shall allow for wastage, off-cuts and joints.				
1.1	50mm ² aluminium conductor	58,8	m		
2.	<u>Air Terminal Conductors</u> Supply and fixing on surface in an approved manner of 50mm ² aluminium conductor including all fixing accessories, such as insulating sleeves and stand-off brackets, but not including terminations. Rates quoted shall allow for wastage, off-cuts and joints.				
		58,8	m		
3.	<u>Terminations of Down Conductors to Air Terminals</u> Termination of aluminium conductor to metal roof as specified in Clause A1.4 including lugs and making off of the ends etc.				
3.1	50mm ² aluminium conductor to metal roof.	21	No.		
4.	<u>Earthing Conductors</u> Supply and laying in the ground and in conduits of copper earth wire as specified in Clause A1.5 excluding terminations. Rates quoted shall allow for wastage, off-cut and joints.				
4.1	50mm ² Green PVC insulated copper conductor	58,8	m		
5.	<u>Termination of Earthing Conductors to Down Conductors</u> Termination of earth conductor to aluminium down conductor and earth electrodes including making off the ends, lugs, clamps, etc.				
5.1	50mm ² Termination to 50mm ² conductor	21	No.		
5.2	Connecting conductor all around the roof	310	m		
6.	<u>Earth Electrodes</u> Supply and installation of earth electrodes generally as specified in Clause A1.3.3.				
6.1	3,6m long earth electrodes	21	No.		
7.	<u>Termination of Earth Conductors to Earth Electrodes</u> Termination of Earth Conductors to Earth Electrodes including making off of ends, lugs, clamps, etc.				
7.1	50mm ² Earth Conductor to Earth Electrode	21	No.		
8.	<u>General Earth Bonding</u> Bonding of metal drainage down pipes and items.				
		21	Item		
9.	<u>Testing</u> Supply and testing apparatus and testing in accordance with SABS Code.				
9.1	Testing of joint continuity	5	Item		
9.2	Testing of Lightning Protection System	5	Item		
9.3	Testing of Earthing Points	5	Item		
9.4	Soil Resistivity Test and Report	5	Item		
Total for Bill No. 2 : Carried Forward to Summary Page					

NYAVINI SMALL CLINIC					
VOLUME 2					
SUMMARY PAGE					
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Page	2,1				R
Total for Bill No. 2 c/f to Final Summary					R

NYAVINI SMALL CLINIC**ELECTRICAL INSTALLATION : FIRE DETECTION****BILLS OF QUANTITIES : BILL No.5****SECTION A**

Item	Description	Qty	Unit	Rate	Amount
5.1	<u>Smoke Detection Wiring and Distribution</u>				
5.1.1	20 loop Addressable Fire Detection Panel complete with internal power supply and battery backup.EN54	Supply 1 Install 1	No. No.		
5.1.2	Smoke Sensing fire detector complete with surface base.	Supply 100 Install 100	No. No.		
5.1.3	Heat Sensing fire detector complete with surface base.	Supply 5 Install 5	No. No.		
5.1.4	Break Glass /Call points complete (Resettable), complete with surface base.	Supply 15 Install 15	No. No.		
5.1.5	96db Ceiling mount audible & visual alarm (Sounder-Strobe) combination complete with surface base.	Supply 11 Install 11	No. No.		
5.1.6	Fire Retardant (Red) cabling (PH30)	Supply 1750 Install 1750	m m		
5.1.7	25mm dia conduit with steel saddles	Supply 1750 Install 1750	m m		
5.1.8	Test, commissioning, labeling and handing over fully operational system to client and consulting engineer's requirement	1	Sum		
5.2	<u>Guarantee and Maintenance</u>				
5.2.1	Guarantee and maintenance for the complete installation of Fire Detection Installation including fittings, materials and workmanship for a period of TWELVE MONTHS after date of completion and handover.	1	Item		
Total for Bill No. 2 : Carried Forward to Summary Page					

NYAVINI SMALL CLINIC

ELECTRICAL INSTALLATION : SOLAR WORKS

BILLS OF QUANTITIES : BILL No.6

SECTION A

Item	Description	Qty	Unit	Rate	Amount
6.1	Provisional Sum <u>Note: This is a high level Costing not final cost estimate of solar system</u>				
6.1.1	Allow for a Connection with the 100kw Solar Sytem	1	Item	R 2 450 000,00	R 2 450 000,00
6.1.2	Allowance for Profit.....%				
6.1.3	Allowance for Attendance.....%				
6.2	Guarantee and Maintenance Guarantee and maintenance for the complete installation of Electrical Installation including fittings, materials and workmanship for a period of TWELVE MONTHS after date of completion and handover.	1	Item		
Total for Bill No. 2 : Carried Forward to Summary Page					

**NYAVINI SMALL CLINC
ELECTRICAL INSTALLATION**

SUMMARY PAGE

BILL NO.	Amounts brought forward from:	Amounts (R)
1	Electrical Installation : Clinic Buildings	
2	Electrical Installation : Semi-Detached One Bedroom	
3	Electrical instalation : External Works	
4	Lightning Protection	
5	Fire Detection	
6	Solar Installation	
	TOTAL CARRIED FORWARD TO FINAL SUMMARY OF MAIN BILLS OF QUANTITIES	R -

MECHANICAL BILL OF QUANTITIES

Total to be transferred to Final Summmary, Page FS1, excl VAT

Item	Description	Unit	Qty	Rate	Total
	<p>NOTE: i) Quantities in this schedule are to be re-measurable on completion. Rates are fixed in accordance with the tendered rates. ii) This Bill of Quantities is to be read in conjunction with the specification in respect of the following listed items</p> <p>AIR CONDITIONING</p> <p><u>Supply and install inverter-type split air conditioning units with reverse cycle heating, complete with all necessary piping, insulation, trunking, wiring, electrical work, flush mounted hard wired controls, drains, mounting brackets, rubber waffle pads, etc. necessary to leave the installation in good working order, as follows:</u></p> <p>Midwall Units</p> <p>1 12 000 BTU</p> <p>2 18 000 BTU</p> <p>3 24 000 BTU</p> <p>4 28 000 BTU</p> <p>5 12 000 BTU Cooling only</p> <p>Cassette Units</p> <p>6 12 000 BTU</p> <p>7 28 000 BTU</p> <p>VENTILATION</p> <p><u>In-line Extraction Air Fans, installed with electrical connections to the electrical point provided by others. Including attenuators, if necessary, to achieve maximum sound pressure in ablutions: NR 35 (approximately 40 dB(A))</u></p> <p>8 1300 lit/sec @ 250 Pa</p> <p>9 1000 lit/sec @ 250 Pa</p> <p>10 900 lit/sec @ 200 Pa</p> <p>11 200 lit/sec @ 200 Pa</p> <p>12 100 lit/sec @ 200 Pa</p> <p>13 60 lit/sec @ 50 Pa</p> <p><u>In-line Supply Air Fan Filter Units, installed with electrical connections to the electrical point provided by others. Including attenuators, if necessary, to achieve maximum sound pressure in ablutions: NR 35 (approximately 40 dB(A)) Including filter boxes with removable primary filter.</u></p> <p>14 1000 lit/sec @ 250 Pa</p> <p>15 900 lit/sec @ 250 Pa</p>				

16	800 lit/sec @ 250 Pa	No	1	
TOTAL CARRIED FORWARD TO SUMMARY				

Item	Description	Unit	Qty	Rate	Total
	<u>Ducting</u>				
	<u>Circular galvanised sheetmetal ducting suspended under the soffit/trusses by a band with single/double rod(s) (suited to size of ducting) above the ceiling, including all fittings, fixings, tee's, bends, reducers, joints, hangers, fixing to slab, fittings, etc.</u>				
17	450mm diameter	m	10		
18	400mm diameter	m	30		
19	350mm diameter	m	40		
20	300mm diameter	m	80		
21	250mm diameter	m	60		
22	200mm diameter	m	80		
23	160mm diameter	m	60		
24	125mm diameter	m	40		
25	100mm diameter	m	30		
	<u>Flexible ducting. Non-allergenic spiral wound a Not exceeding 1m in length, including all fittings, fixings, etc.</u>				
26	250mm diameter flexible ducting	m	50		
27	200mm diameter flexible ducting	m	40		
28	160mm diameter flexible ducting	m	25		
29	125mm diameter flexible ducting	m	20		
30	100mm diameter flexible ducting	m	10		
	<u>Extract Air Grilles</u>				
31	600x600mm egg crate hinged grilles with removable filters, including filter. Complete with side entry plenum box. To be installed in ceiling.	No	23		
	<u>Disc Valves</u>				
	<u>Disc Valves, galvanised steel, powder coated white, as specified:</u>				
32	100mm	No	5		
33	125mm	No	15		
34	160mm	No	17		
35	200mm	No	9		
TOTAL CARRIED FORWARD TO SUMMARY					

Item	Description	Unit	Qty	Rate	Total
	<u>Weather Louvres</u>				
	<u>Natural anodised aluminium Weather Louvres, complete with sub-frames and fixed to the wall.</u>				
36	500x500mm	No	1		
37	450x450mm	No	4		
38	400x400mm	No	2		
39	350x350mm	No	4		
40	200x200mm	No	5		
	<u>Door Grilles</u>				
41	350x350mm double sided natural anodised aluminium door grille, drilled for countersunk fixing.	No	55		
	<u>Room Heaters</u>				
42	2 kW shortwave radiant heaters.	No	13		
43	3 kW shortwave radiant heaters.	No	4		
44	500w Panel Heaters, covered with 0,6mm stainless steel sheet.	No	10		
	<u>Ceiling Sweep Fan</u>				
45	1420mm ceiling sweep fan, with 3 aluminium blades, epoxy powder coated white. Supplied with a 4-speed controller installed flush mounted adjacent to the room light switch.	No	7		
	<u>Fire Protection Equipment</u>				
46	New 4.5kg Dry Chemical Powder Hand Held Fire Extinguishers as per SANS 1522 and SANS 1739. Mounted on a full length hardwood backing plate. Installed as per SANS 10105.	No	10		
47	New 9kg Dry Chemical Powder Hand Held Fire Extinguishers as per SANS 1522 and SANS 1739. Mounted on a full length hardwood backing plate. Installed as per SANS 10105.	No	8		
48	New 30m fire Hose Reel, complete with hose and nozzle, are to be fitted with an isolating valve and union, in that order (so that the reel can be isolated and removed without having to isolate the mains) as SANS 543.	No	6		
	<u>Fire Signage</u>				
49	200x200mm photoluminescent signage a clear perspex sheet, with anodised aluminium frame, for fire equipment and escape routes, as per SANS 1186, screwed to wall/suspended from ceiling/mounted perpendicular to the wall.	No	150		
50	200x200mm plastic signage for fire equipment, as per SANS 1186, screwed to wall/suspended from ceiling/mounted perpendicular to the wall in anodised aluminium frame.	No	300		

TOTAL CARRIED FORWARD TO SUMMARY	
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Item	Description	Unit	Qty	Rate	Total
	HOT WATER EQUIPMENT				
51	2.5lit Hydroboil, as per Franke or other approved.	No	3		
52	200 lit roof mounted indirect solar water heaters and cylinder, with 2.0 kW back-up electrical element, complete with all valves and safety releases. As per Kwikot Kwiksol or other approved.	No	10		
53	Purpose made hot dipped galvanised steel stands to elevate the solar panel and storage cylinder to 30% off the horizontal.	No	10		
54	150 lit cylinder with 3.5 kW heat pump (COP>3:1 for 60°C water at 10°C ambient) system, including all interconnecting piping between heat pump and cylinder, valves, multipressure control valve, vacuum breakers, circulation pump, controller, etc. as specified. Note: approximate distance between heat pump and storage cylinder: 9m.	No	2		
55	Circulation pump 1 lit/sec @ 5m head, as per Davey SXM 32-45 or other approved.	No	1		
	WATER RETICULATION				
	<u>Copper Piping</u>				
	<u>Copper piping, class 2 as per SANS 460, fixed to walls, concrete soffits, etc. including all hangers, brackets & holder bats:</u>				
56	32mm Pipe	m	50		
57	28mm Pipe	m	90		
58	22mm Pipe	m	260		
59	15mm Pipe	m	320		
	<u>Copper Fittings</u>				
	<u>Extra over class 2 copper pipes for capillary fittings</u>				
30	32mm Fittings	No	20		
61	28mm Fittings	No	40		
62	22mm Fittings	No	150		
63	15mm Fittings	No	250		
	<u>Isolating Valves</u>				
	<u>Isolating valves, ball type with brass or gunmetal bodies, stainless steel ball and nylon seat:</u>				
64	32mm	No	4		
65	28mm	No	10		
66	22mm	No	15		
67	15mm	No	25		
68	15mm ball-o-stop valves	No	55		

69	15mm angled valves	No	60	
TOTAL CARRIED FORWARD TO SUMMARY				

Item	Description	Unit	Qty	Rate	Total
	<u>Chasing</u>				
70	Chasing into walls. 50mm deep x 30mm wide. Replastering and making good.	m	50		
	<u>Pressure Testing</u>				
71	Pressure Testing of Piping - all piping to be pressurised to 10 bar for a period of 30 minutes, including hiring of a mobile water pump suitable to pressurise the system.	No	1		
	WATER PUMP				
72	Water pump 40 lit/min @ 45m head, including controls, connections and cabling.	No	1		
	BOREHOLE PUMP				
73	Borehole pump to 0.4 m ³ /hr @ 165m dynamic head, at 134m below ground level.	No	1		
74	Control system for above borehole pump with level probes, complete as specified.	No	1		
	FIRE WATER PUMP				
75	Fire Water Pump Set: 90ℓ/min at 550kPa, including Main Pump, Jockey Pump, 20ℓ Hydrosphere and integral pressure sensors/controls.	No	1		
	GENERAL				
76	6 monthly services of all equipment, as specified.	No	1		
77	Annual service, as specified.	No	1		
78	Testing, commissioning and handover of all equipment.	No	1		
79	O&M Manuals, in separate lever arch files, for all mechanical installations, including all technical brochures, commissioning data, as-built drawings and staff training certificates, as specified.	No	3		
80	Staff training (maintenance and users) Signed certificates, as specified, to be provided.	No	1		
TOTAL CARRIED FORWARD TO SUMMARY					

	Total
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TOTAL	



NYAVINI CLINIC: CONSTRUCTION OF SMALL CLINIC

PART C3. SCOPE OF WORKS

C3.1 SCOPE OF WORKS GCC FOR CONSTRUCTION WORKS (Edition 2 of 2010)			
Scope of Works complied in accordance with SANS 10403 where reference is made to this part of SANS 1921-1:2004			
Project title:	NYAVINI CLINIC: CONSTRUCTION OF SMALL CLINIC		
Tender no:	ZNB 5549/2023-H	Project Code:	TBA
1	<p><u>SECTION 1</u></p> <p><u>EXTENT OF THE WORKS</u></p> <p>1.1 EMPLOYERS OBJECTIVES To provide a newclinic with good infrastructure, adequate staffing facilities , adequate storage for medicine and supplies, good administrative working areas and sufficient bulk supplies that use applicable clinical policies, protocols, guidelines to ensure the provision of quality health services to the community.</p> <p>1.2 OVERVIEW OF THE WORKS Construction of the New Small Clinic complete with 4 nurses accomodation houses and related siteworks.</p> <p>1.3 EXTENT OF THE WORKS The works comprises of the following: - 1. Construction of the Main Clinic Building 2. Construction of 4 New Staff residences 3. Enclosing the site boundary with fencing 4. External works including site clearance, civil plumbing, paving and road works, etc.</p> <p>1.4 LOCATION OF THE WORKS The site is located at D938 from Nyavini village, Ugu Health District, Umzumbe Municipality. Co-ordinates 30° 23'11.03S, 30° 22'9.52E</p> <p>1.5 TEMPORARY WORKS All temporary work to comply with the Occupational Health and safety Act (Act 85 of 1993)</p>		
2	<p><u>ENGINEERING</u></p> <p>2.1 EMPLOYER'S DESIGN Design done by the Eugene Maphumulo Architects and consulting engineers on behalf of the employer. Copies of the drawings are attached to these bills of quantities.</p> <p>2.2 DESIGN BRIEF Not applicable</p> <p>2.3 DRAWINGS See list of Drawings/Annexures attached to this document</p>		

2.4	DESIGN PROCEDURES Not applicable
3	<u>PROCUREMENT</u>
3.1	PREFERENTIAL PROCUREMENT PROCEDURES This tender will be subject to the implementation of the Preferential Procurement Regulations, 2022 pertaining to the Preferential Procurement Policy Framework Act, Act Number 5 of 2000 and the relevant Supply Chain Management Legislation and the KwaZulu-Natal Supply Chain Management Policy Framework published by the KwaZulu-Natal Provincial Treasury. Tenderers are referred to www.kzntreasury.gov.za for access to the relevant documents. Tenderers are advised to familiarize themselves with the contents of the KwaZulu-Natal Supply Chain Management Policy Framework regarding Preference Point Systems, evaluation of tenders appeals and other matters.
3.2	RESOURCE STANDARD PERTAINING TO TARGETED PROCUREMENT NOTE : This project will be adjudicated as exceeding R 50,000 000,00
3.3	SCOPE OF MANDATORY SUBCONTRACT WORK Not applicable
3.4	PREFERRED SUBCONTRACTORS/SUPPLIERS Not applicable
3.5	SUBCONTRACTING PROCEDURES Not applicable
4	<u>CONSTRUCTION</u>
4.1	APPLICABLE SANS 2001 STANDARDS FOR CONSTRUCTION WORKS The Contractor is referred to the "Model Preambles to Trades - 2008", any "Supplementary Preambles", the Electrical Specifications and Mechanical Specification for full descriptions of materials and methods referred to in these Bills of Quantities/Lump Sum documents, insofar as they apply. The Contractor is advised to study the "Standard Preambles to all Trades", any "Supplementary Preambles", the Electrical Specifications and Mechanical Specification, before pricing Bills of Quantities/Lump Sum documents. Where the description in the Bills of Quantities/Lump Sum documents differ from those in the Standard Electrical Specifications, the descriptions in the Bills of Quantities/Lump Sum documents are to apply. No claim whatsoever will be allowed in respect of errors in pricing due to brevity of description of items in the Bills of Quantities/Lump Sum documents which are fully described when read in conjunction with the relevant Preambles and/or Specifications. Suppliers of materials and the like, whose quality systems apply with one or more of the SABS/SANS ISO 9000 Series should be used whenever possible in the absence of a particular SABS/SANS Specification Standard Mark. Wherever the words "shall be deemed to be included in the description", "shall be stated" or other words having the same effect, appear in the Standard System, it shall be deemed that all descriptions in these Bills of Quantities/Lump Sum documents incorporated such inclusions and statements whether specifically stated or not. The Contractor is hereby informed that where SABS/SANS Specifications are referred to in these Bills of Quantities/Lump Sums documents and Specifications thereto, then ONLY the Specification of Work Clauses will apply. The method of measurement and payment clauses will NOT apply to this Contract.

The Contractor is hereby informed that risk of collapse and keeping excavations free from water (excluding subterranean water) generally are deemed to be included in the descriptions unless accommodated in the system of measurement. Please refer to the Geotechnical Investigation report when included at the end of these tender documents.

Whenever reference is made to "Sub-Contractor", "Nominated Sub-Contractor" or the like in the specifications included or referred to in these Bills of Quantities/Lump Sums documents, it shall be deemed to mean "Contractor" as defined.

4.2 APPLICABLE NATIONAL AND INTERNATIONAL STANDARDS

See above 4.1

4.3 PARTICULAR / GENERIC SPECIFICATIONS

The Contractor is referred to the following documents whether attached to this document or not:

<u>SPECIFICATION</u>	<u>PAGES</u>
Specification for HIV/AIDS Awareness (CIDB)	HIV1 TO HIV3
Specific Construction, Safety, Health and Environmental Plan	
Standard Preambles for all Trades (Rev 3) - DOH 2009	1 to 95
General Electrical Specification	E/1 to E/20
Lightning Protection Installation	LP/1 to LP/6

4.4 CERTIFICATION BY RECOGNIZED BODIES

Appointed consultants must be actively registered with their relevant professional discipline

4.5 AGRÉMENT CERTIFICATES

Not applicable

4.6 PLANT AND MATERIAL PROVIDED BY THE EMPLOYER

Not applicable

4.7 SERVICES AND FACILITIES PROVIDED BY THE EMPLOYER

None.

4.8 OTHER SERVICES AND FACILITIES

The Contractor shall provide any artificial lighting which may be necessary or required for the proper execution of the works, and provide electric power and water required by all Sub-Contractors, Nominated Sub-Contractors and Sub-Contractors appointed directly by the Administration.

The Contractor shall give all notices and pay all fees in connection with temporary electrical and water connections and shall connect temporary Electrical and Water meters for and pay for all current and water consumed.

The Contractor is advised that the permanent light fittings and water points of any kind installed in the Works are not to be used to provide temporary lighting and supplement water requirements for construction purposes.

<p>5</p> <p>5.1</p>	<p><u>MANAGEMENT</u></p> <p>APPLICABLE SANS 1921 STANDARDS</p> <p>SANS 876:2016 - Cable terminations and live conductors within air-filled enclosures (insulation co-ordination) for rated a.c. voltages from 7,2 kV up to and including 36 kV.</p> <p>SANS 1874:2015 - Switchgear - Metal-enclosed ring main units for rated a.c. voltages above 1 kV and up to and including 36 kV.</p> <ul style="list-style-type: none"> o The Occupational Health and Safety Act (Act 85, 1993) as amended o The control panel, associated components and wiring shall be installed in compliance with the latest, relevant and applicable standards. o SANS 10147: Refrigerating systems, including plants associated with AC systems o SANS 347: Categorization and conformity assessment criteria for all pressure equipment o SANS 10142: Code of Practice for Wiring of Premises o SANS 60947-1: 2005/IEC 60947-1: 2004 to SANS 60947-8: 2004/IEC 60947-8: 2004: Low voltage switch gear and control gear. o A Certificate of Conformity, in accordance with the OHS Act as amended and SANS 347, will be required for all refrigeration and air-conditioning works o KwaZulu-Natal Department of Health Policy on Design of Mechanical Installations o An Electrical Certificate of Compliance, in accordance with the OHS Act as amended, will be required for all Electrical Works. o The Machinery and Occupational Safety Act - Act 6/1983 o The Municipal by-laws and any special requirements of the Supply Authorities of the area or district concerned. o Local Fire Regulations. o All building works shall be in accordance with the Standard Preambles to All Trades. The contractor should fully familiarise himself with these documents prior to quoting. 																																																																	
<p>5.2</p>	<p>RECORDING OF WEATHER</p> <p>The Contractor shall keep record of abnormal climatic conditions to facilitate the adjudication of claims for extension of the contract period.</p>																																																																	
	<p>The Contractor shall allow in his programme for the following number of days for rain days (rain > 10mm per day) as per the table below:</p> <table border="1"> <thead> <tr> <th colspan="3">CURRENT YEAR</th> <th>YEAR + 1</th> <th>YEAR + 2</th> </tr> </thead> <tbody> <tr><td>January</td><td>w/days</td><td>3</td><td>3</td><td>3</td></tr> <tr><td>February</td><td>w/days</td><td>3</td><td>3</td><td>3</td></tr> <tr><td>March</td><td>w/days</td><td>3</td><td>3</td><td>3</td></tr> <tr><td>April</td><td>w/days</td><td>3</td><td>3</td><td>3</td></tr> <tr><td>May</td><td>w/days</td><td>3</td><td>3</td><td>3</td></tr> <tr><td>June</td><td>w/days</td><td>3</td><td>3</td><td>3</td></tr> <tr><td>July</td><td>w/days</td><td>3</td><td>3</td><td>3</td></tr> <tr><td>August</td><td>w/days</td><td>3</td><td>3</td><td>3</td></tr> <tr><td>September</td><td>w/days</td><td>3</td><td>3</td><td>3</td></tr> <tr><td>October</td><td>w/days</td><td>3</td><td>3</td><td>3</td></tr> <tr><td>November</td><td>w/days</td><td>3</td><td>3</td><td>3</td></tr> <tr><td>December</td><td>w/days</td><td>3</td><td>3</td><td>3</td></tr> </tbody> </table>	CURRENT YEAR			YEAR + 1	YEAR + 2	January	w/days	3	3	3	February	w/days	3	3	3	March	w/days	3	3	3	April	w/days	3	3	3	May	w/days	3	3	3	June	w/days	3	3	3	July	w/days	3	3	3	August	w/days	3	3	3	September	w/days	3	3	3	October	w/days	3	3	3	November	w/days	3	3	3	December	w/days	3	3	3
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<p>5.3</p> <p>5.4</p>	<p>MANAGEMENT MEETINGS</p> <p>In order to facilitate the smooth functioning of the Works and to ensure the closest co-operation between all the parties concerned, the Employer will call for regular meetings to be held on the site, at which a senior member of the Contracting firm and the General Foreman of the Works will always be required to be present.</p> <p>In addition to the above, other persons will be required to attend these meetings as and when their presence is necessary, e.g., Consultants in all disciplines, representatives of the various Sub-Contractors, etc.</p> <p>Proper minutes of these meetings will be kept by the Employer\Principal Agent and copies will be circulated to all persons attending the meetings and to others who need to be kept informed.</p> <p>FORMS FOR CONTRACT ADMINISTRATION</p>																																																																	

The Employer shall provide all necessary forms.

5.5 ELECTRONIC PAYMENTS

The Contractor shall provide all required information to the Employer to facilitate electronic payments upon request.

5.6 DAILY RECORDS

The Contractor shall keep daily records of people and equipment employed as well as a site diary in respect of work performed on the site.

At the end of each week the Contractor shall provide the Principal Agent with a written record, in schedule form, reflecting the number and description of tradesmen and labourers employed by him and all Sub-Contractors on the works each day.

At the end of each week the Contractor shall provide the Principal Agent with a written record, in schedule form, reflecting the number, type and capacity of all plant, excluding hand tools, currently used on the works.

5.7 BONDS AND GUARANTEES

The Contractor shall within 10 calendar days after receiving notice from the Engineer and prior to receiving a completed copy of this agreement, including the schedule of deviations (if any), contact the Employer's agent (whose details are given in the contract data) to arrange the delivery of any bonds, guarantees, proof of insurance and any other documentation to be provided in terms of the conditions of contract identified in the Contract Data.

5.8	<p>PAYMENT CERTIFICATES</p> <p>Requirements will be in accordance with the Employers prescriptions.</p>
5.9	<p>PERMITS</p> <p>The Contractor is advised that, in the case of an existing building or institution, all security measures in force will remain in operation and he must acquaint himself and his Employees with them as he and his Employees will at all times be subject to these measures.</p> <p>The Contractor will on no account extend his operations beyond the confines of the building site as indicated by the Employer and must ensure that all his Employees are made aware of these limits. Any Employee disregarding this instruction and found outside the limit of the building site without authority, shall be redeployed immediately and shall not again be employed on this Contract.</p> <p>The Contractor will be responsible for ensuring that this instruction is strictly enforced and must provide and remove upon completion or when directed, such other necessary temporary barriers, fences, etc., as may be required and is to allow opposite this item for any charges he may wish to make in this connection.</p> <p>The Employer will accept no responsibility whatsoever for damage to or the loss of plant, materials, etc., from the site.</p>
5.10	<p>PROOF OF COMPLIANCE WITH THE LAW</p> <p>The following certificates must be provided before first delivery is taken:</p> <ul style="list-style-type: none"> - Electrical Compliance Certificate - Lightning Certificate - Electrical and Mechanical test certificates - SANS 10400-A:2010 compliance certificates - Latest National Building Regulation - Asbestos removal compliance certificates
5.11	<p>INSURANCE PROVIDED BY THE EMPLOYER</p> <p>Not Applicable</p>
<p>Clause Numbers</p> <p>4.1.7</p> <p>4.2.1</p> <p>4.2.2</p> <p>4.2.3</p>	<p><u>SECTION 2</u></p> <p><u>SPECIFICATION DATA ASSOCIATED WITH SANS 1921-2004</u></p> <p>The requirements for drawings, information and calculations for which the Contractor is responsible are:</p> <p>Prefabricated roof trusses design must be submitted for approval 30 days prior to erections.</p> <p>The responsibility strategy assigned to the Contractor for the works is:</p> <p>Strategy A</p> <p>The structural engineer is:</p> <p>Eyethu Engineers (Pty)Ltd</p> <p>Drawings & other info are to be submitted in accordance with the contractors programme</p> <p>Not applicable</p>

4.3	<p>The planning, programme and method statement are to comply with the following:</p> <p>N/A</p>
4.12.1	<p>Samples of materials</p> <p>The work is to be executed with materials of the best specified and in the most substantial and workmanlike manner under the inspection of the Employer and to his satisfaction. The Contractor shall furnish, without delay, such samples as called for or may be called for by the Employer, who may reject all materials or workmanship not corresponding with the approved sample. The samples of materials, workmanship and finishes that the Contractor is to provide and deliver to the employer are: TBC</p>
4.12.2	<p>Fabrication drawings that the contractor is to provide to the employer are:</p> <p>None</p>
4.12.3	<p>Office accommodation, equipment, accommodation for site meetings and other facilities for use by the employer and his agents are:</p> <p>OFFICE FOR FOREMAN</p> <p>Provide, erect, maintain and remove at completion a suitable temporary office for the Contractor or his Foreman, perfectly secured, lighted and ventilated and having a desk with drawers.</p> <p>TELEPHONE</p> <p>The Contractor shall provide a telephone on the site for the use of the Contractor and all Sub-Contractors for the duration of the Contract, and must make the necessary application for connection, give all notices and pay all fees, rentals and charges for the service and also for all calls.</p> <p>OFFICE FOR INSPECTOR OF WORKS</p> <p>Provide, erect, maintain and remove at completion a well constructed temporary office for the Inspector of Works not less than 4 x 3 m on plan and 3 m high to eaves to the approval of the Employer. The office shall be constructed of wood framing covered externally with corrugated iron or corrugated asbestos and with a lean-to roof covered with the same material as the external wall covering. The office shall be lined internally with soft board or other approved material and a ceiling shall be provided of the same material as the internal lining. A suspended wood floor shall be provided and is to finish not less than 300 mm above the ground level. A lockable door and a window, which provides adequate light and ventilation, shall be fitted. An office constructed of 115 mm thick brick-work and provided with a screeded concrete floor and roofed and ceiled as above described may be accepted as an alternative but prior permission of the Employer will be necessary before construction of such an office is commenced and his requirements shall be stated and fulfilled by the Contractor. The office shall be fitted in an approved manner with a sloping topped desk of height and length suitable for the laying out and studying of drawings, a desk or table with not less than two lock-up drawers, shelves, seating and wash-stand, and the Contractor shall provide all necessary attendance.</p> <p>TELEPHONE IN OFFICE FOR INSPECTOR OF WORKS</p> <p>The Contractor shall arrange for the installation of a lockable telephone in the Office for the Inspector of Works for the duration of the Contract. The Contractor will be required to make the necessary application for connection and give all notices on behalf of the Employer. The Employer will, however, be responsible for the direct payment of all fees, rentals and other charges by Telkom for the service for the Inspector of Works and for all calls made from this telephone.</p>

	SHED
	Provide, erect, maintain and remove at completion, ample temporary sheds for the proper storage of materials and for the use of the workmen, and remove when no longer required.
4.14.6	The requirement for provision and erection of signboards are:
	Supply, erect, maintain and remove at completion a painted notice board, size overall 2800 x 2345 mm high sign written to detail as Drawing No. T9506 which drawing is available from offices of the Department of Public Works. Only the official notice board is to be displayed on the site and no Sub-Contractor's boards will be permitted. The Contractor, at his own cost, may provide a board on which all sub-contract firms' names may be sign written. The notice board is to be to the approval of the Employer and is to be maintained in first class condition and placed where directed at the entrance to the site and remain there for the duration of the Contract.
4.17.1	Requirement for the termination, diversion or maintenance of existing services:
	Should the Contractor come in contact with any underground cables or pipes during excavations, immediate notification must be made to the Employer and all work in the vicinity of such cables, pipes, etc., shall cease until authority to proceed has been obtained from the Employer. Should the Contractor damage underground cables or pipes resulting in a disruption of services to an existing institution such damage shall be repaired immediately.
4.17.3	Services which are known to exist on the site:
	Investigate and provide detail drawings.
4.17.4	Requirement for detection apparatus
	None
4.18	ADDITIONAL HEALTH AND SAFETY REQUIREMENTS ARE:
	By the submission of a tender, any Tendered will, if awarded the contract to which this tender document relates, be deemed to be the mandatory as envisaged by Section 37 (2) of the Act. As a mandatory the successful Tendered will be deemed to be the "principal contractor" and an employer in his/her/their own right with duties as prescribed in the Act and accordingly will be deemed to have agreed to be solely responsible for ensuring that in connection with the service to which this tender document relates, all work will be performed and machinery and plant used in accordance with the Act. Should the Contractor, for whatever reason be unable to perform as required by the Act, the Contractor undertakes to inform the Employer accordingly. Tenderers are advised that it is a Condition of this Tender that a 'Construction Phase Safety, Health and Environmental Plan' specifically relates to the project for which tenders are being submitted and must be prepared by the Tendered and submitted with the other tender documents at the time of tender. Failure to do so will Tenderers are therefore advised to study the 'Construction Safety, Health and Environmental Specification' which is issued as part of this tender document, the Model Preambles to Trades - 2008, any project Specification included in this tender document and any and all drawings which are referred to and issued as part of this tender document before preparing their own project specific 'Construction Phase Safety, Health and Environmental Plan'. Tenderers are also advised that such a plan which is submitted with a tender but is incomplete or considered inadequate by the Employer or his Representative will invalidate the tender. The Contractor will be deemed to have satisfied himself with his obligations in terms of the Act and to have allowed for all costs arising from compliance with the Act as no claim for extra costs arising from compliance with, and obligations in terms of the Act will be entertained.
4.22	WORK BY NOMINATED AND SELECTED SUBCONTRACTORS COMPRISE:
	List of applicable sub-contractors to be compiled post award.

C3.2 - SPECIFICATION FOR HIV/AIDS AWARENESS

1 Scope

This generic specification contains requirements applicable to the reduction of the risk of transfer of the HIV virus between and among construction workers and the local community through the following four strategies:

- a) raising awareness about HIV/AIDS;
- b) providing construction workers with access to condoms;
- c) HIV counselling, testing and referral services; and
- d) Sexually Transmitted Infection diagnosis and treatment.

2 Normative references:

The following standard contains provisions that, through reference in this text, constitute provisions of this standard:

SANS 4074 ISO 4074, *Condom Rubbers*

3 Definitions and Abbreviations

3,1 Definitions

Construction Worker: all persons in the employ of the contractor or in the employ of any of the subcontractors contracted by the contractor.

Local Community: the communities local to the site which are most likely to have contact with the construction worker and, in particular, sex workers in those communities.

Service provider: the natural or juristic person recognised by the South African Department of Health as specialist in conducting Aids Awareness Programmes.

3,2 Abbreviations

STI: Sexually transmitted infection

HIV: Human Immunodeficiency Virus

AIDS: Acquired Immune Deficiency Syndrome

4 Objectives

The objectives are to:

- a) reduce the risk of transfer of the HIV virus between and among construction workers and the local community;
- b) raise awareness amongst construction workers and the local community of the risk of infection with the HIV virus;
- c) promote early diagnosis; and
- d) assist affected individuals to access care and counselling.

- b) either place and maintain HIV/AIDS awareness posters of size of not less than A1 in areas which are highly trafficked by construction workers, or provide construction workers with a pamphlet, in languages largely understood by construction workers, which
- c) encourage voluntary HIV/STI testing;
- d) provide information concerning counselling, support and care of those that are infected services; and
- e) comply with the requirements of 5.2.

The provisions of 5.1 c) and d) do not apply to this contract.

5.2 HIV awareness programme

5.2.1 The contractor shall:

- a) engage a qualified service provider as described in the scope of works to conduct an HIV Awareness Programme which is structured to achieve the outcomes stated in 5.2.3 for contract workers as soon as a construction workers camp is established and populated or, where no such camp is established, within two weeks of the commencement of a significant portion of the works and at subsequent intervals, if any, provided for in the scope of works; and
- b) arrange for, provide a suitable venue, and instruct all construction workers to attend the HIV Awareness Programme and notify the Employer's Representative of the date, time and venue whenever a session with construction workers is conducted.

Note: The National Department of Public Works maintains a list of qualified service providers.

5.2.2 The contractor shall do nothing to dissuade construction workers from attending such an HIV Awareness Programme and shall take all reasonable steps to ensure that a minimum of 90% of construction workers engaged in the works attend such a programme, when it is conducted.

5.2.3 The outcomes of the HIV Awareness Programme shall as a minimum, result in contract workers exposed to such a programme being able to:

- a) communicate the existence of problems of HIV and be able to outline the consequences of transmission of HIV to or from the local community;
- b) recall and communicate the mode of HIV transmission and preventative measures including the proper use of the condom.

The HIV/ Aids awareness programme described in 5.2 is to be repeated at four month intervals throughout the duration of the contract. (Four times in total, including the initial one at the start of the contract)

5.3 Reporting

- 5.3.1** The contractor shall prepare and attach to his claims for payment a brief report which outlines how the actions taken by the contractor in the period for which payment is claimed satisfy the requirements and a schedule which lists the names, identity numbers, trade / occupation and name of employer of all construction workers exposed to the programme (see **HIV/STI Compliance Report**).
- 5.3.2** The employer's representative shall certify the report and schedule described in 5.3.1 whenever a claim for payment is issued to the employer.

Note: In the event that the contractor fails to satisfy the requirements of this specification, the employer (Head: Public Works) may apply any of the sanctions provided for in the contract. Sanctions may include the application of a financial penalty of .04% of the Contract Sum.

The *HIV /Aids* awareness programme described in 5.2 shall in addition *be conducted* for the benefit of the local community on two occasions in the community centre nearest to the building site. The contractor shall be *responsible* for inviting identifiable community-based *institutions and organisations, churches, and schools to participate in the programme.*

C3.3 - HIV/STI COMPLIANCE REPORT

Pro-forma reporting format in terms of the SPECIFICATION FOR HIV/AIDS AWARENESS

Project Code:
Payment Claim number: Period covered by payment claim:

<p>1. Distribution of condoms (briefly describe where and how condoms are distributed).</p> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
<p>2. Posters / pamphlets (briefly describe where posters were placed / how pamphlets were distributed).</p> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
<p>3. Voluntary testing (briefly describe the actions taken / information provided to promote testing).</p>
<p>4. Counselling, support and care (summarise information provided).</p>
<p>5. HIV awareness programme (briefly describe action).</p> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>

6. Schedule of construction workers exposed to the HIV awareness programme.

Name	<u>Identity number</u>	Trade / <u>occupation</u>	Name of <u>employer</u>

I hereby declare the above to be a true reflection of actions taken to ensure compliance with the specification.

For Contractor:

Employer's representative:

Name: _____

Name: _____

Signature: _____

Signature: _____

Date: _____

Date: _____



NYAVINI CLINIC: CONSTRUCTION OF SMALL CLINIC

PART C4. SITE INFORMATION

C4.1 SITE INFORMATION GCC FOR CONSTRUCTION WORKS (2 Edition of 2010)			
Project title:	NYAVINI CLINIC: CONSTRUCTION OF SMALL CLINIC		
Tender No.	ZNB 5549/2023-H	Project Code:	TBA
C4.1 Site Information			
C4.1	GENERAL		
	<p>(a) (a) The Standard for Uniformity in Construction Procurement published in terms of the Construction Industry Development Board (CIDB) Act, 2000 (Act no. 38 of 2000), the Standardized Construction Procurement Documents for Engineering and Construction Works as issued by the CIDB and any other relevant documentation pertaining thereto must be studied and all principles in this regard must be applied to all procurement documentation, practices and procedures.</p> <p>(b) (b) The Bidder is referred to the Geotechnical Report appended elsewhere in this Bid Document for detailed information regarding current conditions on site.</p> <p>(c) (c) The site is located in Nyavini in the Umzumbe Municipality. There are no existing buildings on the site and the site near a tribal court and school.</p>		
C4.2	GEOTECHNICAL INVESTIGATION REPORT		
	<p>(a) As attached.</p>		

Geotechnical Investigation Report Nyavini Clinic

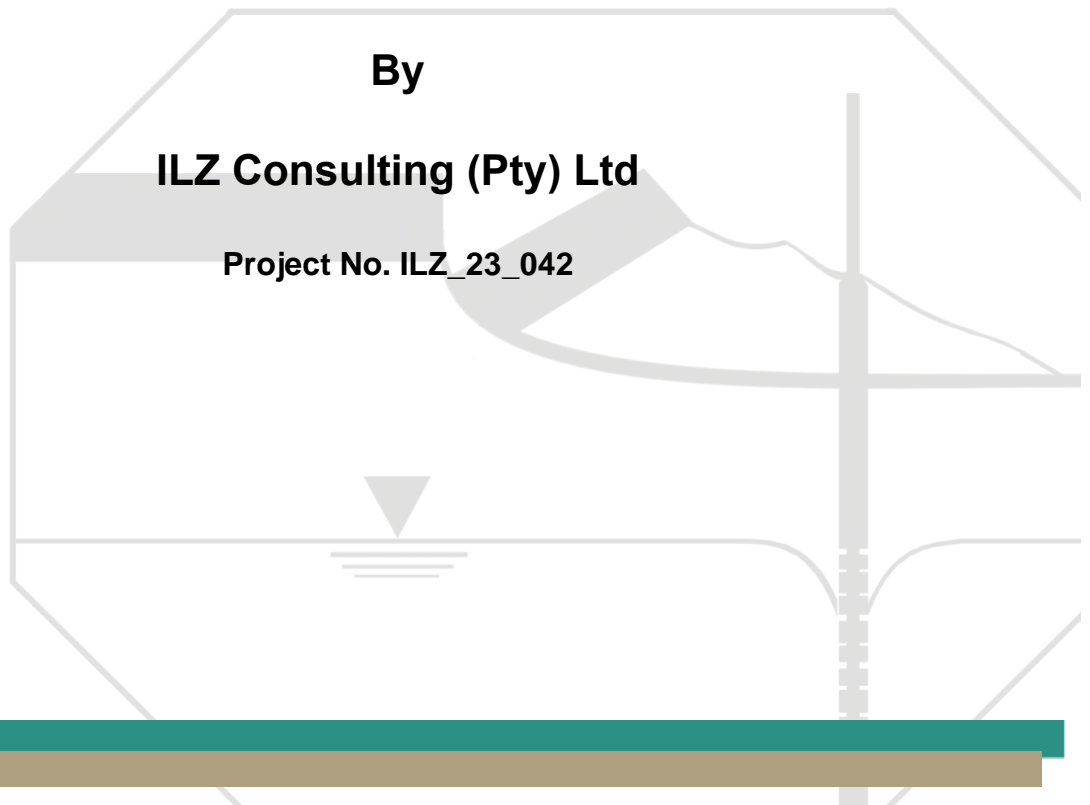
For



By

ILZ Consulting (Pty) Ltd

Project No. ILZ_23_042




Geotechnical Investigation for Nyavini Clinic

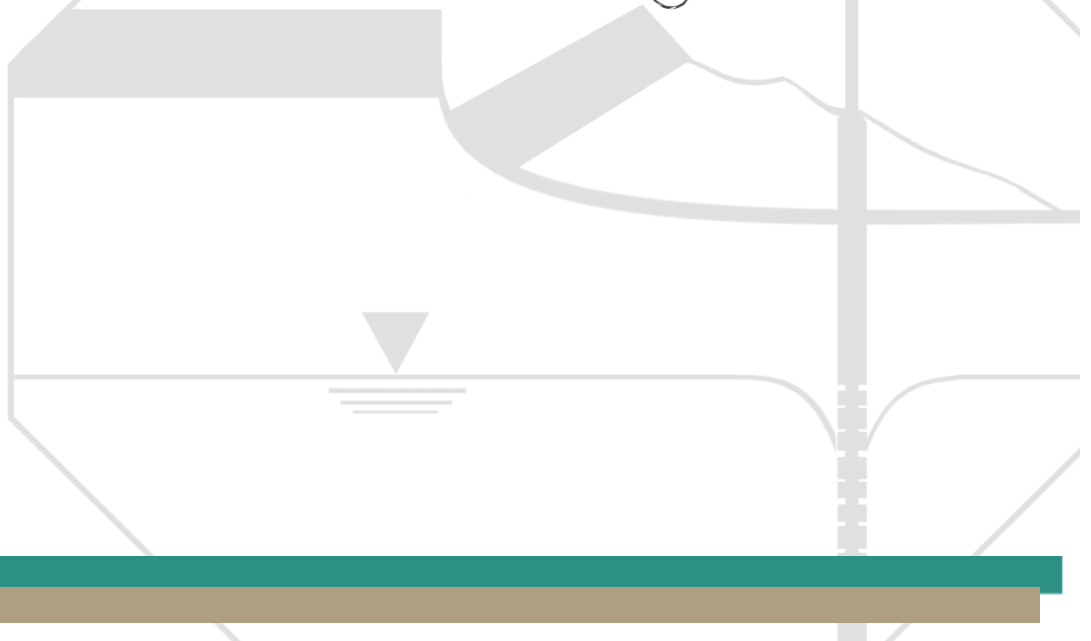
**Report
Version – Final**

July 2023

iLZ_23_043

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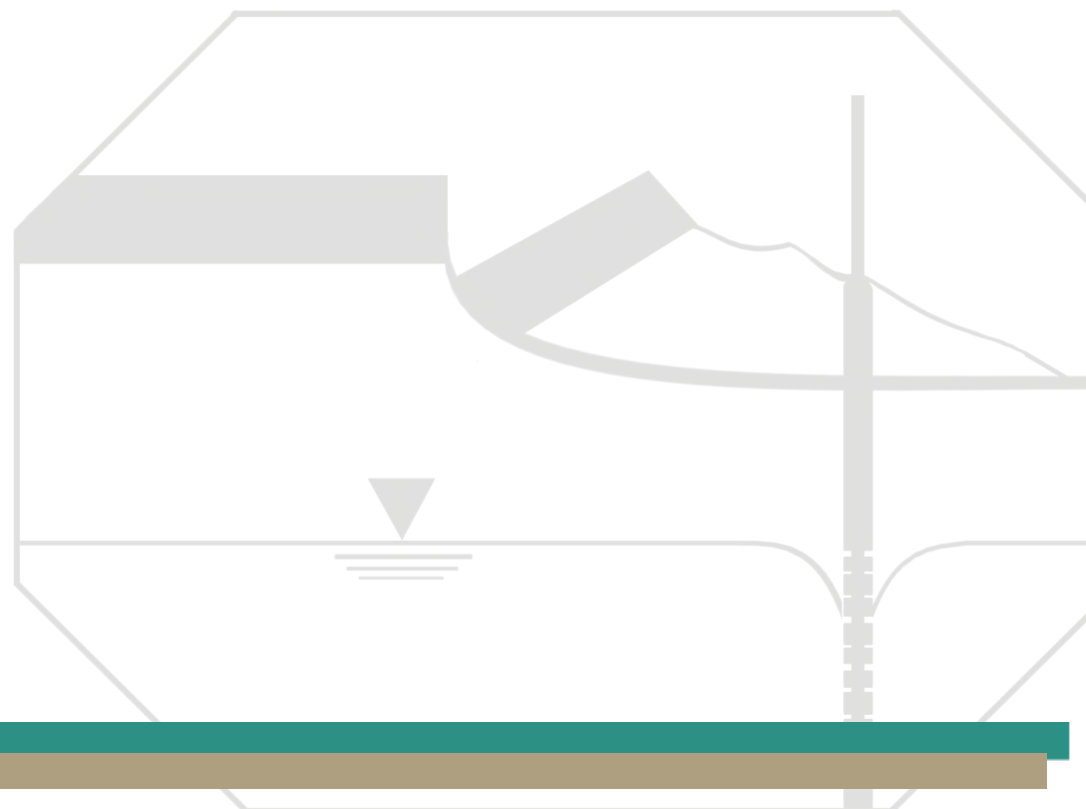
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1 INTRODUCTION

ILZ Consulting was appointed by Mr. Maphumulo of EMA on behalf of KwaZulu Natal Department of health to undertake shallow geotechnical investigation for the proposed construction of Nyavini Clinic.

The objectives of the investigation were to complete an engineering geological investigation of the site giving: -

- The soil/rock profiles;
- The engineering properties of the near surface soils;
- Groundwater occurrence;
- NHBRC site classification;
- An assessment of the near surface soils, for their use in earthworks and layer works;
- Estimation of bearing capacity and recommendations for foundations,
- Comments on any perceived geotechnical problems which may affect on the proposed development.

This report presents the results of the shallow geotechnical investigation undertaken for the proposed Nyavini Clinic. Recommendations are given for:

- NHBRC site classification;
- Excavation classification; and
- Founding solution;

It must be noted that the recommendations and conclusions made in this report are based on field investigation and testing information obtained at specific investigation points.

The assessment of the overall geotechnical conditions for the proposed development has been inferred by professional judgement made from the interpolation and extrapolation of the point information gained from trial pits, and penetrometer tests, as well as visual assessments of surface features.

Although considered unlikely, should significant variations from the inferred conditions become apparent during construction, the advice of a geotechnical professional must be sought.

2 INFORMATION AVAILABLE

Information made available to or sourced by iLZ at the time of investigation comprised of the following: -

- Google earth image of the site.
- 1: 250 000 Scale, Geological Map
- 1:50 000 Scale, Topographical Map

3 SITE DESCRIPTION

3.1 Locality

The site for the proposed development has an extent of about 0.7 hectares. It is in Nyavini Village, Ward 7 under Umzumbe Local Municipality. The land is under Chief Ngcobo and Councilor Mntambo.

The site is accessible via R612 from to. I road.

It is characterized by relatively dense trees on top of a mountainous region.

3.2 Topography

Generally, the site is relatively flat with gentle slopes towards the steep slopes to the north, east and south of the site. The site is at the top of the hill. **Figure 3-1** shows topographical maps of the site extracted from **3030 AD Jolivet Topographic Maps** at scale of **1:50 000**, shows contour lines which is indicative of the topography of the site and the mountainous regions around the site.

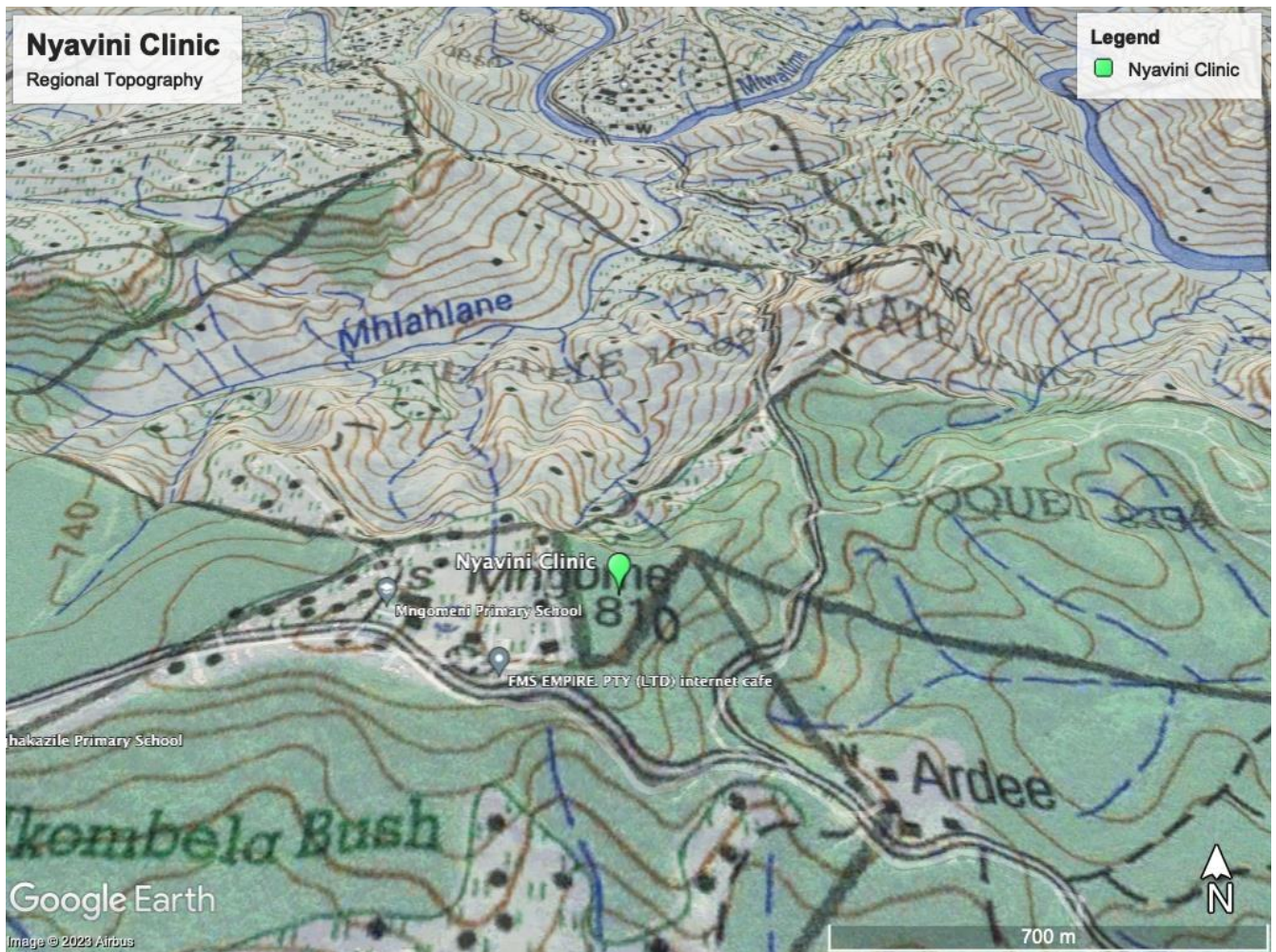


Figure 3-1: Topographical map of the site at 1:50 000

4 METHODOLOGY

Geotechnical site investigation was conducted on the 6th of June 2023 and comprised of the following: -

- Excavation and logging of trial pits
- Dynamic Probe Light (DPL) tests,
- Single percolation test, and
- Material sampling for laboratory analysis.

Trial pits were excavated by hand, using pick and shovel. The trial pits were spread such that they are representative of the ground conditions on site.

The excavated subsoils were profiled immediately by an Engineering Geologist according to SANS 633:2012 guidelines. Each inspection pit was set out in the field using a hand-held Garmin eTrex GPS, and their positions are indicated on the site plan that appears in **Figure 4-1** below. After profiling, trial pits were loosely backfilled.

The profile descriptions are discussed under Geology and presented in **Appendix A** of this report.



Figure 4-1: Site layout map with test position pinned on Google Earth image

During field work, soil samples were taken from selected trial pits and submitted to a SANAS accredited soil testing laboratory for testing.

Penetrometer tests were conducted adjacent to each trial pits. In areas where the building will be situated, a Dynamic Probe Light (DPL) test with 12kg hammer was used to determine the soil consistency as well as to estimate the safe allowable bearing pressure of the soil (EASBP).

4.1 Trial pit

A total of 5 trial pits designated TP1 through to TP5 were excavated at selected locations across the site. They were extended to depths of between 1.3 and 1.4m below existing ground level.

4.2 Dynamic Cone Penetrometer Tests

A total of 5 penetrometer tests were conducted, designated as DPL1 through to DPL5 were advanced to a depth of 1.8m below existing ground level.

4.3 Material Sampling

Representative disturbed samples were retrieved from the trial pits for laboratory testing. The following tests were conducted

- Hydrometer; and
- MOD-CBR

5 REGIONAL GEOLOGY

According to the 3030 Port Shepstone, 1:250 000 Geological Series, the site is generally underlain by sandstone of the Natal Group (O-Sn) as shown in **Figure 5-1** below.

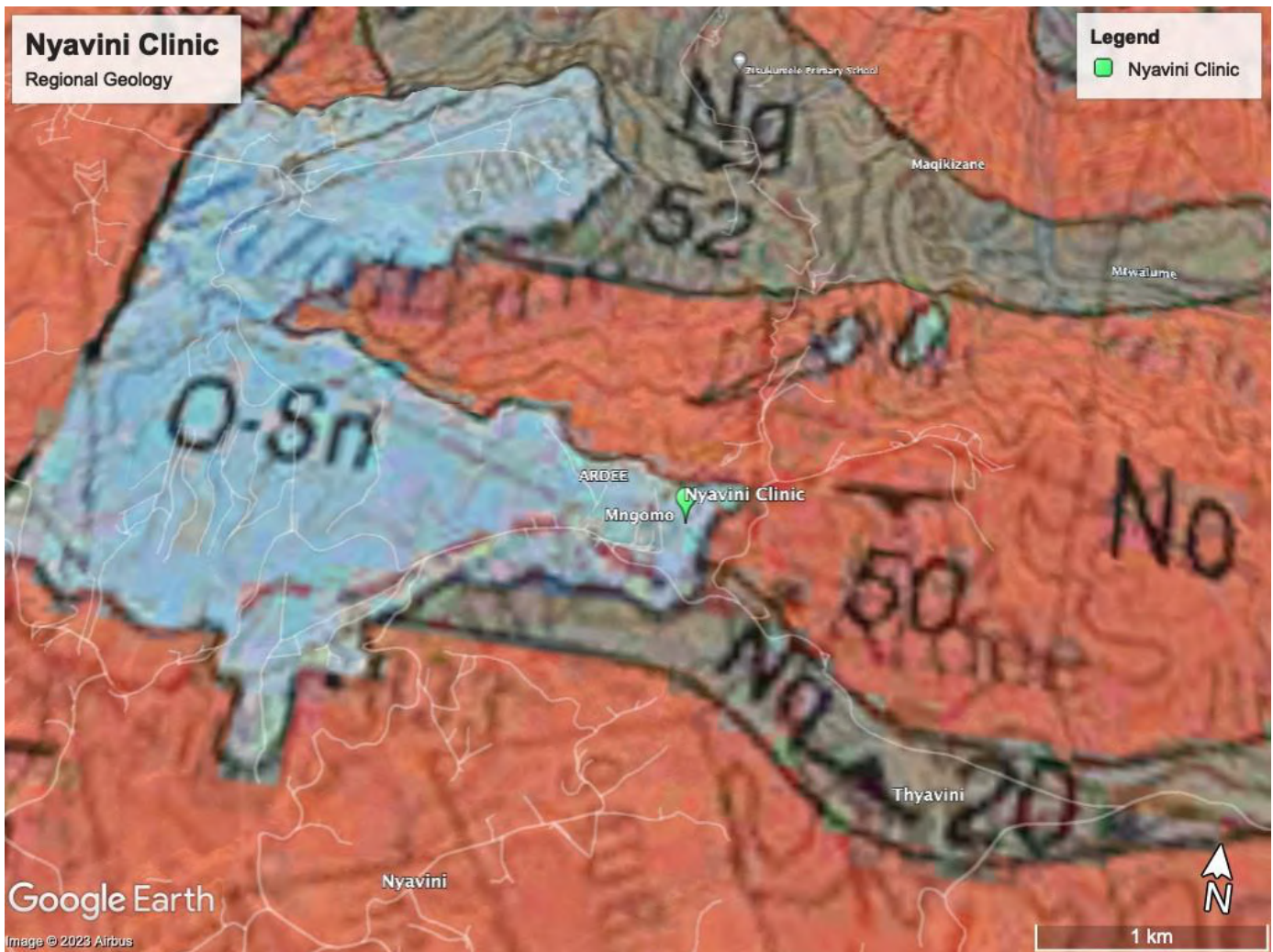


Figure 5-1: Regional geology extracted from 3030 Port Shepstone

Field investigation showed a continuous mantle of transported soils in a form of colluvium which overlies residual sandstone. The residual sandstone was in turn underlain by weathered sandstone. Each horizon is described in detail on the soil profiles attached as **Appendix A**.

6 GROUNDWATER OCCURRENCE

No groundwater seepage was encountered in any of the trial pits. However, during rainy season a marked increase in a perched groundwater is expected at soil/rock interface. Any cuttings that are taken below this horizon are likely to experience groundwater seepage problems during the wet summer season.

7 LABORATORY TEST RESULTS

To assess more accurately the engineering properties of the various materials encountered on site and their suitability for use for construction of road layers, the following materials classification tests were carried out on selected samples during the investigation:

- Atterberg Limit and Linear Shrinkage Determinations
- Mod AASHTO and California Bearing Ratio

The results of the laboratory tests are given in **Appendix C** and are summarized in **Table 7-1** below for ease of reference.

Table 7-1: Summary of Results of Particle Size Distribution Analysis, Atterberg Limit Determinations, MOD AASHTO and CBR Tests

Pit No	Depth (m)	Atterberg Limits %			GM	Modified AASHTO		CBR Values (%) Compaction MDD (%)				Classification and Activity
		LL	PI	LS		MDD (kgm ³)	OMC %	90	93	95	100	
TP 1RS	0.64-1.0	CBD	NP	0	1.4	1718	17.7	10	13	16	26	A-4(0), G8, LOW
TP 2C	0-0.7	20	11	2.5	0.5	1512	24.5	6	9	12	24	A-6(7), G10, LOW
TP 4RS	0.62-1.0	CBD	NP	0	2.0	2013	10.2	3	12	18	47	A-1-b(0), G9, LOW
PT1RS	0.6-1.0	18	4	2	0.54	-	-	-	-	-	-	LOW

LL- Liquid Limit

Classification in terms of AASHTO

OMC – Maximum Moisture Content

PI - Plasticity Index

MDD – Maximum Dry Density

LS - Linear Shrinkage

TRH14 (1985)

GM– Grading Modulus

8 MATERIAL CLASSIFICATION AND USAGE

The laboratory test results and the visual assessment conducted on site have been used as an indication of suitability for use of the materials encountered on site for the construction of pavement layers.

The classification and recommended usage is summarized in **Table 8-1** below.

Table 8-1: Material Classification and Usage

Material Type	Classification Details	Recommended Use and Subgrade Treatment
Colluvium	PI = 11 LS = 2.5 GM = 0.5 A-6(7), classify as G10 in terms of TRH14. Low heave potential	Fair to poor subgrade quality Suitable for use as general subgrade in layerworks. It has low heave potential.
Residual Sandstone	PI = NP to 4 LS = 0 to 2 GM = 0.54 to 1.4 A-1-b(0) to A-4(0), classify as G8 to G9 in terms of TRH14. Low heave potential	Fair to good subgrade quality Suitable for use as general subgrade and selected layers. It has low heave potential.

9 GEOTECHNICAL APPRAISAL

9.1 Proposed Development

The proposed development comprises of design and construction of Nyavini Clinic in Ward 7, uMzambe Local Municipality. The Clinic will have the main building comprising of reception, consultation rooms, waiting area, a kitchen, ablutions and parking bays.

9.2 Site Stability

At the time of desktop and field investigation, there was no evidence of any instability of the site. Therefore, the site is considered suitable for the proposed development provided the recommendation of this report are adhered to.

9.3 Bearing Capacity

Dynamic Cone Penetration can assist in determining the estimated allowable safe bearing pressures (EASBP) of the soils. **Appendix B** shows that EASBP on the residual sandstone (depths of between 0.9 and 1.2m) can be anticipated to range between a minimum of 42kPa to a maximum of 180kPa.

9.4 NHBRC Classification

Based on the geology and the soil profiles encountered during investigation; the site class for Nyavini Clinic is S1 shown in **Table 9-1** below.

Table 9-1: NHBRC Site Classification after Watermeyer and Tromp (1992)

TYPICAL FOUNDING MATERIAL	CHARACTER OF FOUNDING MATERIAL	EXPECTED RANGE OF TOTAL SOIL MOVEMENTS (mm)	ASSUMED DIFFERENTIAL MOVEMENT (% OF TOTAL)	SITE CLASS
Rock (excluding mud rocks which may exhibit swelling to some depth)	STABLE	NEGLIGIBLE	-	R
Fine grained soils with moderate to very high plasticity (clays, silty clays, clayey silts and sandy clays)	EXPANSIVE SOILS	< 7,5	50%	H
		7,5 – 15	50%	H1
		15 – 30	50%	H2
		> 30	50%	H3
Silty sands, sands, sandy and gravelly soils	COMPRESSIBLE AND POTENTIALLY COLLAPSABLE SOILS	<5	75%	C
		5-10	75%	C1
		>10	75%	C2
Fine grained soils (clayey silts and clayey sands of low plasticity), sands, sandy and gravelly soils	COMPRESSIBLE SOILS	<10	50%	S
		10-20	50%	S1
		>20	50%	S2
Contaminated soils, Controlled fill, Dolomitic areas, Landslip, Landfill, Marshy areas Mine waste fill, mining subsidence Reclaimed areas, Uncontrolled fill, Very soft silts/silty clays	VARIABLE	VARIABLE		P

9.5 Foundations

The foundation recommendations given are considered appropriate to the site class given to the project area. The recommended foundation designs for the dwellings are discussed in detail in **Table 9-2** below.

Table 9-2: Foundation design, building procedures and precautionary measures for single storey residential structures founded on soil horizons subject to heave, consolidation, and collapse settlement.

SITE CLASS	ESTIMATED TOTAL SETTLEMENT (mm)	CONSTRUCTION TYPE	FOUNDATION DESIGN AND BUILDING PROCEDURES
S1	10 to 20	Modified normal	<ul style="list-style-type: none"> Lightly reinforced strip footings Articulation joints at all internal and external doors and openings Light reinforcement in masonry Site drainage and service and plumbing precautions
		Soil raft	<ul style="list-style-type: none"> Remove all or necessary parts of expansive horizon to 1,0 m beyond the perimeter of the building and replace with inert backfill compacted to 93 % MOD AASHTO density at -1 % to +2 % of optimum moisture content Normal construction with lightly reinforced strip footings and light reinforcement in masonry if residual movements are < 7,5 mm, or construction type is appropriate to residual movements Site drainage and plumbing and service precautions

NOTE

- Differential settlement equals 75% of total settlement.

-
2. The relaxation of some of these requirements, e.g. the reduction or omission of reinforcement or articulation joints may result in a Category 2 level of expected damage.

Although various foundation options are given above for S1 classification, based on the prevailing site conditions, modified normal foundations are considered suitable.

It is recommended that the foundations for all dwelling structures be designed by a competent structural engineer. In addition, it is further recommended that the precautions are taken in the construction of the block/brickwork, drainage and plumbing as outlined in **Table 9-2** above.

No foundations should be founded on fill unless the fill is engineered for this purpose.

If a building is located over the fill part of the platform, then the footings will need to be taken down through the fill and into the in-situ material where the above bearing pressure recommendation applies. To optimise shallow foundations, it is recommended that the buildings be positioned in areas of cut of building platforms as far as possible.

In addition to the above, the following good building practice is recommended to minimise heave and settlement beneath foundations: -

All buildings should have a concrete surround, minimum 1.2 metres, with falls away from the building to ensure drainage of stormwater away from the structure. This will prevent the ingress of water into the foundation soils.

- All roof water is to be collected via down pipes and discharged away and downslope of the building.
- No flower beds or vegetation to be planted within 3m of any structure.

9.6 Earthworks

No major earthworks are anticipated; therefore, it is recommended that all earthworks (if any) be carried out in accordance with SABS 1200 (latest version) to promote stable development of site.

9.7 Drainage

A most important factor in the promotion of a stable site is the control and removal of both surface and groundwater from the site. It is important that the design of the stormwater management system allow for the drainage of accumulated surface water. Such water should be directed towards the natural surface drainage lines. Disposal of stormwater should conform to the Local Authority's requirements.

Surface drainage of building platforms should be designed to direct water away from fill edges to prevent overtopping of the fill crest and erosion of the fill embankment slopes. It is important that grassing of fill embankments can be carried out as soon as possible after construction.

Although it is not anticipated that there will be a need for subsoil drains, this will have to be assessed on site during development. If groundwater seepage is encountered during construction, these zones will need to be controlled with subsoil drains, particularly where water is likely to gain ingress into the structural layers.

9.8 Excavatibility

Excavation conditions over much of the site should categorize as 'soft to intermediate mechanical excavation' to a depth of 1.7m according to SANS 1200D.

Table 9-3: SANS 1200D excavation class descriptions- restricted excavation

Excavation Class	Description
Soft	Excavation in material that can be efficiently removed by a back-acting excavator of flywheel power approximately 0.10 kW per millimetre of tined-bucket width, without the use of pneumatic tools such as paving breakers
Intermediate	Excavation in material that requires a back-acting excavator of flywheel power exceeding 0.10 kW per millimetre of tined-bucket width or the use of pneumatic tools before removal by equipment equivalent to that specified for soft excavation.
Hard	Hard rock excavation shall be excavation in material (excluding boulder excavation) that cannot be efficiently removed without blasting or wedging and splitting.
Boulder (excavation class A)	Excavation in material containing more than 40% by volume of boulders of size in the range of 0.03-20m ³ , in a matrix of soft or smaller boulders.

The earthworks may be carried out using light earthmoving plant such as a TLB. An allowance of about 30% needs to be made for boulder excavation.

9.9 Subgrade Treatment for paved surfaces

No layer works were provided for the paved surfaces. However, as a general indication, subgrade treatment should comprise a simple rip and re-compact procedure. The surface should therefore be ripped to at least 300mm depth, wet and re-compact to minimum 93% MDD where a CBR of 10 may be adopted for design.

The Civil Engineer may provide detailed layerworks for paved surfaces around the site.

10 ON-SITE WATER DISPOSAL

The results of the percolation test are summarized in **Table 8-1** below. The depth of the test was 0.7m to 1.0m below existing ground and the results shows permeability of the hillwash.

Table 10-1: Percolation test results

Time (minutes)	Drop in water level (mm)
0	300
5	250
10	295
15	293
20	288
25	283
30	280
Depth of percolation test (metres below existing ground level)	0.7-1.0
Percolation rate (average time in minutes for a 25mm drop in water level)	4 minutes
Results of Test	Pass

The site is suitable for waste water disposal via percolation with 104 l/m²/day as the rate of effluent application.

11 CONCLUSION

This report contains the results of a geotechnical investigation carried out for the proposed development of Nyavini Clinic in Ward 7 under Umzumbe Local Municipality.

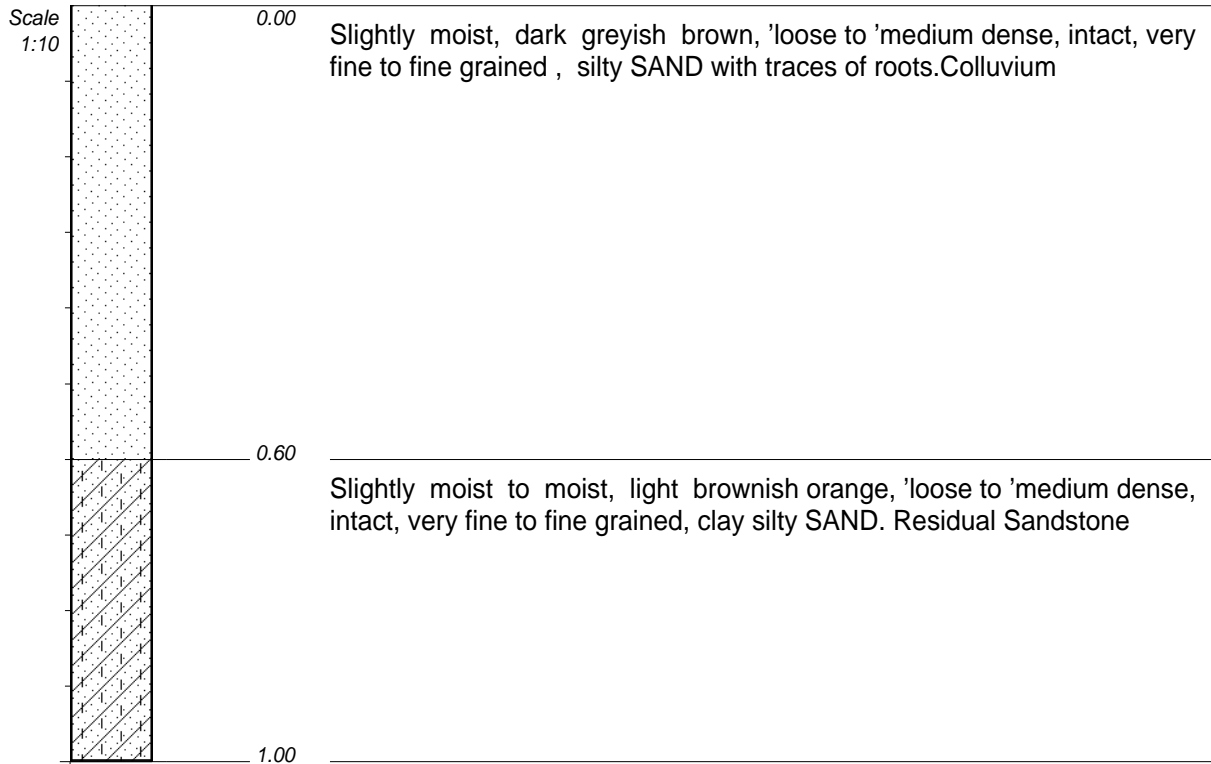
The site is considered suitable for the proposed development from a geotechnical perspective provided the recommendations given in this report are adhered to.

Finally, the ground conditions described in this report refer specifically to those encountered in the inspection pits and DPL test conducted on site. It is therefore quite possible that conditions at variance with those discussed above can be encountered elsewhere. It is advised that a competent person be called to advise on the way forward should conditions at variance be encountered.

12 REFERENCES

- SANS 633: Soil profiling and rotary percussion borehole logging on dolomite land in Southern Africa for engineering purposes, 2012.
- 1: 250 000 Scale Geological Map. Sheet 3030 Port Shepstone. Published by South African Council for Geoscience.
- 1:50 000 Scale Topography Map. Sheet 3030 AD Jolivet. Published by Surveys
- Code of Practice _ the Safety of Persons Working in Small Diameter Shafts and Test Pits for Civil Engineering Purposes – Geotechnical Division of SAICE –2003.
- NHBRC 10400H (2012). The Application of the National Building Regulations – Part H: Foundations

APPENDIX A: GEOLOGICAL PROFILES



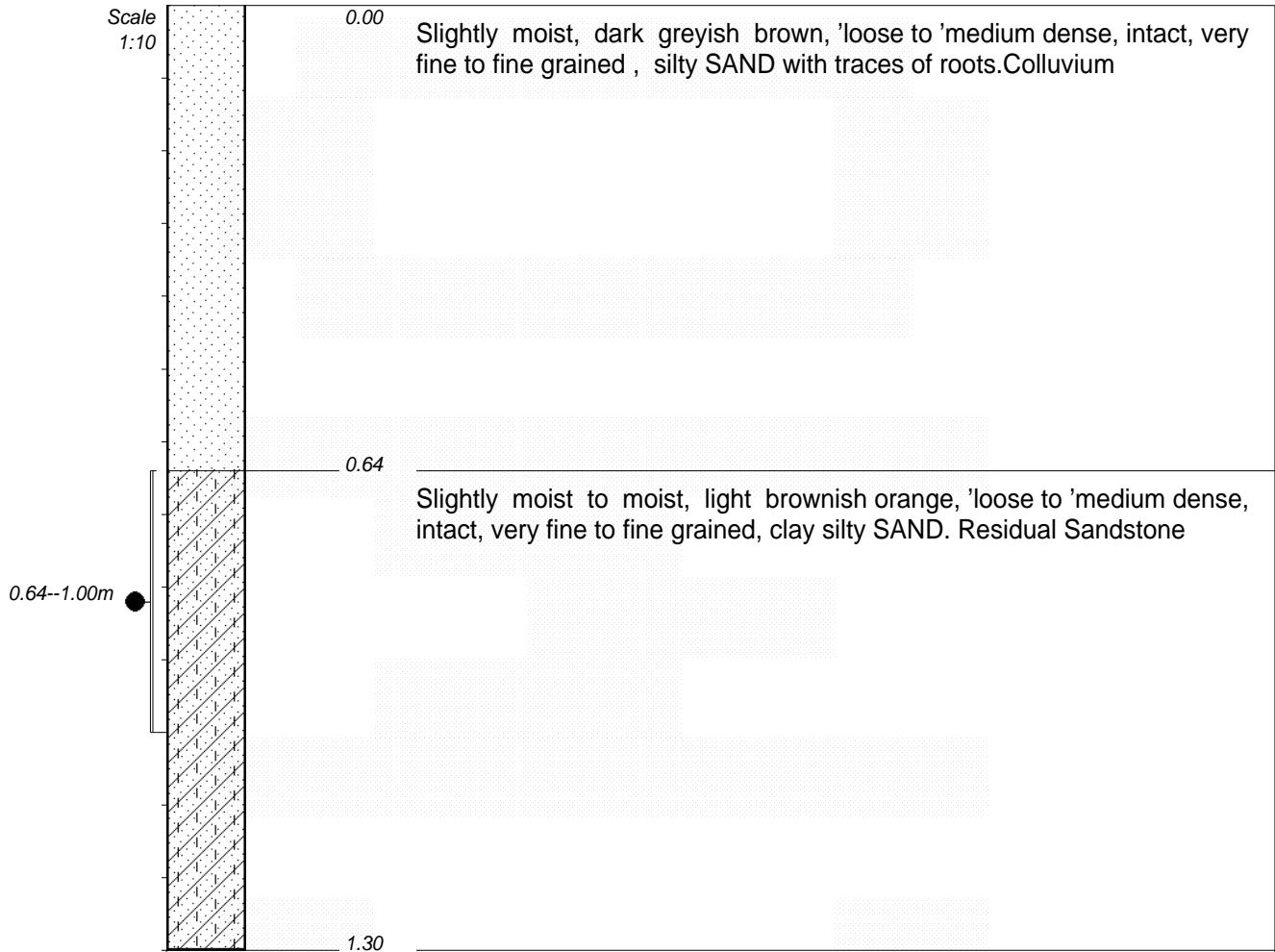
NOTES

- 1) Final at 1.00m on residual sandstone.
- 2) No groundwater seepage.
- 3) No Sidewall collapse.
- 4) taken between 0.60--1.00m (FIND).

CONTRACTOR : -
MACHINE : Pick and Shovel
DRILLED BY :
PROFILED BY : S. Mashabane
TYPE SET BY : S. Mashabane
SETUP FILE : STANDARD.SET

INCLINATION :
DIAM :
DATE :
DATE : 6 June 2023
DATE : 11/07/2023 09:49
TEXT : D\NyaviniClinic.txt

ELEVATION :
X-COORD : 30.37055°E
Y-COORD : -30.38511°S



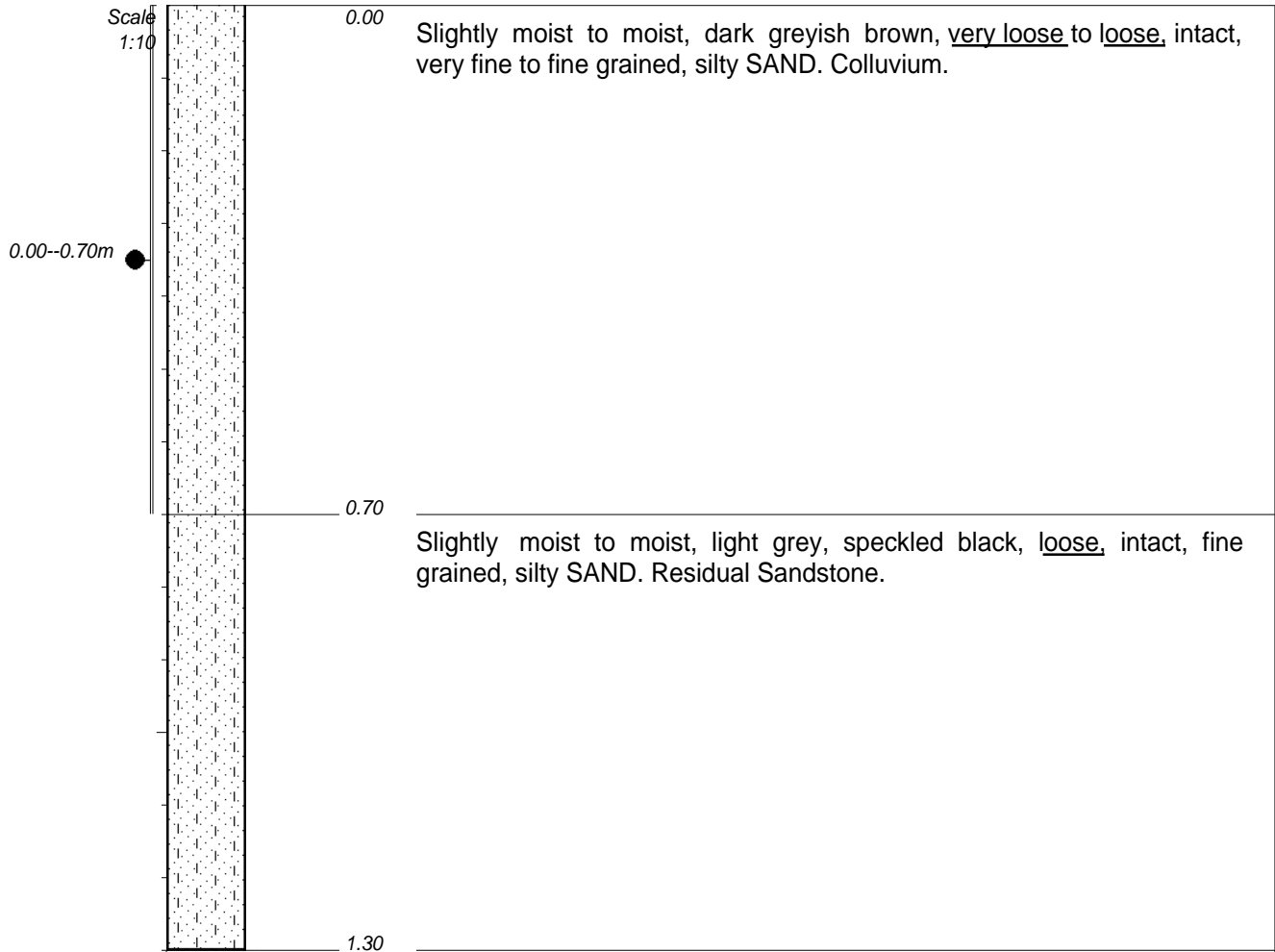
NOTES

- 1) Final at 1.30m on Residual Sandstone.
- 2) No groundwater seepage.
- 3) No sidewall collapse.
- 4) Sample taken between 0.64--1.00m (MOD-CBR-i).

CONTRACTOR : -
MACHINE : Pick and Shovel
DRILLED BY :
PROFILED BY : S. Mashabane
TYPE SET BY : S. Mashabane
SETUP FILE : STANDARD.SET

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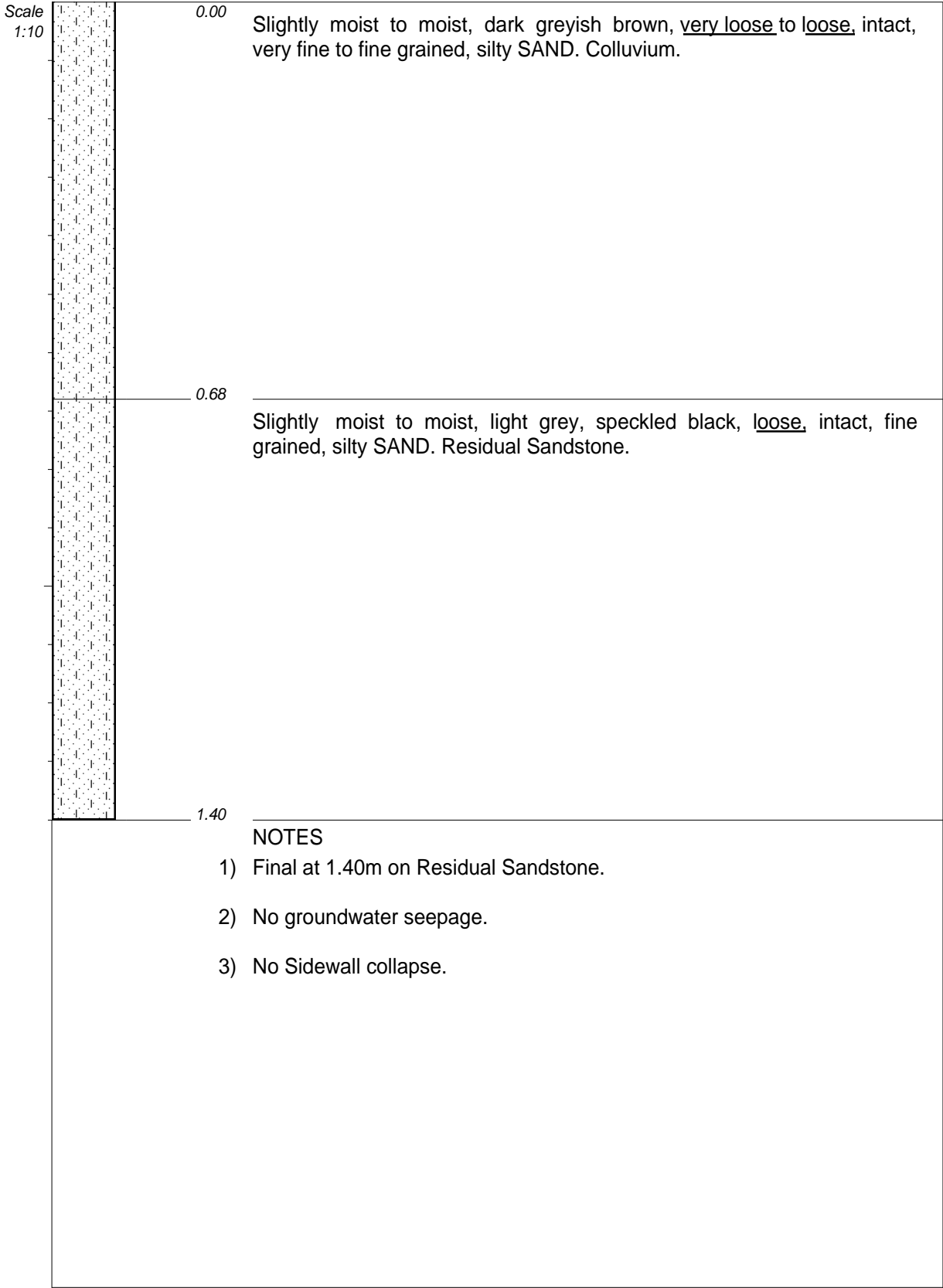
NOTES

- 1) Final at 1.30m on Residual Sandstone.
- 2) No groundwater seepage.
- 3) No Sidewall collapse.
- 4) Sample taken between 0.00--0.70m (MOD-CBR-i).

CONTRACTOR : -
MACHINE : Pick and Shovel
DRILLED BY :
PROFILED BY : S. Mashabane
TYPE SET BY : S. Mashabane
SETUP FILE : STANDARD.SET

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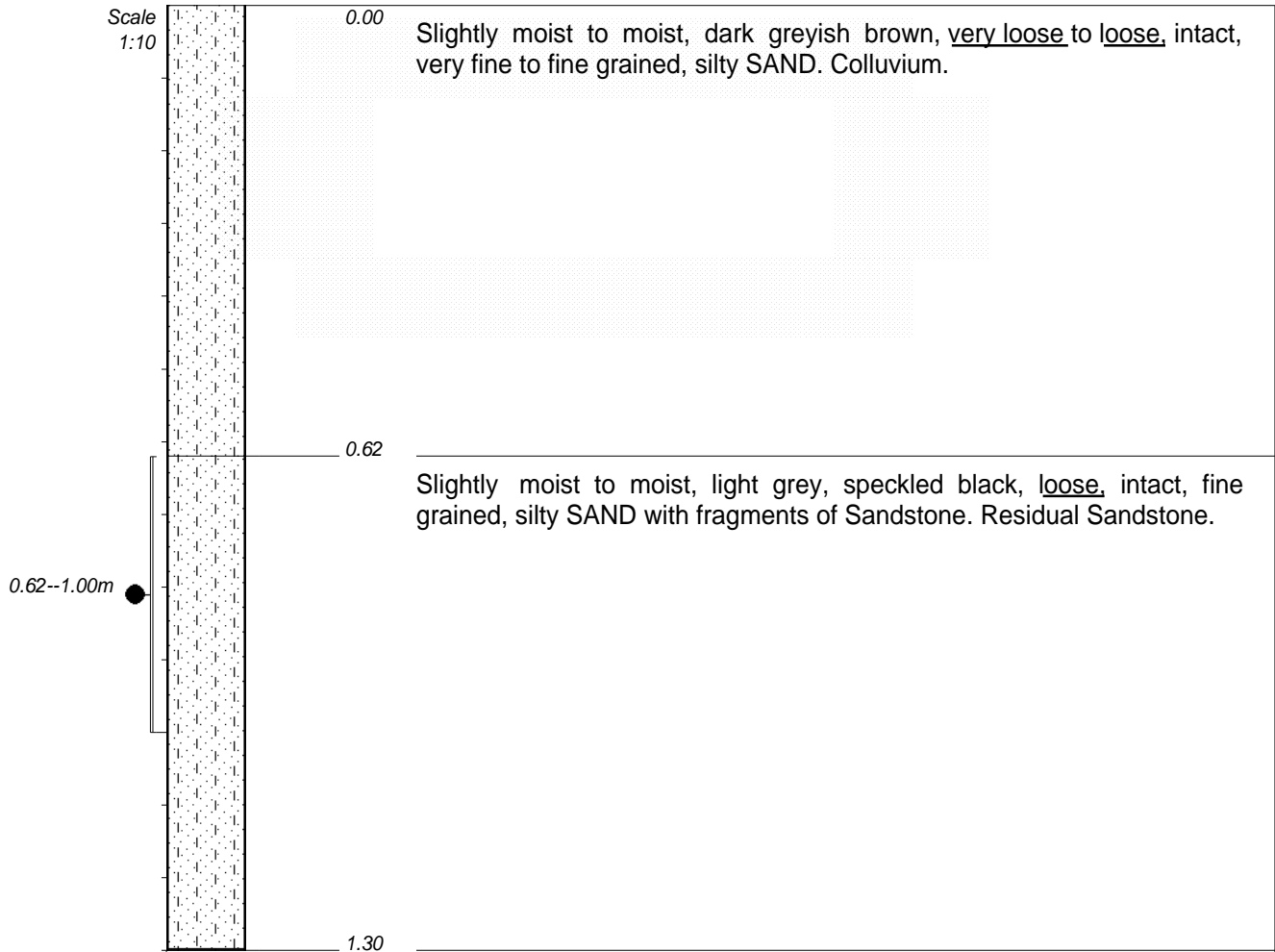
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CONTRACTOR : -
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 DRILLED BY :
 PROFILED BY : S. Mashabane
 TYPE SET BY : S. Mashabane
 SETUP FILE : STANDARD.SET

INCLINATION :
 DIAM :
 DATE :
 DATE : 6 June 2023
 DATE : 11/07/2023 09:49
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ELEVATION :
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 Y-COORD : -30.38612°S



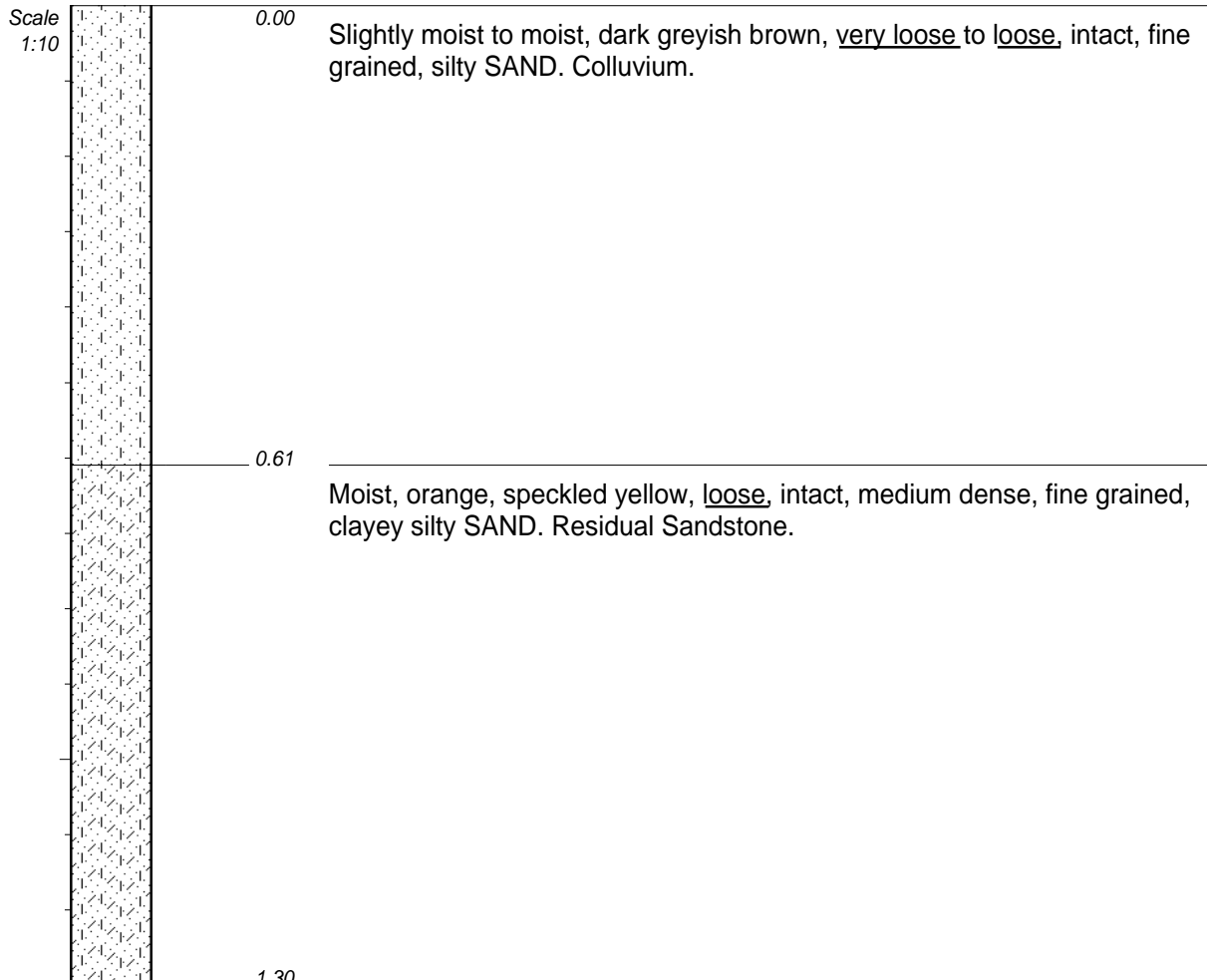
NOTES

- 1) Final at 1.30m on Residual Sandstone.
- 2) No groundwater seepage.
- 3) No Sidewall collapse.
- 4) Sample taken between 0.62--1.00m.

CONTRACTOR : -
MACHINE : Pick and Shovel
DRILLED BY :
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TYPE SET BY : S. Mashabane
SETUP FILE : STANDARD.SET

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


NOTES

- 1) Final at 1.30m Sandstone.
- 2) No groundwater seepage.
- 3) No Sidewall collapse.

CONTRACTOR : -
MACHINE : Pick and Shovel
DRILLED BY :
PROFILED BY : S. Mashabane
TYPE SET BY : S. Mashabane
SETUP FILE : STANDARD.SET

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DATE : 6 June 2023
DATE : 11/07/2023 09:49
TEXT : D\NyaviniClinic.txt

ELEVATION :
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Y-COORD : -30.385478 °S

		SAND	{SA04}
		SILTY	{SA07}
		CLAY	{SA08}
		CLAYEY	{SA09}
Name ●		DISTURBED SAMPLE	{SA38}



CONTRACTOR :
 MACHINE :
 DRILLED BY :
 PROFILED BY :
 TYPE SET BY : S. Mashabane
 SETUP FILE : STANDARD.SET

INCLINATION :
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 Y-COORD :

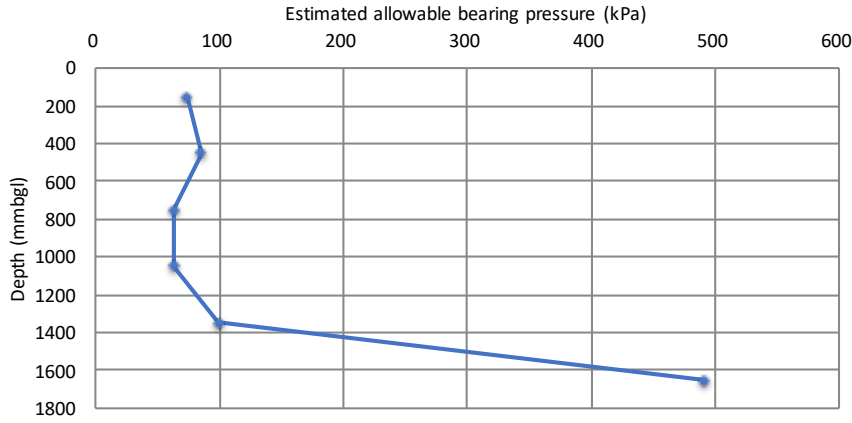
APPENDIX B: IN SITU PENETROMETER TEST RESULTS

ANALYSES OF DPL TEST RESULTS

Project Name Nyavini Clinic
Date 06/Jun/2023
DPL No. 1



Note on refusal
 Depth of hole in which DCP was taken : 0 mm below NGL
 Applied Factor : 1 times Terzaghi's value



Penetration Guide		
SPT mm/blow	DCP DN	Consistency
75-100	132-210	Very Dense
30-75	78-132	Dense
10-30	25-78	Med Dense
4-10	10 25	Loose
<4	<10	Very Loose

NOTE :
 Stated consistencies do not apply to cohesive materials. Describe using "stiff or firm or soft".

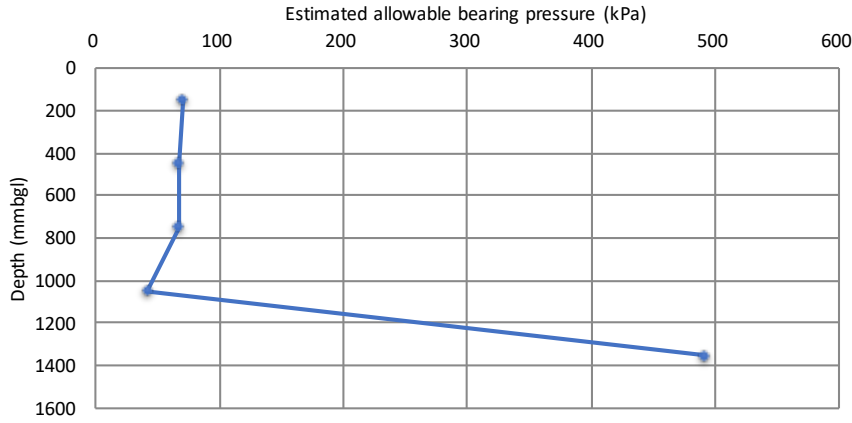
Reading No.	Layer From	Layer To	Average Layer Depth	DCP DN lows/300m	Level Below NGL mm	DCP penetration mm/blow	Equiv. SPT N Value	Approx In-situ CBR	Approx EASBP kPa
1	0	300	150	15	150	14	6	15	74
2	300	600	450	18	450	14	7	15	85
3	600	900	750	12	750	20	5	9	63
4	900	1200	1050	12	1050	24	5	7	63
5	1200	1500	1350	22	1350	22	8	8	99
6	1500	1800	1650	100	1650	24	38	7	491

ANALYSES OF DPL TEST RESULTS

Project Name Nyavini Clinic
Date 06/Jun/2023
DPL No. 2



Note on refusal
 Depth of hole in which DCP was taken : 0 mm below NGL
 Applied Factor : 1 times Terzaghi's value



Penetration Guide		
SPT mm/blow	DCP DN	Consistency
75-100	132-210	Very Dense
30-75	78-132	Dense
10-30	25-78	Med Dense
4-10	10 25	Loose
<4	<10	Very Loose

NOTE :
 Stated consistencies do not apply to cohesive materials. Describe using "stiff or firm or soft".

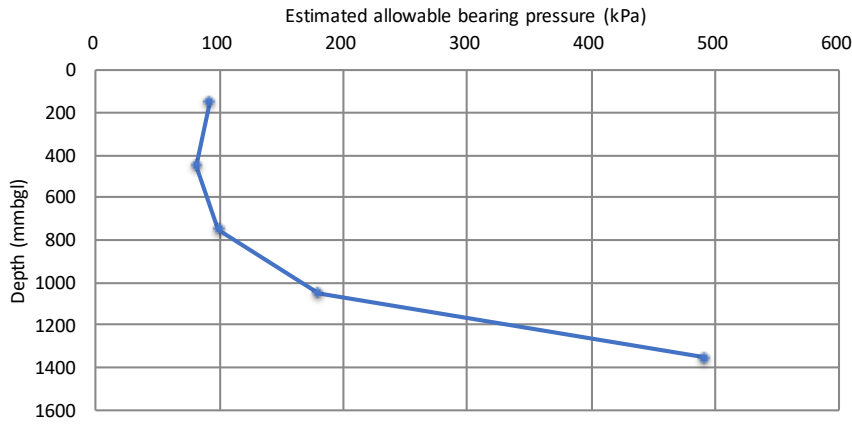
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1	0	300	150	14	150	14	5	15	71
2	300	600	450	13	450	14	5	15	67
3	600	900	750	13	750	20	5	9	67
4	900	1200	1050	6	1050	24	2	7	42
5	1200	1500	1350	100	1350	22	38	8	491

ANALYSES OF DPL TEST RESULTS

Project Name Nyavini Clinic
Date 06/Jun/2023
DPL No. 3



Note on refusal
 Depth of hole in which DCP was taken : 0 mm below NGL
 Applied Factor : 1 times Terzaghi's value



Penetration Guide		
SPT mm/blow	DCP DN	Consistency
75-100	132-210	Very Dense
30-75	78-132	Dense
10-30	25-78	Med Dense
4-10	10 25	Loose
<4	<10	Very Loose

NOTE :
 Stated consistencies do not apply to cohesive materials. Describe using "stiff or firm or soft".

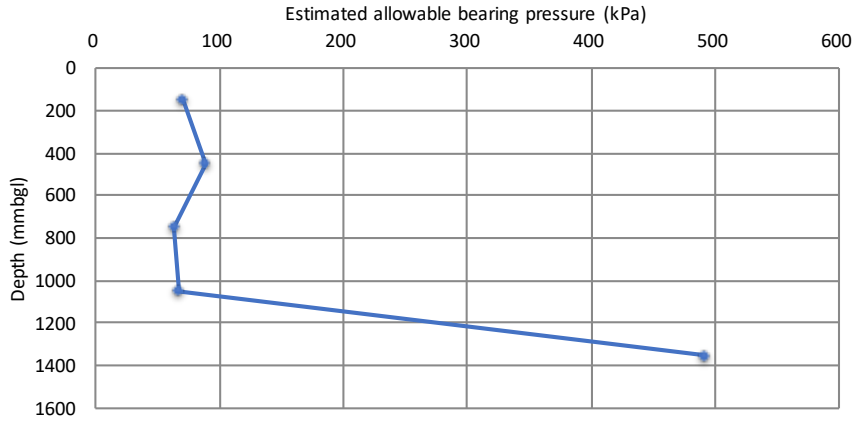
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1	0	300	150	20	150	14	8	15	92
2	300	600	450	17	450	14	6	15	81
3	600	900	750	22	750	20	8	9	99
4	900	1200	1050	34	1050	24	13	7	180
5	1200	1500	1350	100	1350	22	38	8	491

ANALYSES OF DPL TEST RESULTS

Project Name Nyavini Clinic
Date 06/Jun/2023
DPL No. 4



Note on refusal
 Depth of hole in which DCP was taken : 0 mm below NGL
 Applied Factor : 1 times Terzaghi's value



Penetration Guide		
SPT mm/blow	DCP DN	Consistency
75-100	132-210	Very Dense
30-75	78-132	Dense
10-30	25-78	Med Dense
4-10	10 25	Loose
<4	<10	Very Loose

NOTE :
 Stated consistencies do not apply to cohesive materials. Describe using "stiff or firm or soft".

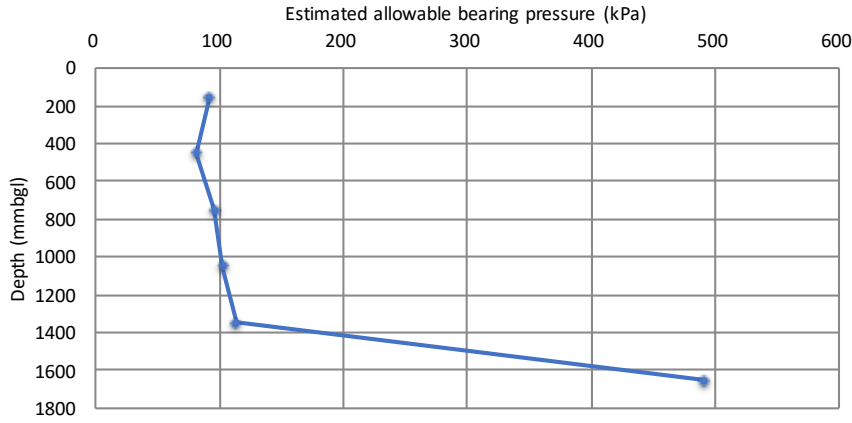
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1	0	300	150	14	150	14	5	15	71
2	300	600	450	19	450	14	7	15	89
3	600	900	750	12	750	20	5	9	63
4	900	1200	1050	13	1050	24	5	7	67
5	1200	1500	1350	100	1350	22	38	8	491

ANALYSES OF DPL TEST RESULTS

Project Name Nyavini Clinic
Date 06/Jun/2023
DPL No. 5



Note on refusal
 Depth of hole in which DCP was taken : 0 mm below NGL
 Applied Factor : 1 times Terzaghi's value



Penetration Guide		
SPT mm/blow	DCP DN	Consistency
75-100	132-210	Very Dense
30-75	78-132	Dense
10-30	25-78	Med Dense
4-10	10 25	Loose
<4	<10	Very Loose

NOTE :
 Stated consistencies do not apply to cohesive materials. Describe using "stiff or firm or soft".

Reading No.	Layer From	Layer To	Average Layer Depth	DCP DN lows/300m	Level Below NGL mm	DCP penetration mm/blow	Equiv. SPT N Value	Approx In-situ CBR	Approx EASBP kPa
1	0	300	150	20	150	14	8	15	92
2	300	600	450	17	450	14	6	15	81
3	600	900	750	21	750	20	8	9	96
4	900	1200	1050	23	1050	24	9	7	103
5	1200	1500	1350	26	1350	22	10	8	114
6	1500	1800	1650	100	1650	24	38	7	491

APPENDIX C: LABORATORY TEST RESULTS



Roadlab KZN (Pty) Ltd

Civil Materials Testing
 Registration No:
 2012/080975/07
 VAT No: 4870266444

+27 32 944 5977
 jay@roadlab.co.za
 Unit 6 24 Edmund Morewood
 Street, Trurolands, Tongaat,
 Durban, 4399

› material Passion.
 › trusted Accuracy.
 › timeous Excellence



T0806

Client:	ILZ Consulting (Pty) Ltd	Date Sampled:	07/06/23
Address:	Suit 7 Epcot Centre 615 Umgeni Road	Date Received:	07/06/23
		Date Tested:	07/06/23-23/06/23
Attention:	Mr S. Mdalose	Date Reported:	23/06/23
Project:	Nyavini Clinic	Clients Reference No:	-
		Order No:	ILZ_EMA_3

INTERIM TEST REPORT REFERENCE NUMBER: RD 6737/23

Dear Sir,

Enclosed herewith please find test reports(s) pertaining to the above-mentioned project. All tests were in accordance with the prescribed test method(s). Information herein consists of the following:

3 X Material Classification / 3 X MDD / 4 X Foundation Indicator

Test Carried Out / Test Method					
SANS 3001 – GR 1	X	SANS 3001 – GR 50		SANS 3001 – AG 10	
SANS 3001 – GR 10	X	SANS 3001 – GR 51		SANS 3001 – AG 22	
SANS 3001 – GR 11	X	SANS 3001 – GR 53		SANS 3001 – AS 1	
SANS 3001 – GR 12		SANS 3001 – GR 54		SANS 3001 – AS 2	
SANS 3001 – GR 20	X	SANS 3001 – NG 5		SANS 3001 – AS 10	
SANS 3001 – GR 30	X	SANS 3001 – AG 1		SANS 3001 – AS 11	
SANS 3001 – GR 40	X	SANS 3001 – AG 2		SANS 3001 – AS 20	
SANS 3001 – GR 31		SANS 3001 – AG 4		SANS 3001 – GR 3 & GR 5	
X - Symbol denotes tests that were carried out & are accredited.				Total number of pages in this Report:	9

Sample Information	Field Technician / Tested By
Sampler(s) Name:	Client
Sampling Environmental Condition:	N/S
NB: Sample Location and Test Positions Identified by Client	

TMH 5 (1981) - Sampling Method				
MA2		MB1		MC1
				MC2
				MB7

TMH 5 (1981) - Sample Preparation		
MD1	X	MD2
		X

We would like to take this opportunity to thank you for your continuous support. Should you have any further queries please do not hesitate to contact me.

Yours faithfully

Technical Signatory: Mr J. Sarjooparsad

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Job Request No.: RD 6737/23

Date Reported : 23/06/23

ILZ Consulting (Pty) LTD

Suit 7

Epcot Centre

615 Umgeni Road

Attention : Mr S. Mdlalose

Project : Nyavini Clinic

Material Classification

SAMPLE INFORMATION AND PROPERTIES

SAMPLE NO	D15838	D15839	D15840
HOLE NO./ Km / CHAINAGE	N/S	N/S	N/S
ROAD NO./ NAME Line 1 ROAD NO./ NAME Line 2	Nyavini Clinic TP1	Nyavini Clinic TP2	Nyavini Clinic TP4
LAYER TESTED/SAMPLED	N/S	N/S	N/S
SAMPLE DEPTH	0,64m - 1,00m	0,0m - 0,70m	0,62m - 1,00m
DATE SAMPLED	07/06/23	07/06/23	07/06/23
COLOUR OF SAMPLE	Dk Br	Black	Dk Black
TYPE OF SAMPLE	Silty Clay	Gravelly Silty Sand	Silty Sand + Gravel

SIEVE ANALYSIS - % PASSING SIEVES *(SANS 3001-GR1:2010, SANS 3001-GR2:2010)

SIEVE ANALYSIS (GR 1) % PASSING	D15838	D15839	D15840
100.0 mm			
75.0 mm			
63.0 mm			
50.0 mm			
37.5 mm			
28.0 mm			
20.0 mm	100		100
14.0 mm	99		95
5.0 mm	90	100	67
2.0 mm	76	99	52
0.425 mm	50	87	30
0.075 mm	36	68	20
GM %	1,4	0,50	2,0

ATTERBERG LIMITS ANALYSIS - *(SANS 3001-GR10:2010)

ATTERBERG LIMITS (%) SANS GR10,GR11	LIQUID LIMIT	D15838	D15839	D15840
	LIQUID LIMIT	CBD	20	CBD
	PLASTICITY INDEX	NP	11	NP
	LINEAR SHRINKAGE	0	2,5	0
CLASSIFICATION	H.R.B.	A-4(0)	A-6(7)	A-1-b(0)
	COLTO	G8	-	G8
	TRH 14	G8	G10	G9

CALIFORNIA BEARING RATIO - *(SANS 3001-GR30:2010, SANS 3001-GR40:2010)

SANS GR30 MAX. DRY DENSITY	OMC %	D15838	D15839	D15840
	OMC %	17,7	24,5	10,2
	MDD (kg/m³)	1718	1512	2013
	COMP MC %	17,7	24,5	10,2
SWELL % @	MOD NRB PRO	0,28 0,33 0,36	0,66 0,71 0,75	0,06 0,13 0,20
	100 %	26	24	47
C.B.R. SANS GR40	98 %	21	18	32
	97 %	19	16	26
	95 %	16	12	18
	93 %	13	9	12
	90 %	10	6	7

STABILISER IN LAB	N/A	N/A	N/A
TEST TYPE	MDD/IND/CBR	MDD/IND/CBR	MDD/IND/CBR
SAMPLING METHOD	TMH5	TMH5	TMH5
WEATHER WHEN SAMPLED	N/S	N/S	N/S

Deviation from Test Method :

Remarks and Notes : (-) Symbol Denotes Colto Worse Than G9 and TRH14

Opinions and interpretations are not included in our schedule of accreditation.(T0806)
 The sample were subjected to analysis according to (SANS)(TMH5)(DOT)(ASTM)
 The test results reported relate to the samples tested.
 Further use of the above information is not the responsibility or liability of Roadlab.
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 Report compiled by : Shannon Naidoo



Jay Sarjooparsad
 Technical Signatory

Job Request No.: RD 6737/23
ILZ Consulting (Pty) LTD
Suit 7
Epcot Centre
615 Umgeni Road
Attention : Mr S. Mdlalose

Date Reported : 23/06/23

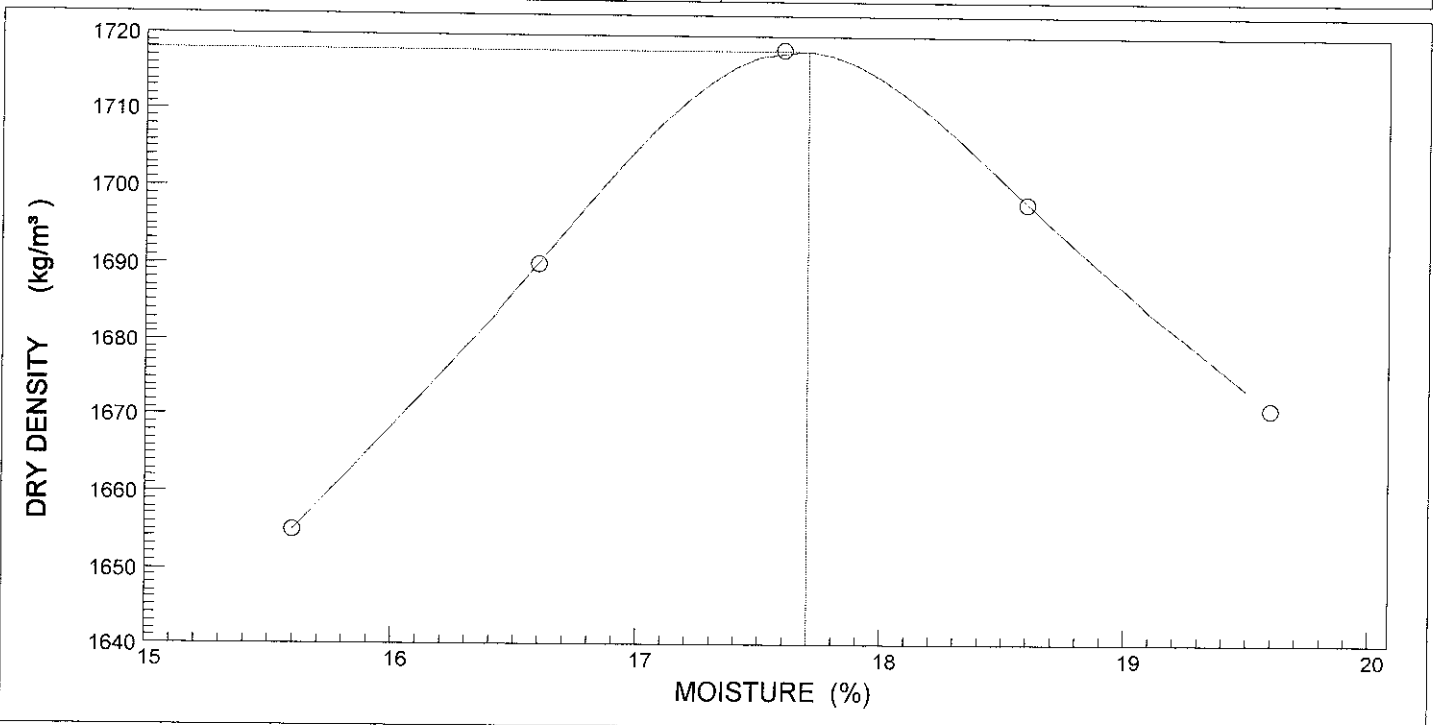
Project : Nyavini Clinic

SAMPLE NO.	D15838
CONTAINER FOR SAMPLING	Plastic Bag
SIZE / APPROX. MASS OF SAMPLE	60Kg
MOISTURE CONDITION OF SAMPLE	Moist
LAYER TESTED / SAMPLED FROM	N/S
MATERIAL DESCRIPTION	Silty Clay
HOLE NO./ km / CHAINAGE	N/S
ROAD NO.	Nyavini Clinic
DATE RECEIVED	07/06/23
DATE SAMPLED	07/06/23
CLIENT MARKING	T1
COLOUR AND TYPE	Dk Br

POINT NO.	1	2	3	4	5			
DRY DENSITY (kg/m ³)	1655	1690	1718	1698	1671			
MOISTURE (%)	15,6	16,6	17,6	18,6	19,6			

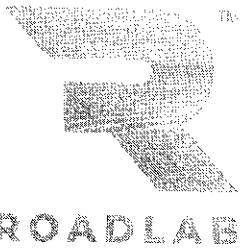
MAXIMUM DRY DENSITY (kg/m³) : 1718

OPTIMUM MOISTURE CONTENT (%) : 17,7



Deviation from Test Method :
Remarks and Notes :

Opinions and interpretations are not included in our schedule of accreditation.(T0806)
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Report compiled by : Shannon Naidoo



KZN

Unit 6 24 Edmund Morewood Street, Truroland, Tongaat 4399
 P.O.Box 63477 Verulam 4340
 Tel: (032) 944 5977 Fax:
 Email: durban@roadlab.co.za
 Web: www.roadlab.co.za

Job Request No.: RD 6737/23
 ILZ Consulting (Pty) LTD
 Suit 7
 Epcot Centre
 615 Umgeni Road
 Attention : Mr S. Mdlalose

Date Reported : 23/06/23

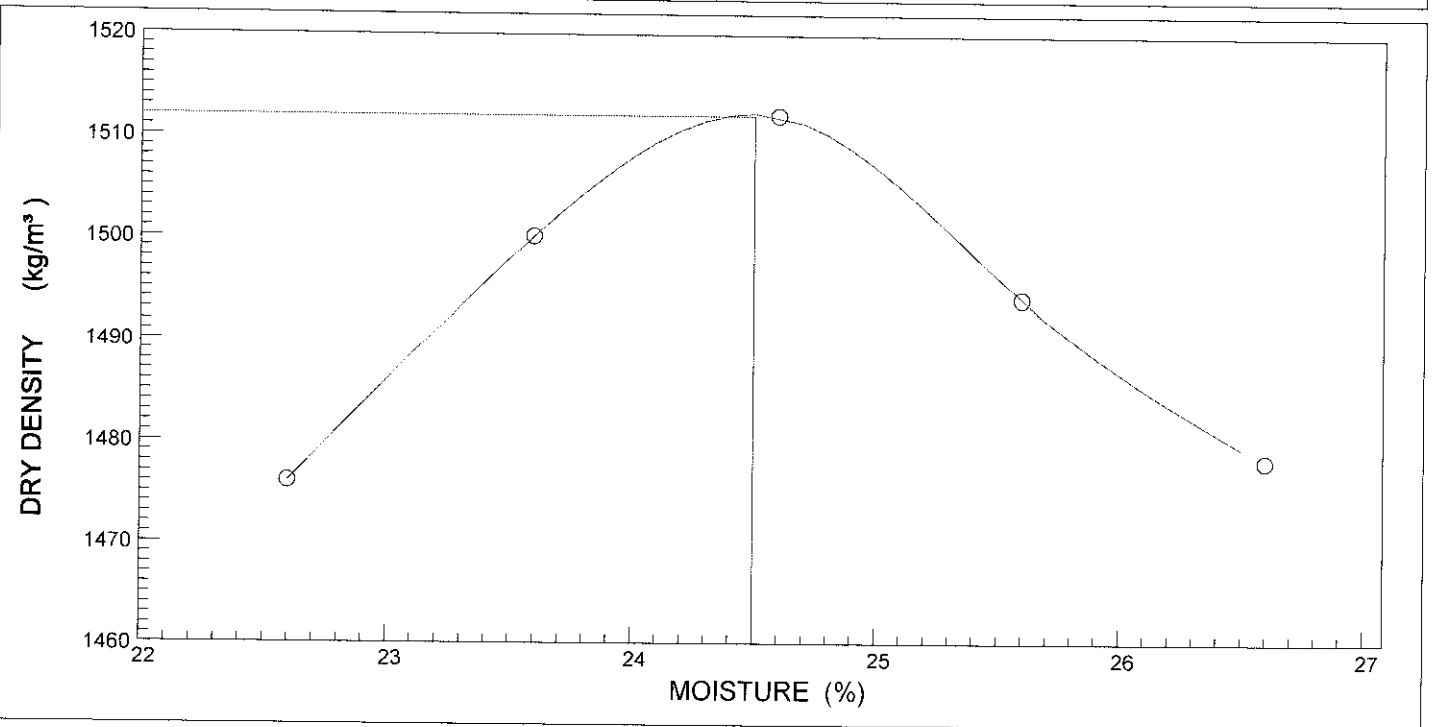
Project : Nyavini Clinic

SAMPLE NO.	D15839
CONTAINER FOR SAMPLING	Plastic Bag
SIZE / APPROX. MASS OF SAMPLE	60Kg
MOISTURE CONDITION OF SAMPLE	Moist
LAYER TESTED / SAMPLED FROM	N/S
MATERIAL DESCRIPTION	Gravelly Silty Sand
HOLE NO. / km / CHAINAGE	N/S
ROAD NO.	Nyavini Clinic
DATE RECEIVED	07/06/23
DATE SAMPLED	07/06/23
CLIENT MARKING	T2
COLOUR AND TYPE	Black

POINT NO.	1	2	3	4	5			
DRY DENSITY (kg/m³)	1476	1500	1512	1494	1478			
MOISTURE (%)	22,6	23,6	24,6	25,6	26,6			

MAXIMUM DRY DENSITY (kg/m³) : 1512

OPTIMUM MOISTURE CONTENT (%) : 24,5



Deviation from Test Method :

Remarks and Notes :

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Jay Sarjooopsad
 Technical Signatory

Job Request No.: RD 6737/23
 ILZ Consulting (Pty) LTD
 Suit 7
 Epcot Centre
 615 Umgeni Road
 Attention : Mr S. Mdalose

Date Reported : 23/06/23

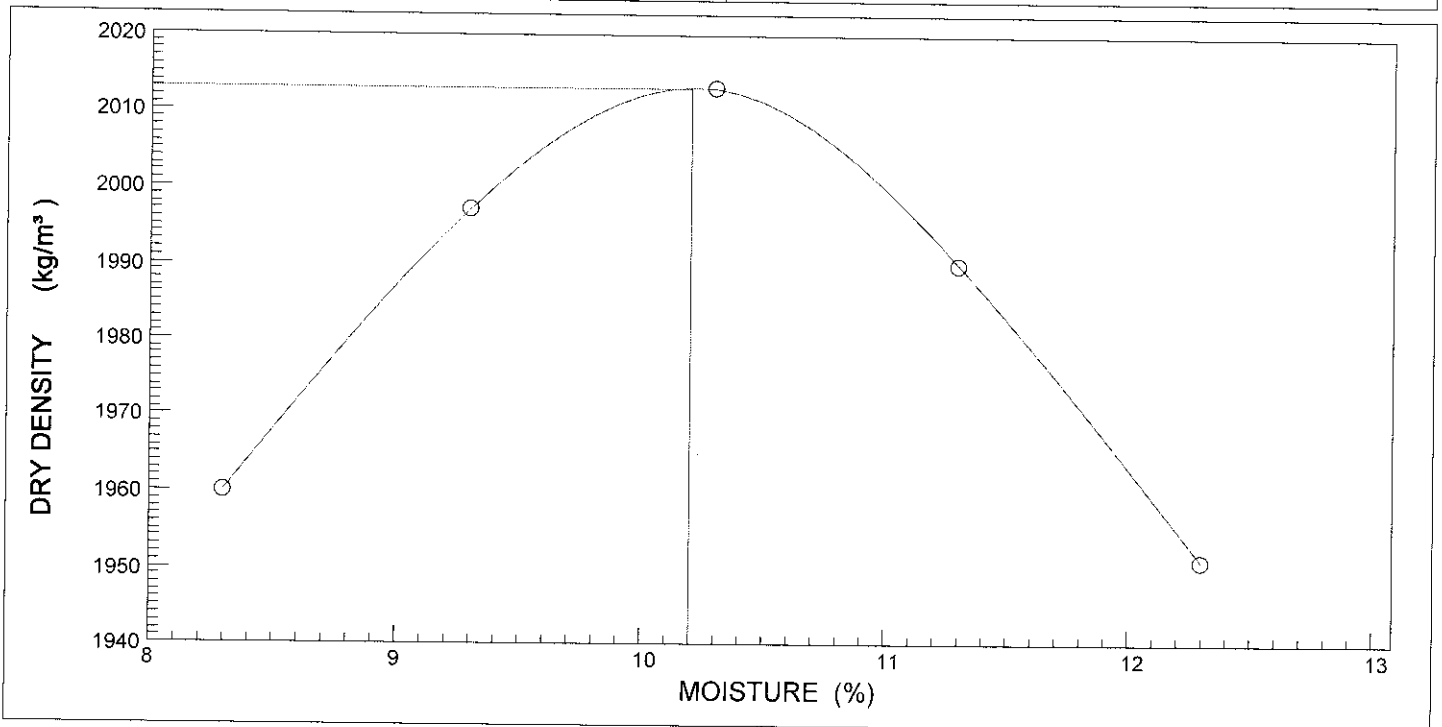
Project : Nyavini Clinic

SAMPLE NO.	D15840
CONTAINER FOR SAMPLING	Plastic Bag
SIZE / APPROX. MASS OF SAMPLE	60Kg
MOISTURE CONDITION OF SAMPLE	Moist
LAYER TESTED / SAMPLED FROM	N/S
MATERIAL DESCRIPTION	Silty Sand+ Slight Gravel
HOLE NO./ km / CHAINAGE	N/S
ROAD NO.	Nyavini Clinic
DATE RECEIVED	07/06/23
DATE SAMPLED	07/06/23
CLIENT MARKING	T3
COLOUR AND TYPE	Dk Br

POINT NO.	1	2	3	4	5			
DRY DENSITY (kg/m ³)	1960	1997	2013	1990	1951			
MOISTURE (%)	8,3	9,3	10,3	11,3	12,3			

MAXIMUM DRY DENSITY (kg/m³) : 2013

OPTIMUM MOISTURE CONTENT (%) : 10,2



Deviation from Test Method :

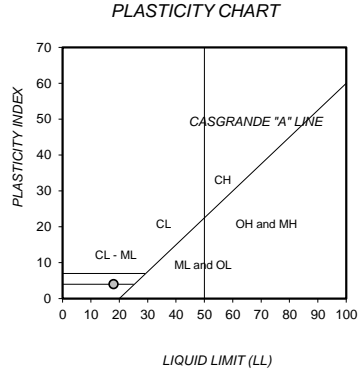
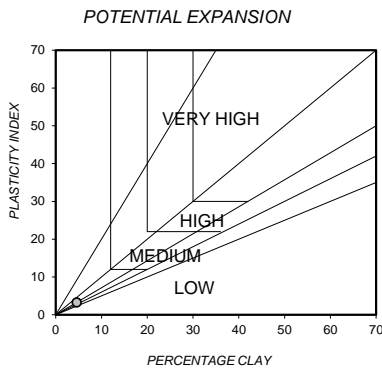
Remarks and Notes :

Opinions and interpretations are not included in our schedule of accreditation.(T0806)
 The sample were subjected to analysis according to (SANS)(TMH5)(DOT)(ASTM)
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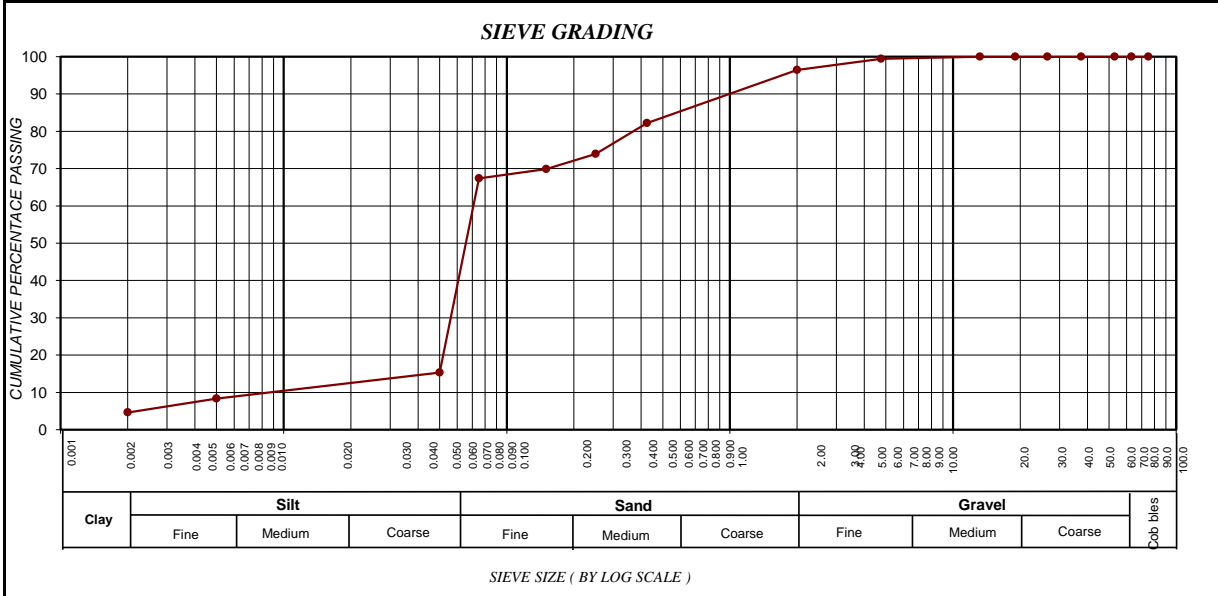
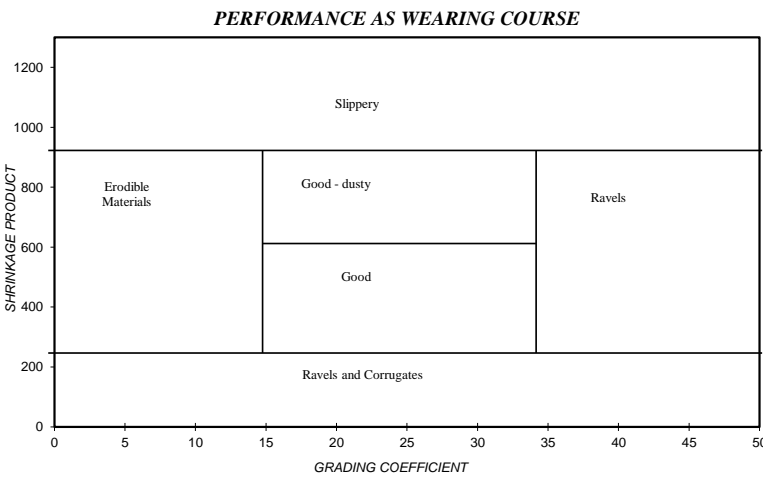
OUR REF : RD 6767-23	DATE RECEIVED : 07 Jun 23
CLIENT : ILZ Consulting (Pty) LTD	POSITION : 0,60m - 1,00m
SITE : Nyavini Clinic	LAYER : PT1
	SAMPLE No. : D15837
	SAMPLE DESCRIPTION : Black Silty Clay
	MOISTURE CONTENT : 28,10%

FOUNDATION INDICATOR - (SANS 3001-GR1, *SANS 3001-GR3-GR3,SANS 3001-GR100)

Weighted PI	3,3	
Sieve analysis Cumulative percentage passing (mm)	75,0	100
	63,0	100
	53,0	100
	37,5	100
	26,5	100
	19,0	100
	13,2	100
	4,75	99
	2,000	96
	0,425	82
	0,250	74
	0,150	70
	0,075	67
	0,050*	15
0,005*	8	
0,002*	4,6	



Soil Mortar Analysis % < 2.00mm	2.000 - 0.425	15
	0.425 - 0.250	9
	0.250 - 0.150	4
	0.150 - 0.075	3
	< 0.075	70
Effective size		
Uniformity Coefficient		
Curvature Coefficient		
Oversize Index		
Shrinkage Product		
Grading Coefficient		
Grading modulus	0,54	
Atter-berg Limits	Liquid Limit	18
	Plasticity Index	4
	Linear Shrinkage	2
	PI < 0.075	-
Unified Soil Classification	ML	
U.S. Highway Classification	-	
pH - Value	N/A	
Conductivity mS/cm	N/A	



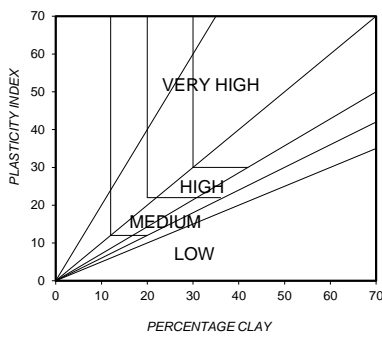
CLAY (%) (0.001-0.002)	SILT (%) (0.002-0.060)	SAND (%) (0.060-2.00)	GRAVEL (%) (2.00-60.0)
4,6	62,4	29,4	3,6

OUR REF : RD 6767-23	DATE RECEIVED : 07 Jun 23
CLIENT : ILZ Consulting (Pty) LTD	POSITION : 0,64m - 1,00m
SITE : Nyavini Clinic	LAYER : TP1
	SAMPLE No. : D15838
	SAMPLE DESCRIPTION : Dark Brown Silty Clay
	MOISTURE CONTENT : 23,50%

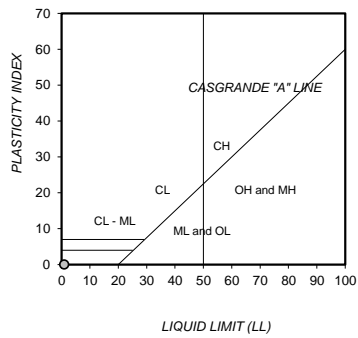
FOUNDATION INDICATOR - (SANS 3001-GR1, *SANS 3001-GR3-GR3,SANS 3001-GR100)

Weighted PI		
Sieve analysis Cumulative percentage passing (mm)	75,0	100
	63,0	100
	53,0	100
	37,5	100
	26,5	100
	19,0	100
	13,2	100
	4,75	99
	2,000	90
	0,425	76
	0,250	68
	0,150	59
	0,075	54
	0,050*	11
0,005*	6	
0,002*	4,1	

POTENTIAL EXPANSION

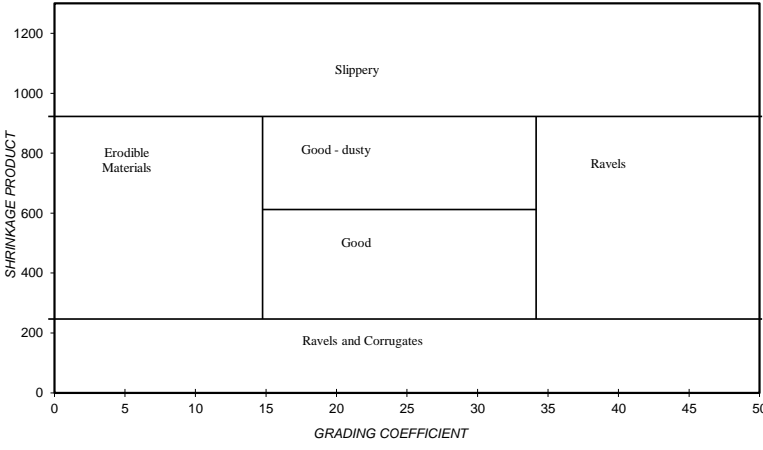


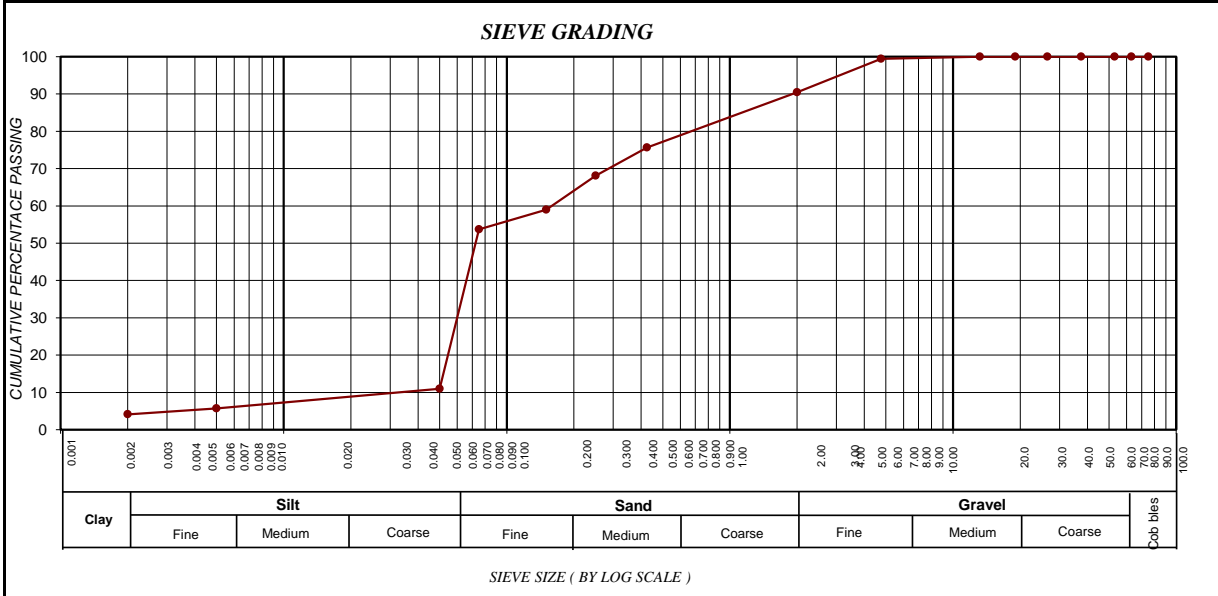
PLASTICITY CHART



Soil Mortar Analysis % < 2.00mm	2.000 - 0.425	16
	0.425 - 0.250	8
	0.250 - 0.150	10
	0.150 - 0.075	6
	< 0.075	59
Effective size		
Uniformity Coefficient		
Curvature Coefficient		
Oversize Index		
Shrinkage Product		
Grading Coefficient		
Grading modulus		0,80
Atterberg Limits	Liquid Limit	CBD
	Plasticity Index	NP
	Linear Shrinkage	0
	PI < 0.075	-
Unified Soil Classification		CH
U.S. Highway Classification		-
pH - Value		N/A
Conductivity mS/cm		N/A

PERFORMANCE AS WEARING COURSE



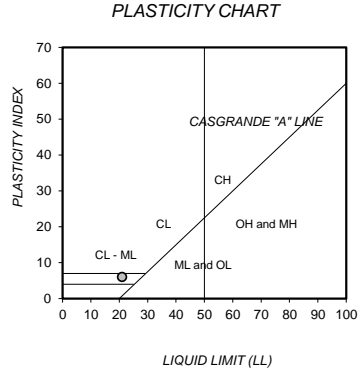
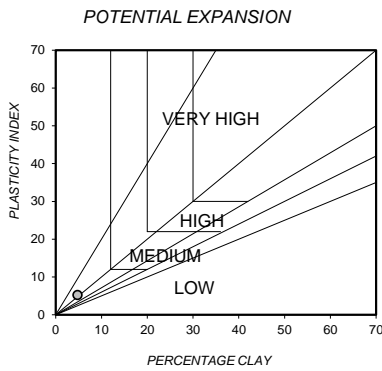


CLAY (%) (0.001-0.002)	SILT (%) (0.002-0.060)	SAND (%) (0.060-2.00)	GRAVEL (%) (2.00-60.0)
4,1	49,9	36,4	9,6

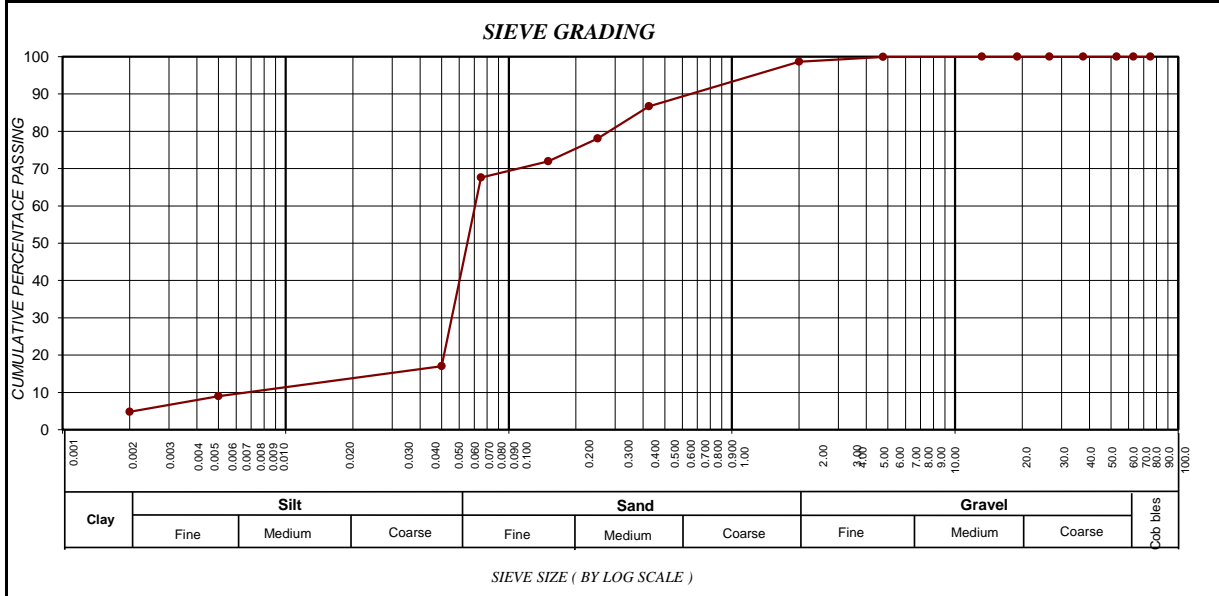
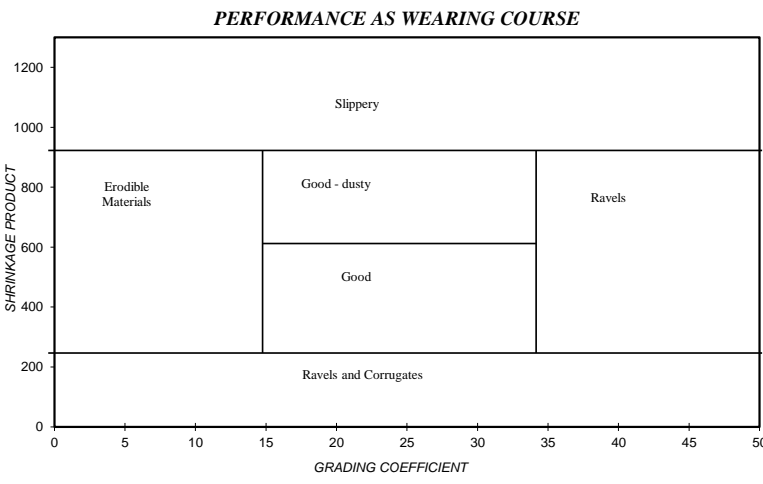
OUR REF : RD 6767-23	DATE RECEIVED : 07 Jun 23
CLIENT : ILZ Consulting (Pty) LTD	POSITION : 0,00m - 0,70m
SITE : Nyavini Clinic	LAYER : TP2
	SAMPLE No. : D15839
	SAMPLE DESCRIPTION : Black Gravelly Silty Sand
	MOISTURE CONTENT : 23,70%

FOUNDATION INDICATOR - (SANS 3001-GR1, *SANS 3001-GR3-GR3,SANS 3001-GR100)

Weighted PI	5,2	
Sieve analysis Cumulative percentage passing (mm)	75,0	100
	63,0	100
	53,0	100
	37,5	100
	26,5	100
	19,0	100
	13,2	100
	4,75	100
	2,000	99
	0,425	87
	0,250	78
	0,150	72
	0,075	68
	0,050*	17
0,005*	9	
0,002*	4,8	



Soil Mortar Analysis % < 2.00mm	2.000 - 0.425	12
	0.425 - 0.250	9
	0.250 - 0.150	6
	0.150 - 0.075	4
	< 0.075	69
Effective size		
Uniformity Coefficient		
Curvature Coefficient		
Oversize Index		
Shrinkage Product		
Grading Coefficient		
Grading modulus	0,47	
Atter-berg Limits	Liquid Limit	21
	Plasticity Index	6
	Linear Shrinkage	3
	PI < 0.075	-
Unified Soil Classification	ML	
U.S. Highway Classification	-	
pH - Value	N/A	
Conductivity mS/cm	N/A	



CLAY (%) (0.001-0.002)	SILT (%) (0.002-0.060)	SAND (%) (0.060-2.00)	GRAVEL (%) (2.00-60.0)
4,8	63,2	30,6	1,4



OUR REF : RD 6767-23 **DATE RECEIVED :** 07 Jun 23
CLIENT : ILZ Consulting (Pty) LTD **POSITION :** 0,62m - 1,00m
SITE : Nyavini Clinic **LAYER :** TP4
SAMPLE No. : D15840
SAMPLE DESCRIPTION : Dark Brown Silty Sand + Slight Granite
MOISTURE CONTENT : 11,40%

FOUNDATION INDICATOR - (SANS 3001-GR1, *SANS 3001-GR3-GR3,SANS 3001-GR100)

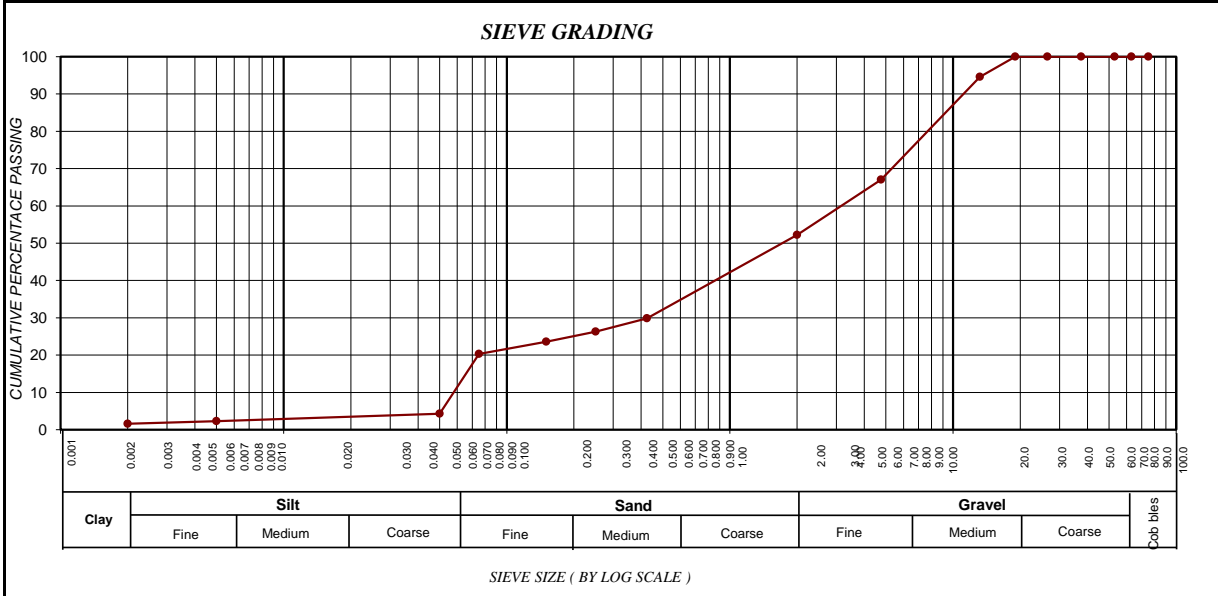
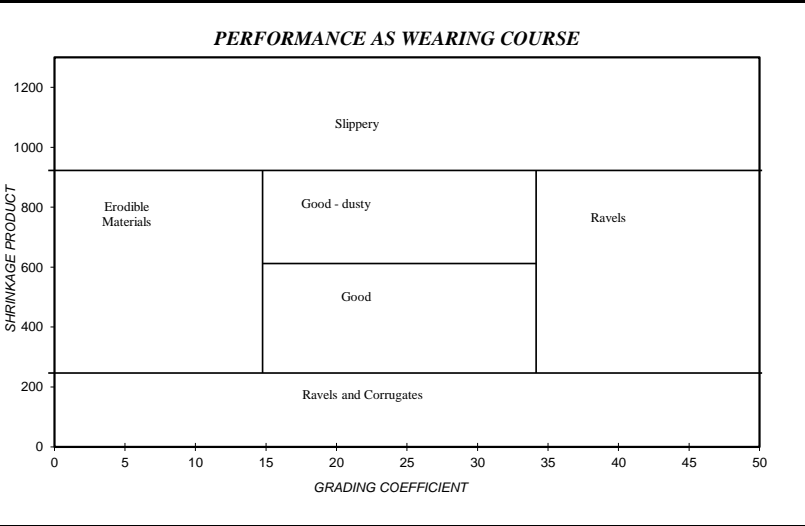
Weighted PI		#VALUE!
Sieve analysis Cumulative percentage passing (mm)	75,0	100
	63,0	100
	53,0	100
	37,5	100
	26,5	100
	19,0	100
	13,2	95
	4,75	67
	2,000	52
	0,425	30
	0,250	26
	0,150	24
	0,075	20
	0,050*	4
0,005*	2	
0,002*	1,6	

POTENTIAL EXPANSION

PLASTICITY CHART

Soil Mortar Analysis % < 2.00mm	#VALUE!
2.000 - 0.425	43
0.425 - 0.250	7
0.250 - 0.150	5
0.150 - 0.075	6
< 0.075	39

Effective size		
Uniformity Coefficient		
Curvature Coefficient		
Oversize Index		
Shrinkage Product		
Grading Coefficient		
Grading modulus	1,98	
Atterberg Limits	Liquid Limit	CBD
	Plasticity Index	NP
	Linear Shrinkage	0
	PI < 0.075	-
Unified Soil Classification	SC	
U.S. Highway Classification	-	
pH - Value	N/A	
Conductivity mS/cm	N/A	



CLAY (%) (0.001-0.002)	SILT (%) (0.002-0.060)	SAND (%) (0.060-2.00)	GRAVEL (%) (2.00-60.0)
1,6	18,4	32,2	47,8



NYAVINI CLINIC: CONSTRUCTION OF SMALL CLINIC

PART C5 - DRAWINGS / ANNEXURES

C5.1 - LIST OF DRAWINGS/ANNEXURES

NYAVINI CLINIC: CONSTRUCTION OF SMALL CLINIC

Tender No.:	ZNB 5549/2023-H	Project Code:	TBA
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The following drawings/annexure's shall be issued during the Tender period to form part of the tender documentation. Where applicable, drawings/annexure's could be re-issued to the Contractor at commencement of the construction phase.

<u>DRAWING NO</u>	<u>DESCRIPTION</u>
23002-TD401	DOOR & GATE SCHEDULE
3039D/P1/P/01	TYPICAL DETAILS
23002-TD100	GROUND FLOOR PLAN
23002-TD403	BLOCK F-SANITARY SCHEDULE
23002-TD403	BLOCK B-SANITARY SCHEDULE
23002-TD403	BLOCK B-SANITARY SCHEDULE
23002-TD403	BLOCK E-SANITARY SCHEDULE
23002-TD403	BLOCK G-SANITARY SCHEDULE
23002-TD403	BLOCK H-SANITARY SCHEDULE
23002-TD403	X4 SEMI DETACHED SINGLE BED UNITS-SANITARY SCHEDULE
23002-TD403	BLOCK C-SANITARY SCHEDULE
23002-TD403	BLOCK A-SANITARY SCHEDULE
23002-TD600	TYPICAL SEMI-DETACHED SINGLE BED UNIT
23002-TD100	GROUND FLOOR PLAN
23002-TD403	BLOCK A-SANITARY SCHEDULE
23002-TD403	BLOCK B-SANITARY SCHEDULE
23002-TD403	BLOCK C-SANITARY SCHEDULE
23002-TD403	BLOCK D-SANITARY SCHEDULE
23002-TD403	BLOCK E-SANITARY SCHEDULE
23002-TD403	BLOCK F-SANITARY SCHEDULE
23002-TD403	BLOCK H-SANITARY SCHEDULE
23002-TD403	X4 SEMI DETACHED SINGLE BED UNITS-SANITARY SCHEDULE
23002-TD500	JOINERY SCHEDULE
23002-TD101	ROOF PLAN
23002-TD300	ELEVATIONS
23002-TD200	SECTION A-D
23002-TD402	WINDOW SCHEDULE
3039D-PH1-D-389-REVA	ATTENUATION TANK DETAILS
3039D-PH1-D-384-REVA	STORMWATER STANDARD DETAILS
3039D-PH1-D-382-REVA	STORMWATER HEADWALL DETAILS
3039D-PH1-D-386-REVA	STORMWATER CHANNELING DETAILS
3039D-PH1-D-385-REVA	SEWER MANHOLE DETAILS
3039D-PH1-D-389-REVA	WATER STANDARD DETAILS
3039D-PH1-D-381-REVA	STORMWATER SPLAY DETAILS
3039D-PH1-D-385-REVA	SEWER MANHOLE DETAILS
3039D-PH1-D-386-REVA	STORMWATER CHANNELING DETAILS
3039D-PH1-D-383-REVA	ROAD STANDARD DETAILS
23002-TD001	SITE PLAN
3039D-PH1-D-387-REVA	SEPTIC TANK DETAILS SHEET 1 OF 2
3039D-PH1-D-388-REVA	SEPTIC TANK DETAILS SHEET 2 OF 2
3039D-PH1-D-389-REVA	WATER STANDARD DETAILS
3039D/P1/P/01	TYPICAL DETAILS

<u>ANNEXURES</u>	
Annexure 1	Standard Preambles for all Trades (Rev 3) - DOH 2009
Annexure 2	General Electrical Specifications
Annexure 3	Lightning Protection Specifications
Annexure 4	Map of Tender submission location
Annexure 5	Joint Venture Agreement
Annexure 6	Health and Safety Specification
Annexure 7	Health and Safety Bill of Quantities
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NYAVINI CLINIC: CONSTRUCTION OF SMALL CLINIC

ANNEXURES



Joint Venture Agreement
(March 2004)
(First Edition of CIDB document 1017)

1. **PREAMBLE**

This agreement is made and entered into by and between

of the first part and

of the second part and

of the third part.

(allow for additional parties as necessary).

Whereas the foregoing parties have resolved to form a Joint Venture under the title of

for the exclusive purposes of securing and/or executing the Contract to be awarded by

(name of Employer)

to the KZN Department of Health in respect of the following project:

for *(brief description of Contract)*

NYAVINI CLINIC: CONSTRUCTION OF SMALL CLINIC

Now it is hereby agreed as follows :

2. **DEFINITIONS AND INTERPRETATION**

2.1 **Definitions**

The following words and expressions shall have the meanings indicated, except where the context otherwise requires. Defined terms and words are, in general, signified in the text of the Agreement by the use of capital initial letters, but the absence of such letters does not necessarily signify that a term, or word, is not defined.

'Agreement' means the agreement between the Members of the Joint Venture and includes this model form of agreement together with the Preamble, Specific Provisions, if any, Schedules 'A', 'B' and 'C' and any relevant Documents prepared prior to the signing of the Agreement and appended thereto.

'Contract' means the contract with the Employer for the supply of the Deliverables, for the purposes of securing and executing which, the Joint Venture has been formed.

'Deliverables' means the works and/or services, equipment, materials, goods, etc. to be furnished by the Joint Venture to the Employer in terms of the Contract.

'Document' means any written, drawn, typed, printed, or photographic material, which relates to the Agreement.

'Employer' means the person, or body, which is to award the Contract and will employ the Joint Venture if it is awarded the Contract.

'Joint Venture' means the joint venture formed by the Members in accordance with the Agreement.

'Management Committee' means the body established in terms of the Agreement to manage all aspects of the work of the Joint Venture in securing and executing the Contract and in meeting the provisions for the Agreement.

'Member' means a person, or body which, being a party to the Agreement, is a member of the Joint Venture.

'Member's Interest' means the proportion expressed as a percentage, which the total monetary value of all resources provided and contributions made by a Member towards the execution by the Joint Venture of the Contract bears to the total of such values by all Members and, unless otherwise indicated in the Agreement, represents the extent to which the Member participates in the fortunes of the Joint Venture.

'Representative' means the person representing a Member on the Management Committee.

'Schedules' means Schedules 'A', 'B' and 'C' which set out general, financial and other information relating to the Members and the obligations, duties, rights, risks and benefits arising from their participation in the Joint Venture.

'Specific Provisions' means the variations, if any, required to this standard form of agreement for the specific purposes of the Agreement.

2.2 Interpretation

Unless inconsistent with the context, an expression in the Agreement which denotes:

- any gender shall include the other genders
- a natural person shall include a juristic person and vice versa
- the singular shall include the plural and vice versa

2.3 Headings

The headings to clauses of the Agreement shall not be considered part thereof, nor shall the words they contain be taken into account in the interpretation of any clause.

2.4 Law

The Agreement shall be construed in accordance with and governed by the laws of the Republic of South Africa and the English language versions shall prevail.

2.5 Language

English shall be exclusively used by the Members in the preparation of Documents unless otherwise indicated.

2.6 Conflict between Agreement and Contract

Should any provision of the Agreement be in conflict with the terms of the Contract, the Agreement shall be amended to the approval of the Management Committee so as to eliminate the conflict.

3. JOINT VENTURE GENERAL

3.1 Establishment and Purpose

The Joint Venture established by the Members in terms of the Agreement is an unincorporated association with the exclusive purposes of securing and executing the Contract for the benefit of the Members.

3.2 Termination

The operation of the Joint Venture and the validity of the Agreement shall terminate if and when it becomes evident that the Joint Venture will not be awarded the Contract, or, if the Joint Venture secures the Contract, when all obligations and rights of the Joint Venture and the Members in connection with the Contract and the Agreement have ceased and/or been satisfactorily discharged.

Unless otherwise decided by the Management Committee, the Agreement shall not terminate if a Member changes its name, or is taken over by, or merged with, another body.

This agreement will terminate when any one of the Members resigns, are liquidated or opts out of this agreement and the Joint Venture will be in breach of contract with the Employer and their contract could be cancelled.

3.3 Exclusivity

Unless otherwise agreed by the Management Committee, or provided for in the Contract no Member shall engage in any activity related to the Contract other than as a Member of the Joint Venture and Members shall ensure that their subsidiaries and other bodies over which they have control comply with this requirement.

3.4 Participation of Members

Except as may otherwise be stipulated in the Agreement, each Member shall be responsible for all costs incurred by it prior to the date of inception of the Agreement.

Subsequent to the date of inception of the Agreement, each Member shall, participate in the operations, risks, responsibilities and fortunes of the Joint Venture including, inter alia, the provision of funding, sureties, guarantees, insurances, human and other resources and participation in profits and losses to the extents indicated in the Schedules. Participation in any aspect not covered in the Schedules shall, if an agreement cannot be reached between the Members, be to the same extents as indicated by the Members Interests.

3.5 Management

The affairs of the Joint Venture shall be directed and controlled by the Management Committee, as set out in Section 4 hereof.

- 3.6 Confidentiality
All matters relating to the Agreement and the Contract shall be treated by the Members as confidential and no such matter shall be disclosed to any third party without the prior written approval of the Management Committee.

No Member shall be party to the dissemination of publicity relating to the Contract, or the Agreement, without the prior written approval of the Management Committee and the Employer.

- 3.7 Assignment
No Member shall cede, assign, or in any other way make over any of its rights, or obligations, under the Agreement without the prior written consent of the Management Committee.

- 3.8 Subcontracting
No Member shall subcontract any obligation, work or duty for which it is, itself, responsible in terms of the Agreement without the prior written consent of the Management Committee.

- 3.9 Variations to Agreement
No variation, modification, or waiver of any part of the Agreement shall be of any force, or effect, unless unanimously agreed by the Members and reduced to writing.

- 3.10 Liability
Each Member warrants that it will indemnify the other Members against all legal liabilities arising out of, or in connection with the performance of its obligations under the Agreement.
It is acknowledged by the Members that they may be held jointly and severally liable in respect of claims against the Joint Venture by the Employer or third parties.

4. MANAGEMENT OF JOINT VENTURE

4.1 General

The affairs of the Joint Venture shall be directed, controlled and managed by the Management Committee, which, within the terms of the Agreement and the Contract, shall have full authority to bind the Members in all matters relating to the affairs of the Joint Venture.

Communication between the Joint Venture and the Employer, or third parties, relating to the Contract shall be conducted exclusively by the Management Committee, or by such person as it may delegate to perform this function.

The Management Committee shall have the power to appoint a project manager and/or such other persons as it may see fit to appoint for the purpose of executing the Contract and may delegate such of its powers, responsibilities and duties as it may consider necessary, or desirable, to persons or bodies appointed or seconded for this purpose.

Such administrative functions as are necessary to ensure the effective operation of the Management Committee shall be performed by its chairman.

4.2 Management Committee

4.2.1 Composition

The Management Committee shall, unless otherwise agreed by all the Members, consist of one Representative of each Member and each Member shall be obliged, at all times, to maintain a Representative on the Management Committee.

Each member shall, not later than three working days after the signing of the Agreement, appoint its Representative and notify the other Members of the name and contact details of the Representative. Such Representative shall have the power to bind the Member that he represents in all matters relating to the execution of the Contract and the performance of the Agreement.

A Member shall be entitled, after giving the other Members not less than three working days written notice of his intention to do so, appoint, remove and/or replace, an alternate who shall, at any meeting of the Management Committee from which the Representative whom he represents is absent, be vested with all rights and powers and subjected to all the obligations of the absent Representative.

The chairman of the Management Committee shall be the Representative of the Member which has the largest Member's Interest. If two, or more, Members have the same, largest Member's Interest, the chairmanship shall rotate between the Representatives of such Members at three monthly intervals, the order of rotation to be determined by ballot.

Notwithstanding the foregoing, the chairmanship of the Management Committee may be determined, or changed, at any time by unanimous decision of the Management Committee.

No remuneration shall be paid by the Joint Venture to Representatives or their alternates for serving on the Management

4.2.2 *Meetings*

Meetings of the Management Committee shall take place at such times and places as the Management Committee may determine, provided that the chairman shall convene a meeting of the Management Committee to be held not later than ten working days after he has been requested, in writing, by a Member to do so. Not less than five working days written notice of any meeting of the Management Committee shall be given to all Representatives and their alternates.

The Management Committee may permit, or invite, persons other than Representatives or alternates to attend any of its meetings, but such persons shall not have voting rights.

4.2.3 *Decisions*

Each Representative shall have one vote on the Management Committee and where, in terms of this clause, a casting vote is required, this shall be exercised by the chairman.

All decisions of the Management Committee shall, desirably, be unanimous. Accordingly, if unanimity cannot, initially, be achieved in regard to a decision, the meeting at which that decision is sought shall be adjourned for a period of 48 hours to enable Representatives to consult with their principals. If, on resumption of the adjourned meeting, unanimity can still not be achieved, the decision, provided it is not one requiring unanimity of the Members, shall be taken by majority vote and, in the event of a tie, the chairman shall exercise a casting vote.

A Member not satisfied with a majority decision of the Management Committee may declare a dispute, to be dealt with in terms of Clause 8 hereof, but the majority decision shall, nevertheless, be implemented with immediate effect.

Decisions of the Management Committee, whether taken at a meeting, or otherwise, shall be recorded in written minutes, which shall be distributed by the chairman to reach the Representatives not later than five working days after those decisions were taken. Such minutes shall be deemed to have been affirmed by the Representatives unless written notice of dissent is received by the chairman not later than three working days after receipt of the minutes by the Representative.

4.2.4 Powers and duties

The functions, responsibilities and powers of the Management Committee shall include, inter alia, those listed below:

- 4.2.4.1 Formulating overall policy in regard to the achievement of the objectives of the Joint Venture.
- 4.2.4.2 Managing the day to day affairs of the Joint Venture.
- 4.2.4.3 Monitoring, directing and co-ordinating the activities of the Members to ensure that the objectives of the Joint Venture are achieved and that the obligations and responsibilities of the individual Members are met.
- 4.2.4.4 Monitoring and controlling the financial affairs of the Joint Venture and ensuring that proper books of account and financial records relating to affairs of the Joint Venture are maintained in an approved form and submitted to the Management Committee for approval at regular intervals, which shall not be longer than one month.
- 4.2.4.5 Determining the necessity for and the details of any changes in the duties and responsibilities of Members provided that any resulting changes in Members' Interests shall be unanimously approved by the Members.
- 4.2.4.6 Determining the terms and conditions of employment of personnel and the emoluments applicable to staff seconded to the Joint Venture by the Members.
- 4.2.4.7 Controlling and approving the appointment of all subcontractors.
- 4.2.4.8 Procuring, after the completion of the Contract and the release of all bonds, guarantees and sureties given in respect of the performances of the Joint Venture and the Members, the preparation and auditing of a final set of accounts, on the basis of which the final profits, or losses, attributable to the individual Members shall be determined and any necessary adjustments effected.

5 **RESOURCES OF JOINT VENTURE**

The resources to be utilised by the Joint Venture in securing and executing the Contract shall, insofar as these are to be provided directly by the Members, be as set out in the Schedules and may, from time to time, be amended by decision of the Management Committee, provided that the Member's Interests are not, except with the unanimous approval of the Members, affected thereby.

Similarly, specific areas of responsibility of the Members for the performance of work and the provision of facilities shall be as set out in the Schedules and may, from time to time, be amended by decision of the Management Committee, provided that the Members' Interest are not, except with the unanimous approval of the Members, affected thereby.

5.1 Schedule 'A' (General)

Schedule 'A' shall contain general information relating to the Joint Venture including, inter alia, the following :

1. The Employer's name and address.
2. A brief description of the Contract and the Deliverables.
3. The name, physical address, communications addresses and domicilium citandi et executandi of each Member and of the Joint Venture.
4. The Members' Interests.
5. A statement indicating whether, or not, Specific Provisions apply to the Agreement.
6. A schedule of insurance policies which must be taken out by the Joint Venture and by the individual Members.
7. A Schedule of sureties, indemnities and guarantees that must be furnished by the Joint Venture and by the individual Members.

8. Details of the persons, who, in the event of failure by the Members to reach agreement on the appointments of mediator and arbitrator, will nominate appointees to these positions in terms of Clauses 8.2 and 8.3.

5.2 Schedule 'B' (Financial)

Schedule 'B' shall contain information regarding the financial affairs of the Joint Venture including, inter alia, the following :

1. The working capital required by the Joint Venture and the extent to which and manner whereby this will be provided and/or guaranteed by the individual Members from time to time.
2. The banking accounts that are to be opened in the name of the Joint Venture and the manner in which these are to be operated.

3. The rates of interest that will be applicable to amounts by which Members are in debit, or credit, to the Joint Venture.

4. The names of the auditors and others, if any, who will provide auditing and accounting services to the Joint Venture.

5. The intervals at which interim financial accounts and forecasts will be prepared for approval by the Management Committee.

6. Insofar as not covered in Schedule 'C', the basis on which contributions of various types by the Members towards the work of the Joint Venture in securing, executing, managing and satisfactorily completing the Contract, will be valued.

7. The basis on which profits and/or surplus cash will, if available from time to time, be distributed to Members.
8. The basis upon which losses, if any, are to be apportioned to Members.

5.3 Schedule 'C' (Contributions by Members)

Schedule 'C' shall set out the contributions of various types, other than cash, that will be made by the individual Members towards the work and obligations of the Joint Venture and shall, as far as possible, indicate the monetary values to be placed on such contributions, which may include, inter alia, the following :

1. Staff seconded to the Joint Venture.
2. Work carried out and services provided to, or on behalf of, the Joint Venture.
3. Plant, equipment, facilities etc. made available for use by the Joint Venture.
4. Materials and goods supplied to, or on behalf of, the Joint Venture.
5. Licences, sureties, guarantees and indemnities furnished to, or on behalf of, the Joint Venture.
6. Joint Venture Disclosure form required for the Contract.

6. BREACH OF AGREEMENT

If a Member breaches any material provision of the Agreement, or delays or fails to fulfil its obligations in whole, or in part, and does not remedy the situation within fourteen calendar days of receipt of notice from the Management Committee, or another Member, to do so, the other Members shall have the right, without prejudice to any other rights arising from the default, to summarily terminate the Agreement and re-assign the defaulting Member's rights and obligations in the Joint Venture as they see fit and withhold any moneys due to the defaulting member by the Joint Venture.

Each Member shall indemnify the other Members against all losses, costs and claims which may arise against them in the event of the Agreement being terminated as a result of breach of the Agreement by the said Member.

7. INSOLVENCY OF MEMBER

Should a Member be placed in liquidation, or under judicial management, whether provisionally or finally, or propose any compromise with its creditors, the other Members shall be entitled to proceed in terms of Clause 6, as if the Member had breached the Agreement.

8. DISPUTES

8.1 Settlement

The Members shall negotiate in good faith and make every effort to settle any dispute, or claim, that may arise out of, or relate to, the Agreement.

If agreement cannot be reached, an aggrieved Member shall, if he intends to proceed further in terms of Clause 8.2 hereof, advise all other Members in writing that negotiations have failed and that he intends to refer the matter to mediation in terms of Clause 8.2.

8.2 Mediation

Not earlier than ten working days after having advised the other Members, in terms of Clause 8.1, that negotiations in regard to a dispute have failed, an aggrieved Member may require that the dispute be referred, without legal representation, to mediation by a single mediator.

The mediator shall be selected by agreement between the Members, or, failing such agreement, by the person named for this purpose in Schedule 'A'. The costs of the mediation shall be borne equally by all Members.

The mediator shall convene a hearing of the Members and may hold separate discussions with any Member and shall assist the Members in reaching a mutually acceptable settlement of their differences through means of reconciliation, interpretation, clarification, suggestion and advice. The Members shall record such agreement in writing and thereafter they shall be bound by such agreement.

The mediator is authorised to end the mediation process whenever in his opinion further efforts at mediation would not contribute to a resolution of the dispute between the Members.

8.3 Arbitration

Where a dispute or claim is not resolved by mediation, it shall be referred to arbitration by a single arbitrator to be selected by agreement between the Members or, failing agreement, to be nominated by the person named for this purpose in Schedule 'A'.

The Member requiring referral to arbitration shall notify the other Members, in writing, thereof, not later than thirty calendar days after the mediator has expressed his opinion, failing which the mediator's opinion shall be deemed to have been accepted by all Members and shall be put into effect.

Arbitration shall be conducted in accordance with the provisions of the Arbitration Act No. 42 of 1965, as amended, and in accordance with such procedure as may be agreed by the Members or, failing such agreement, in accordance with the rules for the Conduct of Arbitrations published by the Association of Arbitrators and current at the date that the arbitrator is appointed.

The decisions of the arbitrator shall be final and binding on the Members, shall be carried into immediate effect and, if necessary, be made an order of any court of competent jurisdiction.

9. DOMICILIUM

The Members choose domicilium citandi et executandi for all purposes of and in connection with the Agreement as stated in Schedule 'A'. A Member shall be entitled to change his domicilium from time to time, but such change shall be effective only on receipt of written notice of the change by all other Members.

Member No. 1

Thus done and signed at _____ this ____ day of _____ 20__

For and on behalf of _____ [Company]

by [name] _____ who warrants his authority to do so.

As witnesses 1. _____ As witnesses 2. _____

Member No. 2

Thus done and signed at _____ this ____ day of _____ 20__

For and on behalf of _____ [Company]

by [name] _____ who warrants his authority to do so.

As witnesses 1. _____ As witnesses 2. _____

Member No. 3

Thus done and signed at _____ this ____ day of _____ 20__

For and on behalf of _____ [Company]

by [name] _____ who warrants his authority to do so.

As witnesses 1. _____ As witnesses 2. _____

[Allow for additional parties as necessary].

HEALTH AND SAFETY IMPLEMENTATION COSTING

Contractor to give a breakdown of his Health and Safety costs on this sheet.

ITEM	DESCRIPTION	UNIT	QUAN- TITY	MONTHS (Indicative)	RATE	AMOUNT
			(a)		(b)	(a) x (b)
1	MEDICALS					
1.1	Pre-employment medical	Nr.	-			
1.2	Re-medicals - yearly	Nr.	-			
	TOTAL					
2	PERSONAL PROTECTIVE EQUIPMENT					
2.1	Overalls	Nr.				
2.2	Hard Hats	Nr.				
2.3	Safety boots/shoes	Nr.				
2.4	Gloves	Nr.				
2.5	Gumboots steel toe cap	Nr.				
2.6	Safety glasses	Nr.				
2.7	Reflector Bibs	Nr.				
2.8	Barricading Material	M				
2.9	Dust masks	Box 20				
	TOTAL					
3	FIRE FIGHTING					
3.1	Fire extinguishers - 4.5Kg	Nr.				
3.2	Surveys - Annual Service	Nr.				
	TOTAL					
4	HEALTH AND SAFETY PERSONNEL					
4.1	Safety Manager	Nr.				
4.2	Safety Officer	Nr.				
4.3	Construction Phase Safety, Health, Environmental and Waste Management Plan	Nr.				
	TOTAL					
5	FACILITIES					
5.7	Degreasing & Toilet soap	Nr.				
	TOTAL					
6	FALL PREVENTION / PROTECTION					
6.1	Safety harnesses with double lanyards	Nr.				
6.2	Safety harnesses with Scaffold hooks	Nr.				
6.3	Lifelines and vertical fall arrest systems	Nr.				
6.4	Scaffolding – material, erection and inspection (Estimate for project)	Nr.				
6.5	Temporary hand railing material and kick flats	Nr.				
6.6	Chin Straps	Nr.				
	TOTAL					

7	FIRST AID					
7.1	Replenishment of boxes and other supplies		Nr			
	TOTAL					
8	TRAINING					
8.1	SHE Representative		Nr.			
8.2	First Aid Level 1		Nr.			
8.3	Fire Fighting		Nr.			
	TOTAL					
9	SIGNAGE					
9.1	All Signage as required by Law, regulatory, warning and information		Nr.			
9.2	Posters for awareness		Nr.			
	TOTAL					
10	ELECTRICAL					
10.1	Replacement of Locks required for lockouts		Nr.			
10.2	Replacement of tags		Nr.			
10.3	Replacement for Permit books		Nr.			
10.4	Replacement of Callipers		Nr.			
	TOTAL					
11	OTHERS (Project Specific)					
11.1			Nr.			
	TOTAL					
GRAND TOTAL TO BE CARRIED TO THE PRELIMINARIES AND GENERAL IN BILL OF QUANTITIES						

WAIVER OF CONTRACTOR'S LIEN

DEFINITIONS

Contractor: _____

Employer: Head of Department: Health (KZN Department of Health: Province of KwaZulu-Natal)

Agreement: GCC FOR CONSTRUCTION WORKS - SECOND EDITION 2010

Works (description): **NYAVINI CLINIC: CONSTRUCTION OF SMALL CLINIC**

Site: **NYAVINI CLINIC**

AGREEMENT

The Contractor waives, in favour of the Employer, any lien or right of retention that is or may be held in respect of the Works to be executed on the Site

Thus done and signed at _____ on _____
[Date]

Name of signatory

Capacity of signatory

ADDITIONAL SPECIFICATION - EPWP

SL EMPLOYMENT AND TRAINING OF EPWP BENEFICIARY ON THE EXPANDED PUBLIC WORKS PROGRAMME (EPWP) Infrastructure Projects:

CONTENTS

SL 01	SCOPE
SL 02	TERMINOLOGY AND DEFINITIONS
SL 03	APPLICABLE LABOUR LAWS
SL 04	EXTRACTS FROM MINISTERIAL DETERMINATION REGARDING EPWP
SL 05	EMPLOYER'S RESPONSIBILITIES
SL 06	PLACEMENT OF RECRUITED EPWP BENEFICIARY
SL 07	TRAINING OF YOUTH WORKERS
SL 08	BENEFICIARY (EPWP BENEFICIARY) SELECTION CRITERIA
SL 09	CONTRACTUAL OBLIGATIONS IN RELATION TO EPWP BENEFICIARY
SL 10	PROVINCIAL RATES OF PAY
SL 11	MEASUREMENTS AND PAYMENT
EXAMPLE	EPWP EMPLOYMENT AGREEMENT

SL 01 SCOPE

This project is part of the Expanded Public Works Programme aims to train young people and provide them with practical work experience as part of this programme. Youth aged between 18 and 35 will be recruited and trained in skills relevant to the work to be done on this project. These youth will have to be employed by the contractor as part of this project so that they can gain their work experience on these projects. The training of the youth will be coordinated and implemented by a separate service provider. This service provider will provide the contractor with a list of all the youth and the training each of these youth have received. The Contractor will be required to employ all of these youth for a minimum period of 6 months. Furthermore the Contractor will be required to supervise these youth to ensure that the work they perform is of the required standard. If necessary the contractor's staff will be required to assist and mentor the youth to ensure that they are able to perform the type of work they need to do to the satisfactory standards required. The contractor will not be required to employ all youth in the programme at the same time, but may rotate the youth on the project, as long as all youth are employed for the minimum duration stated earlier.

This specification contains the standard terms and conditions for workers employed in elementary occupations and trained on a Expanded Public Works Programme (EPWP) for the Infrastructure Programme.

SL 02 TERMINOLOGY AND DEFINITIONS

SL 02.01 TERMINOLOGY

- (a) EPWP The Code of Good Practice for Expanded Public Works Programmes, which has been gazetted by the Department of Labour, and which provides for special conditions of employment for these EPWP projects. In terms of the Code of Good Practice, the workers on these projects are entitled to formal training, which will be provided by training providers appointed (and funded) by the Department of Labour. For projects of up to six months in duration, this training will cover life-skills and information about other education, training and employment opportunities.
- (b) EPWP Expanded Public Works Programme, a National Programme of the government of South Africa, approved by Cabinet.
- (c) UYF Umsobumvu Youth Fund.
- (d) DOL Department of Labour.

SL 02.02 DEFINITIONS

- (a) "employer" means the contractor or any party employing the worker / beneficiary under the EPWP Programme.
- (b) "client" means the Department of Public Works.
- (c) "worker / trainee" means any person working or training in an elementary occupation on a EPWP.

SL 03 APPLICABLE LABOUR LAWS

In line with the Expanded Public Works Programme (EPWP) policies, the Ministerial Determination, Special Public Works Programmes, issued in terms of the Basic Conditions of Employment Act of 1997 by the Minister of labour in government Notice No. R63 of 25 January 2002, of which extracts have been reproduced below in clauses SL 04 shall apply to works described in the scope of work and which are undertaken by unskilled or semi-skilled workers. The Code of Good Practise for Employment and Conditions of Work for Expanded Public Works Programmes, issued in terms of the Basic Conditions of Employment Act of 1997 by the Minister of Labour in Government Notice No. R64 of 25 January 2002 shall apply to works described in the scope of work and which unskilled or semi-skilled workers undertake.

SI 04 EXTRACTS FROM MINISTERIAL DETERMINATION REGARDING EPWP

- (g) "task-based work" means work in which a worker is paid a fixed rate for performing a task;
- (h) "task-rated worker" means a worker paid on the basis of the number of tasks completed;
- (i) "time-rated worker" means a worker paid on the basis of the length of time worked
- (j) "Service Provider" means the consultant appointed by Department to coordinate and arrange the employment and training of labour on EPWP infrastructure projects.

SL 04.02 TERMS OF WORK

- (a) Workers on a EPWP are employed on a temporary basis.
- (b) A worker may NOT be employed for longer than 24 months in any five-year cycle on a EPWP.
- (c) Employment on a EPWP does not qualify as employment and a worker so employed does not have to register as a contributor for the purposes of the Unemployment Insurance Act 30

SL 04.03 NORMAL HOURS OF WORK

- (a) An employer may not set tasks or hours of work that require a worker to work–
 - (i) more than forty hours in any week
 - (ii) on more than five days in any week; and
 - (iii) for more than eight hours on any day.
- (b) An employer and a worker may agree that the worker will work four days per week. The worker may then work up to ten hours per day.

- (c) A task-rated worker may not work more than a total of 55 hours in any week to complete the tasks (based on a 40-hour week) allocated to him.

Every work is entitled to a daily rest period of at least eight consecutive hours. The daily rest period is measured from the time the worker ends work on one day until the time the worker starts work on the next day.

SL 04.04 MEAL BREAKS

- (a) A worker may not work for more than five hours without taking a meal break of at least thirty minutes duration.
- (b) An employer and worker may agree on longer meal breaks.
- (c) A worker may not work during a meal break. However, an employer may require a worker to perform duties during a meal break if those duties cannot be left unattended and cannot be performed by another worker. An employer must take reasonable steps to ensure that a worker is relieved of his or her duties during the meal break.

SL 04.05 SPECIAL CONDITIONS FOR SECURITY GUARDS

- (a) A security guard may work up to 55 hours per week and up to eleven hours per day.
- (b) A security guard who works more than ten hours per day must have a meal break of at least one hour duration or two breaks of at least 30 minutes duration each.

SL 04.06 DAILY REST PERIOD

Every worker is entitled to a daily rest period of at least eight consecutive hours. The daily rest period is measured from the time the worker ends work on one day until the time the worker starts work on the next day.

SL 04.07 WEEKLY REST PERIOD

Every worker must have two days off every week. A worker may only work on their day off to perform work which must be done without delay and cannot be performed by workers during their ordinary hours of work ("emergency work").

SL 04.08 WORK ON SUNDAYS AND PUBLIC HOLIDAYS

- (a) A worker may only work on a Sunday or public holiday to perform emergency or security work.
- (b) Work on Sundays is paid at the ordinary rate of pay.
- (c) A task-rated worker who works on a public holiday must be paid –
 - (i) the worker's daily task rate, if the worker works for less than four hours;
 - (ii) double the worker's daily task rate, if the worker works for more than four hours.
- (d) A time-rated worker who works on a public holiday must be paid –
 - (i) the worker's daily rate of pay, if the worker works for less than four hours on the public holiday;
 - (ii) double the worker's daily rate of pay, if the worker works for more than four hours on the public holiday.

SL 04.09 SICK LEAVE

- (a) Only workers who work four or more days per week have the right to claim sick-pay in terms of this clause.
- (b) A worker who is unable to work on account of illness or injury is entitled to claim one day's paid sick leave for every full month that the worker has worked in terms of a contract.
- (c) A worker may accumulate a maximum of twelve days' sick leave in a year.
- (d) Accumulated sick-leave may not be transferred from one contract to another contract.

- (e) An employer must pay a task-rated worker the worker's daily task rate for a day's sick leave.
- (f) An employer must pay a time-rated worker the worker's daily rate of pay for a day's sick leave.
- (g) An employer must pay a worker sick pay on the worker's usual payday.
- (h) Before paying sick-pay, an employer may require a worker to produce a certificate stating that the worker was unable to work on account of sickness or injury if the worker is –
 - (i) absent from work for more than two consecutive days; or
 - (ii) absent from work on more than two occasions in any eight-week period.
- (i) A medical certificate must be issued and signed by a medical practitioner, a qualified nurse or a clinic staff member authorised to issue medical certificates indicating the duration and reason for incapacity.
- (j) A worker is not entitled to paid sick-leave for a work-related injury or occupational disease for which the worker can claim compensation under the Compensation for Occupational Injuries and Diseases Act.

SL 04.10 MATERNITY LEAVE

- (a) A worker may take up to four consecutive months' unpaid maternity leave.
- (b) A worker is not entitled to any payment or employment-related benefits during maternity leave.
- (c) A worker must give her employer reasonable notice of when she will start maternity leave and when she will return to work.
- (d) A worker is not required to take the full period of maternity leave. However, a worker may not work for four weeks before the expected date of birth of her child or for six weeks after the birth of her child, unless a medical practitioner, midwife or qualified nurse certifies that she is fit to do so.
- (e) A worker may begin maternity leave –
 - (i) four weeks before the expected date of birth; or
 - (ii) on an earlier date –
 - (1) if a medical practitioner, midwife or certified nurse certifies that it is necessary for the health of the worker or that of her unborn child; or
 - (2) if agreed to between employer and worker; or
 - (iii) on a later date, if a medical practitioner, midwife or certified nurse has certified that the worker is able to continue to work without endangering her health.
- (f) A worker who has a miscarriage during the third trimester of pregnancy or bears a stillborn child may take maternity leave for up to six weeks after the miscarriage or stillbirth.
- (g) A worker who returns to work after maternity leave, has the right to start a new cycle of twenty-four months employment, unless the EPWP on which she was employed has ended.

SL 04.11 FAMILY RESPONSIBILITY LEAVE

- (a) Workers, who work for at least four days per week, are entitled to three days paid family responsibility leave each year in the following circumstances –
 - (i) when the employee's child is born;
 - (ii) when the employee's child is sick;

- (iii) in the event of the death of –
 - (1) the employee's spouse or life partner
 - (2) the employee's parent, adoptive parent, grandparent, child, adopted child, grandchild or sibling

SL 04.12 STATEMENT OF CONDITIONS

- (a) An employer must give a worker a statement containing the following details at the start of employment –
 - (i) the employer's name and address and the name of the EPWP;
 - (ii) the tasks or job that the worker is to perform;
 - (iii) the period for which the worker is hired or, if this is not certain, the expected duration of the contract;
 - (iv) the worker's rate of pay and how this is to be calculated;
 - (v) the training that the worker may be entitled to receive during the EPWP.
- (b) An employer must ensure that these terms are explained in a suitable language to any employee who is unable to read the statement.
- (c) An employer must supply each worker with a copy of the relevant conditions of employment contained in this specification.
- (d) An employer must enter into a formal contract of employment with each employee. A copy of a pro-forma is attached at the end of this specification.

SL 04.13 KEEPING RECORDS

- (a) Every employer must keep a written record of at least the following –
 - (i) the worker's name and position;
 - (ii) in the case of a task-rated worker, the number of tasks completed by the worker;
 - (iii) in the case of a time-rated worker, the time worked by the worker;
 - (iv) payments made to each worker.
- (b) The employer must keep this record for a period of at least three years after the completion of the EPWP.

SL 04.14 PAYMENT

- (a) A task-rated worker will only be paid for tasks that have been completed.
- (b) An employer must pay a task-rated worker within five weeks of the work being completed and the work having been approved by the manager or the contractor having submitted an invoice to the employer. Payment must be made in cash, by cheque or by direct deposit into a bank account designated by the worker.
- (c) A time-rated worker will be paid at the end of each month and payment must be made in cash, by cheque or by direct deposit into a bank account designated by the worker.
- (d) Payment in cash or by cheque must take place –
 - (i) at the workplace or at a place agreed to by at least 75% of the workers; and
 - (ii) during the worker's working hours or within fifteen minutes of the start or finish of work;
- (e) All payments must be enclosed in a sealed envelope which becomes the property of the worker.
- (f) An employer must give a worker the following information in writing –
 - (i) the period for which payment is made;
 - (ii) the number of tasks completed or hours worked;
 - (iii) the worker's earnings;

- (iv) any money deducted from the payment;
 - (v) the actual amount paid to the worker.
- (g) If the worker is paid in cash or by cheque, this information must be recorded on the envelope and the worker must acknowledge receipt of payment by signing for it.
- (h) If a worker's employment is terminated, the employer must pay all monies owing to that worker within one month of the termination of employment.

SL 04.15 DEDUCTIONS

- (a) An employer may not deduct money from a worker's payment unless the deduction is required in terms of a law.
- (b) An employer must deduct and pay to the SA Revenue Services any income tax that the worker is required to pay.
- (c) An employer who deducts money from a worker's pay for payment to another person must pay the money to that person within the time period and other requirements specified in the agreement law, court order or arbitration award concerned.
- (d) An employer may not require or allow a worker to –
 - (i) repay any payment except an overpayment previously made by the employer by mistake;
 - (ii) state that the worker received a greater amount of money than the employer actually paid to the worker; or
 - (iii) pay the employer or any other person for having been employed.

SL 04.16 HEALTH AND SAFETY

- (a) Employers must take all reasonable steps to ensure that the working environment is healthy and safe and that all legal requirements regarding health and safety are strictly adhered to.
- (b) A worker must:
 - (i) work in a way that does not endanger his/her health and safety or that of any other person;
 - (ii) obey any health and safety instruction;
 - (iii) obey all health and safety rules;
 - (iv) use any personal protective equipment or clothing issued by the employer;
 - (v) report any accident, near-miss incident or dangerous behaviour by another person to their employer or manager.

SL 04.17 COMPENSATION FOR INJURIES AND DISEASES

- (a) It is the responsibility of employers to arrange for all persons employed on a EPWP to be covered in terms of the Compensation for Occupational Injuries and Diseases Act, 130 of 1993.
- (b) A worker must report any work-related injury or occupational disease to their employer or manager.
- (c) The employer must report the accident or disease to the Compensation Commissioner.
- (d) An employer must pay a worker who is unable to work because of an injury caused by an accident at work 75% of their earnings for up to three months. The employer will be refunded this amount by the Compensation Commissioner. This does NOT apply to injuries caused by accidents outside the workplace such as road accidents or accidents at home.

SL 04.18 TERMINATION

- (a) The employer may terminate the employment of a worker provided he has a valid reason and after following existing termination procedures.
- (b) A worker will not receive severance pay on termination.
- (c) A worker is not required to give notice to terminate employment. However, a worker who wishes to resign should advise the employer in advance to allow the employer to find a replacement.
- (d) A worker who is absent for more than three consecutive days without informing the employer of an intention to return to work will have terminated the contract. However, the worker may be re-engaged if a position becomes available for the balance of the 24-month period.
- (e) A worker who does not attend required training events, without good reason, will have terminated the contract. However, the worker may be re-engaged if a position becomes available for the balance of the 24-month period.

SL 04.19 CERTIFICATE OF SERVICE

- (a) On termination of employment, a worker is entitled to a certificate stating –
 - (i) the worker's full name;
 - (ii) the name and address of the employer;
 - (iii) the SPWP on which the worker worked;
 - (iv) the work performed by the worker;
 - (v) any training received by the worker as part of the EPWP;
 - (vi) the period for which the worker worked on the EPWP;
 - (vii) any other information agreed on by the employer and worker.

SL 05 EMPLOYER'S RESPONSIBILITIES

The employer shall adhere to the conditions of employment as stipulated in the *Code of Good Practice for Employment and Conditions of Work for Expanded Public Works Programmes*. Over and above the conditions stipulated above, he shall be responsible to:

- (a) formulate and design a contract between himself/ herself and each of the recruited EPWP beneficiary, ensuring that the contract does not contravene any of the Acts stipulated in South African Law, e.g. Basic Conditions of Employment Act, etc. (A copy of a pro-forma contract is attached at the end of this specification);
- (b) screen and select suitable candidates for employment from the priority list of EPWP beneficiary provided by the Umsobumvu Youth Fund (UYF);
- (c) ensure that the recruited EPWP beneficiary are made available to receive basic life skills training which will be conducted and paid for by the Umsobumvu Youth Fund;
- (d) ensure that all EPWP beneficiary receive instruction on safety on site prior to them commencing with work on site;
- (e) ensure that all EPWP beneficiary are covered under workmen's compensation for as long as they are contracted to the contractor. Payment to the Compensation Commissioner shall be the responsibility of the contractor;
- (f) assist in the identification and assessment of potential EPWP beneficiary to undergo advanced technical training in respective trades;
- (g) test and implement strict quality control and to ensure that the health and safety regulations are adhered to;
- (h) provide all EPWP beneficiary with the necessary protective clothing as required by law for the specific trades that they are involved in.
- (i) provide overall supervision and day-to-day management of EPWP beneficiary and/or sub-contractors; and
- (j) ensure that all EPWP beneficiary are paid their wages on time through a pre-agreed payment method as stipulated in the contract with the EPWP beneficiary.

SL 06 PLACEMENT OF RECRUITED EPWP BENEFICIARY

Employers will be contractually obliged to:

- (a) employ EPWP beneficiary from targeted social groups from the priority list provided by the Service Provider/ Umsobumvu Youth Fund.
- (b) facilitate on-the-job training and skills development programmes for the EPWP beneficiary;
- (c) achieve the following minimum employment targets:
 - (i) 55% people between the ages of 18 and 35
 - (ii) 55% women;
 - (iii) 2% people with disabilities.
- (d) brief EPWP beneficiary on the conditions of employment as specified in sub clause SL 04.09 above;
- (e) enter into a contract with each EPWP beneficiary, which contract will form part of the Employment Agreement;
- (f) allow EPWP beneficiary the opportunity to attend life skills training through DOL. This shall be arranged at the beginning of the contract;
- (g) ensure that payments to EPWP beneficiary are made as set out in sub clauses SL 04.14 and SL 04.15 above.
- (h) set up of personal profile files as prescribed by EPWP beneficiary and as set out in sub clause SL 04.13 above.
- (i) in addition to (h)
 - a copy of the I.D;
 - qualifications;
 - career progress;
 - EPWP Employment Agreement, and
 - list of small trade tools;

must be included in the EPWP beneficiary's personal profile file.

SL 07 TRAINING OF EPWP BENEFICIARY

Three types of training are applicable, namely

- Life skills;
- On the job training and
- Technical Skills training.

Training will be implemented by training instructors accredited by DOL and/or CETA :

- EPWP beneficiary shall be employed on the projects for an average of 6 months.
- EPWP beneficiary shall be deployed on projects in the vicinity of their homes. The same arrangements as for other workers regarding accommodation, subsistence and travel shall be applicable to EPWP beneficiary.

(a) Life skills training

All EPWP beneficiary are entitled to undergo life skills training. Training of this module will be flexible enough to meet the needs of the employer. Training should take place immediately after site hand-over and during the period of site establishment and pre-planning before actual construction starts, alternatively this will be spread over the duration of the contract period. The contractor will be required to work closely with the person to schedule the training sessions so that the timing of the training is aligned with the contractors work schedule and his demand for workers.

(b) On-the job training

The Employer shall provide EPWP beneficiary with on-the-job training to enable them to fulfil their employment requirements. The employer shall also be expected to closely monitor the job performance of EPWP beneficiary and shall identify potential EPWP beneficiary for skills development programmes.

- (c) Technical skills training
The Employer shall assist in identifying EPWP beneficiary for further training. These EPWP beneficiary will undergo further technical training to prepare them for opportunities as semi-skilled labourers.

Such training will comprise of an off-site theoretical component and practical training on-site. The contractor will be responsible for on-site practical work under his supervision. EPWP beneficiary who graduate from the first phase of the training programme will be identified and given opportunities to register for skills development programmes. These can ultimately result in a accredited qualification. The programme will consist of theoretical instruction away from the construction site as well as on-site practical work under the supervision of the employer. Candidates will be entitled to employment to complete all training modules.

SL 08 BENEFICIARY (EPWP BENEFICIARY) SELECTION CRITERIA

SL 08.01 PREAMBLE

The *Code of Good Practise for Employment and Conditions of Work for Expanded Public Works Programmes* encourages:

- optimal use of locally-based labour in a Expanded Public Works Programme (EPWP);
- a focus on targeted groups which consist of namely youth, consisting of women, female-headed households, disabled and households coping with HIV/AIDS; and
- the empowerment of individuals and communities engaged in a SPWP through the provision of training.

SL 08.02 BENEFICIARY (EPWP BENEFICIARY) SELECTION CRITERIA

- (a) The EPWP beneficiary of the programmes should preferably be non-working individuals from the most vulnerable sections of disadvantaged communities who do not receive any social security pension income. The local community must, through all structures available, be informed of and consulted about the establishment of any EPWP
- (b) In order to spread the benefit as broadly as possible in the community, a maximum of one person per household should be employed, taking local circumstances into account.
- (c) Skilled artisans from other areas may be employed if they have skills that are required for a project and there are not enough persons in the local communities who have those skills or who could undergo appropriate skills training. However, this should not result in more than 20% of persons working on a programme not being from local communities.
- (d) Programmes should set participation targets for employment with respect to youth, single male- and female-headed households, women, people with disabilities, households coping with HIV/AIDS, people who have never worked, and those in long-term unemployment.
- (e) The proposed targets as set out in sub clause SL 06 (c)
- 55% youth from 18 to 35 years of age;
 - 55% women;
 - 2% disabled.

SL 09 CONTRACTUAL OBLIGATIONS IN RELATION TO YOUTH LABOUR

The EPWP beneficiary to be employed in the programme (EPWP) shall be directly contracted to the employer. Over and above the construction and project management responsibilities, the employer will be expected to perform the tasks and responsibilities as set out in clause SL 05 above.

SL 10 PROVINCIAL RATES OF PAY

It is stipulated that youth workers on the EPWP receive a minimum of R 1 000 per month whilst working and R 600 per month whilst on training in ALL provinces. Should EPWP beneficiary be attending training whilst employed by the contractor, the contractor will still be responsible for payment to the EPWP beneficiary whilst at training.

SL 11 MEASUREMENTS AND PAYMENT

The number of EPWP beneficiary specified for this contract that will receive life skills training is 50 and technical training is 50

**SL 11.01 PAYMENT FOR TRAINING OF EPWP BENEFICIARY
(TARGET:- 50 EPWP BENEFICIARY)**

**SL 11.01.01 Skills development and Technical training for EPWP beneficiary for an average of 10 days
.....(Prov.Sum).....Unit: R/EPWP beneficiary**

The above item is only applicable if DoL does not fund the Technical Training PRIOR to site handover.

**SL 11.01.02 Penalty due to not meeting the target as in
SL 11.01.01.....Unit: EPWP beneficiary
LESS R 2000 per EPWP beneficiary**

SL 11.02 PAYMENT FOR TRAVELLING AND ACCOMMODATION DURING OFF-SITE TRAINING

SL 11.02.01 Life skills training for 26 days:

- 01 Travelling (based on 50 km/EPWP beneficiary)Unit: km
- 02 Accommodation.....(Prov.Sum).....Unit: R/EPWP beneficiary
- 03 Profit and attendance..... Unit: %

SL 11.02.02 Skilled development and Technical training:

- 01 Travelling (based on 50 km/EPWP beneficiary).....Unit: km
- 02 Accommodation.....(Prov.Sum).....Unit: R/EPWP beneficiary
- 03 Profit and attendance Unit: %

The units of measurement for sub items SL 11.02.01 (01) and SL 11.02.02 (01) above shall be the distance travelled in km by the EPWP beneficiary trained off site. The tendered rate shall include full compensation to safely transport the youth workers to and from the training venue/s.

The unit of measurement for sub items SL 11.02.01 (02) and SL 11.02.02 (02) above shall be the amounts in Rand expended for accommodation and daily meal allowances for the EPWP beneficiary trained off site that must be arranged by the contractor. Amounts quoted shall be corrected according to re-measurement based on actual invoices.

The tendered percentages under sub items SL 11.02.01 (03) and SL 11.02.02 (03) will be paid to the contractor on the value of each payment pertaining to the accommodation and advance meal allowances to cover his expenses in this regard.

SL 11.03 ALTERNATIVE WORKERS FOR THE PERIOD OF OFF-SITE TRAINING

- SL 11.03.01** Life skills training for 26 days Unit: worker-days
SL 11.03.02 Skilled development and Technical training for EPWP beneficiary for (.....) days..... Unit: worker-days

The unit of measurement shall be the number of EPWP beneficiary replaced while in training multiplied by the number of days absent from the site.

The rates tendered shall include full compensation for additional replacement labour during periods of off-site training.

SL 11.04 EMPLOYMENT OF EPWP BENEFICIARY

- SL 11.04.01** Employment of EPWP beneficiary.....(Prov.Sum)¹/₄.Unit: R/ worker-month
SL 11.04.02 Employment of EPWP beneficiary.....(Prov.Sum)¹/₄.Unit: R/ worker-month

The unit of measurement shall be the number of EPWP beneficiary at the statutory labour rates of R multiplied by the period employed in months and the rate tendered shall include full compensation for all costs associated with the employment of EPWP beneficiary and for complying with the conditions of contract. The cost for the training shall be excluded from this item. This item is based on 6 months appointment for EPWP beneficiary.

SL 11.05 PROVISION OF EPWP DESIGNED OVERALLS TO EPWP BENEFICIARY

- SL 11.05.01** Supply EPWP designed overalls to EPWP beneficiary (Prov.Sum).....Unit: R

EPWP beneficiary overalls should be orange (top and bottom) as per EPWP specification with the exception of Correctional Services contracts where the EPWP beneficiary top would be blue and the bottom orange.

- SL 11.05.02** Profit and attendance..... Unit: %

An amount has been provided in the Schedule of Quantities under sub item SL 10.05.01 for the supply of EPWP designed overalls, as per the specification provided by the EPWP unit, arranged by the Service Provider. The Engineer will have sole authority to spend the amounts or part thereof. The tendered percentage under sub items SL 10.05.02 will be paid to the contractor on the value of each payment pertaining to the supply of overalls to cover his expenses in this regard.

SL 11.06 PROVISION OF SMALL TOOLS FOR EPWP BENEFICIARY

- SL 11.06.01** Provide all EPWP beneficiary with prescribed tools for their respective trades. Specification for the mentioned tools to be provided by the EPWP Service Provider. These tools will become the property of the EPWP beneficiary after the completion of the programme.....(Prov.Sum)....Unit: **R 500-00** /youth worker

- SL 11.06.02** Profit and attendance..... Unit: %

SL 11.07 APPOINTMENT OF EPWP BENEFICIARY TEAM LEADER/S

- SL 11.07.01** Appointment of (____) EPWP beneficiary team leader/s for the duration of the contract.....(Prov.Sum)..... Unit: **R / EPWP beneficiary team leader**

The EPWP beneficiary Team Leader will act as CLO/PLO to facilitate the project work between the EPWP beneficiary and the contractor. Umsobumvu Youth Fund can assist with the sourcing of EPWP beneficiary Team Leader for employment by the contractor.

- SL 11.08 LIAISON WITH SERVICE PROVIDER**.....Unit: hours

The tendered rate shall include full compensation for the cost of liaising with the Service Provider and Social Facilitators on all issues regarding the works.

SCOPE OF WORKS IN RESPECT OF WORK RELATING TO THE EXTENDED PUBLIC WORKS PROGRAMME (EPWP)			
Project title:	NYAVINI CLINIC: CONSTRUCTION OF SMALL CLINIC		
Project Code:	N/A	EPWP NO:	N/A

Introductory notes:

1. The works, or parts of the works will be constructed using labour-intensive methods only in terms of this specification. The use of plant to provide such works, other than plant specifically provided for in the scope of work, is a variation to the contract. The items marked with the letters **LI** are not necessarily an exhaustive list of all the activities which must be done by hand, and this clause does not over-ride any of the requirements in the generic labour intensive specification in the Scope of Works.
2. Payment for items which are designated to be constructed labour-intensively (either in this schedule or in the Scope of Works) will not be made unless they are constructed using labour-intensive methods. Any unauthorised use of plant to carry out work which was to be done labour-intensively will not be condoned and any works so constructed will not be certified for payment.

DESCRIPTION OF THE WORKS

Employer's objectives

The employer's objectives are to deliver public infrastructure using labour-intensive methods in accordance with EPWP Guidelines.

Labour-intensive works

Labour-intensive works comprise the activities described in the Labour-Intensive Specification. Labour-intensive works shall be constructed/maintained using local workers who are temporarily employed in terms of the scope of work.

LABOUR-INTENSIVE COMPETENCIES OF SUPERVISORY AND MANAGEMENT STAFF

Contractors shall only engage supervisory and management staff in labour-intensive works that have completed the skills programme including Foremen/ Supervisors at NQF level 4 "National Certificate: Supervision of Civil Engineering Construction Processes" and Site Agent/ Manager at NQF level 5 "Manage Labour-Intensive Construction Processes" or equivalent QCTO qualifications (See Appendix C), at NQF outlined in Table 1. (See GUIDELINES FOR THE IMPLEMENTATION OF LABOUR-INTENSIVE INFRASTRUCTURE PROJECTS UNDER THE EXPANDED Health PROGRAMME (EPWP) -THIRD EDITION 2015)

Emerging contractors shall have personally completed, or be registered on a skills programme for the NQF level 2 unit standard. All other site supervisory staff in the employ of emerging contractors must have completed, or be registered on a skills programme for the NQF level 2 unit standards or NQF level 4 unit standards. Table 1: Skills programme for supervisory and management staff.

Table 1: Skills programme for supervisory and management staff

Personnel	NQF level	Unit standard titles	Skills programme description
Team leader / supervisor	2	Apply Labour-Intensive Construction Systems and Techniques to Work Activities	This unit standard must be completed, and any one of these 3 unit standards
		Use Labour-Intensive Construction Methods to Construct and Maintain Roads and Storm water Drainage	
		Use Labour-Intensive Construction Methods to Construct and Maintain Water and Sanitation Services	

		Use Labour-Intensive Construction Methods to Construct, Repair and Maintain structures	
Personnel	NQF level	Unit standard titles	Skills programme description
Foreman/supervisor	4	Implement Labour-Intensive Construction Systems and Techniques	This unit standard must be completed, and any one of these 3 unit standards
		Use Labour-Intensive Construction Methods to Construct and Maintain Roads and Storm water Drainage	
Details of these skills programmes may be obtained from the CETA ETQA manager (e-mail :gerard@ceta.co.za , tel: 011-265 5900)			

EMPLOYMENT OF UNSKILLED AND SEMI-SKILLED WORKERS IN LABOUR-INTENSIVE WORKS

- 1.1 Requirements for the sourcing and engagement of labour.
 - 1.1.1 Unskilled and semi-skilled labour required for the execution of all labour-intensive works shall be engaged strictly in accordance with prevailing legislation and SANS 1914-5, Participation of Targeted Labour.
 - 1.1.2 The rate of pay set for the SPWP per task or per day will be an acceptable rate determined by the Department of Labour.
 - 1.1.3 Tasks established by the contractor must be such that:
 - a) the average worker completes 5 tasks per week in 40 hours or less; and
 - b) the weakest worker completes 5 tasks per week in 55 hours or less.
 - 1.1.4 The contractor must revise the time taken to complete a task whenever it is established that the time taken to complete a weekly task is not within the requirements of 1.1.3.
 - 1.1.5 The Contractor shall, through all available community structures, inform the local community of the labour-intensive
 - a) where the head of the household has less than a primary school education;
 - b) that have less than one full time person earning an income;
 - c) where subsistence-agriculture is the source of income.
 - d) that who are not in receipt of any social security pension income
 - 1.1.6 The Contractor shall endeavour to ensure that the expenditure on the employment of unskilled and semi-skilled workers is in the following proportions:
 - a) 55% women;
 - b) 55% youth who are between the ages of 18 and 35; and
 - c) 2% on persons with disabilities.
- 1.2 Specific provisions pertaining to SANS 1914-5
 - 1.2.1 Definitions

Targeted labour: Unemployed persons who are employed as local labour on the project.
 - 1.2.2 Contract participation goals
 - 1.2.2.1 There is no specified contract participation goal for the contract. The contract participation goal shall be measured in the performance of the contract to enable the employment provided to targeted labour to be quantified.
 - 1.2.2.2 The wages and allowances used to calculate the contract participation goal shall, with respect to both time-rated and task rated workers, comprise all wages paid and any training allowance paid in respect of agreed training programmes.

- 1.2.3 Terms and conditions for the engagement of targeted labour
Further to the provisions of clause 3.3.2 of SANS 1914-5, written contracts shall be entered into with targeted labour.
- 1.2.4 Terms and conditions for the engagement of targeted labour
Further to the provisions of clause 3.3.2 of SANS 1914-5, written contracts shall be entered into with targeted labour.
- 1.2.5 Variations to SANS 1914-5
- 1.2.5.1 The definition for net amount shall be amended as follows:
Financial value of the contract upon completion, exclusive of any value added tax or sales tax which the law requires the employer to pay the contractor.
- 1.2.5.2 The schedule referred to in 5.2 shall in addition reflect the status of targeted labour as women, youth and persons with disabilities and the number of days of formal training provided to targeted labour.
- 1.3 Training of targeted labour
- 1.3.1 The contractor shall provide all the necessary on-the-job training to targeted labour to enable such labour to master the basic work techniques required to undertake the work in accordance with the requirements of the contract in a manner that does not compromise worker health and safety.
- 1.3.2 The cost of the formal training of targeted labour, will be funded by the local office of the Department of Labour. This training will take place as close to the project site as practically possible. The contractor must access this training by informing the relevant regional office of the Department of Labour in writing, within 14 days of being awarded the contract, of the likely number of persons that will undergo training and when such training is required. The Employer and the Department of Health (Fax: 012 3258625/ EPWP Unit, Private Bag X65, Pretoria 0001) must be furnished with a copy of this request.
- 1.3.3 The contractor shall do nothing to dissuade targeted labour from participating in training programmes and shall take all reasonable steps to ensure that each beneficiary is provided with two days of formal training for every 22 days worked.
- 1.3.4 An allowance equal to 100% of the task rate or daily rate shall be paid by the contractor to workers who attend formal training, in terms of the above.
- 1.3.5 Proof of compliance with the above requirements must be provided by the Contractor to the Employer prior to submission of the final payment certificate.

GENERIC LABOUR-INTENSIVE SPECIFICATION

1 Scope

This specification establishes general requirements for activities which are to be executed by hand involving the following:

- a) trenches having a depth of less than 1.5 metres
- b) storm water drainage
- c) low-volume roads and sidewalks

2 Precedence

Where this specification is in conflict with any other standard or specification referred to in the Scope of Works to this Contract, the requirements of this specification shall prevail.

3 Hand excavateable material

Hand excavateable material is material:

a) Granular materials:

- i) whose consistency when profiled may in terms of table 1 be classified as very loose, loose, medium dense, or dense; or
- ii) where the material is a gravel having a maximum particle size of 10mm and contains no cobbles or isolated boulders, no more than 15 blows of a dynamic cone penetrometer is required to penetrate 100mm;

b) Cohesive materials:

- i) whose consistency when profiled may in terms of table 1 be classified as very soft, soft, firm, stiff and stiff / very stiff; or
- ii) where the material is a gravel having a maximum particle size of 10mm and contains no cobbles or isolated boulders, no more than 8 blows of a dynamic cone penetrometer is required to penetrate 100mm;

Note: 1) A boulder, a cobble and gravel is material with a particle size greater than 200mm, between 60 and 200mm.

2) A dynamic cone penetrometer is an instrument used to measure the in-situ shear resistance of a soil comprising a drop weight of approximately 10 kg which falls through a height of 400mm and drives a cone having a maximum diameter of 20mm (cone angle of 60 degrees with respect to the horizontal) into the material being used.

Table 2: Consistency of materials when profiled

GRANULAR MATERIALS		COHESIVE MATERIALS	
CONSISTENCY	DESCRIPTION	CONSISTENCY	DESCRIPTION
Very loose	Crumbles very easily when scraped with a geological pick.	Very soft	Geological pick head can easily be pushed in as far as the shaft of the handle.

Loose	Small resistance to penetration by sharp end of a geological pick.	Soft	Easily dented by thumb; sharp end of a geological pick can be pushed in 30-40 mm; can be moulded by fingers with some pressure.
Medium dense	Considerable resistance to penetration by sharp end of a geological pick.	Firm	Indented by thumb with effort; sharp end of geological pick can be pushed in upto 10 mm; very difficult to mould with fingers; can just be penetrated with an ordinary hand spade.
Dense	Very high resistance to penetration by the sharp end of a geological pick; requires many blows for excavation.	stiff	Can be indented by thumb-nail; slight indentation produced by pushing geological pick point into soil; cannot be moulded by fingers.
Very dense	High resistance to repeated blows of a geological pick.	Very stiff	Indented by thumb-nail' with difficulty; slight indentation produced by blow of a geological pick point.

4 Trench excavation

All hand excavateable material in trenches having a depth of less than 1,5 metres shall be excavated by hand.

5 Compaction of backfilling to trenches (areas not subject to traffic)

Backfilling to trenches shall be placed in layers of thickness (before compaction) not exceeding 100mm. Each layer shall be compacted using hand stampers

- a) to 90% Proctor density;
- b) such that in excess of 5 blows of a dynamic cone penetrometer (DCP) is required to penetrate 100 mm of the backfill, provided that backfill does not comprise more than 10% gravel of size less than 10mm and contains no isolated boulders, or
- c) such that the density of the compacted trench backfill is not less than that of the surrounding undisturbed soil when tested comparatively with a DCP.

6 Excavation

All hand excavateable material including topsoil classified as hand excavateable shall be excavated by hand. Harder material may be loosened by mechanical means prior to excavation by hand.

The excavation of any material which presents the possibility of danger or injury to workers shall not be excavated by hand.

7 Clearing and grubbing

Grass and small bushes shall be cleared by hand.

8 Shaping

All shaping shall be undertaken by hand.

9 Loading

All loading shall be done by hand, regardless of the method of haulage.

10 Haul

Excavation material shall be hauled to its point of placement by means of wheelbarrows where the haul distance is not greater than 150 m.

11 Offloading

All material, however transported, is to be off-loaded by hand, unless tipper-trucks are utilised for haulage.

12 Spreading

All material shall be spread by hand.

13 Compaction

Small areas may be compacted by hand provided that the specified compaction is achieved.

14 Grassing

All grassing shall be undertaken by sprigging, sodding, or seeding by hand.

15 Stone pitching and rubble concrete masonry

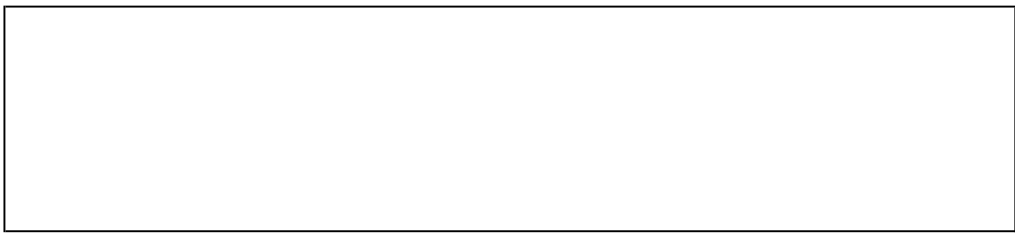
All stone required for stone pitching and rubble concrete masonry, whether grouted or dry, must be collected, loaded, off loaded and placed by hand.

Sand and stone shall be hauled to its point of placement by means of wheelbarrows where the haul distance is not greater than 150m.

Grout shall be mixed and placed by hand.

16 Manufactured Elements

Elements manufactured or designed by the Contractor, such as manhole rings and cover slabs, precast concrete planks and pipes, masonry units and edge beams shall not individually, have a mass of more than 320kg. In addition, the items shall be large enough so that four workers can conveniently and simultaneously acquire a proper handhold on them.



(Insert Your Company Logo)

(This shall serve as the cover page on employment contracts for local labour)

EMPLOYMENT AGREEMENT

BETWEEN

[CONTRACTOR NAME].....

AND

[WORKER NAME].....

1. PARTIES

And

1.2. Mr / Me: _____
[worker's name]

2. DEFINITIONS AND INTERPRETATION

2.1. In this Agreement and any Annexure thereto, unless inconsistent with or otherwise indicated by the context-

“Agreement”	means the contents of this Agreement.
“Company”	means the company that employs the worker
“Department”	means the Department of Public Works
“Worker”	is a person that performs a specific or necessary task or who completes tasks in a certain way
“EPWP”	The Expanded Public Works Programme is a government programme aimed at the alleviation of poverty and unemployment. The programme ensures the full engagement on Labour Intensive Methods of Construction (LIC) to contractors for skills development. The EPWP focuses at reducing unemployment by increasing economic growth by means of improving skills levels through education and training and improving the enabling environment for the industry to flourish.

3. PURPOSE

The purpose of this agreement is to:-

Ensure that the agreement is binding to both the Worker and the Employer.

4. TERMS AND CONDITIONS

- The worker will have no entitlement to the benefits of a full time employee, namely;

- The worker should not have the expectation that this contract will be renewed or extended.
- The worker will be subject to all laws, rules, policies, codes and procedures applicable to the;

- The worker must meet the standards and requirements of the contractor
- The worker must render his/her services during normal working hours of minimum of forty to fifty five hours in any week; which comprise of an eight-hour working day in a five-day week.

5. REMUNERATION

The worker will receive compensation to the amount of R _____ 00 which must be paid by the 25th or on the last day of each month.

6. ROLES AND RESPONSIBILITIES

6.1 Employer / Worker

- Work for _____ in terms of the period as specified in the employment agreement contract.
- Be available for and participate in all learning and work experience required by the company.
- Comply with workplace policies and procedures.
- Complete any attendance or any written assessment tools supplied by the contractor to record relevant workplace experience.
- Demonstrate willingness to grow and learn through work experience.

Provide the following documentation to the employer,

- Certified identity document not longer than 3 months
- ID size photos
- Sign employment contract

6.2 Employer

- Employ the worker for a period specified in the agreement.
- Provide the worker with appropriate work based experience in the work environment.
- Facilitate payments of wages / stipends.
- Keep accurate records of workers.
- Where a worker/ learner is disabled, the employer will have to provide in the additional needs e.g. special materials, learning aids and in some cases physical or professional support (such aids remain the property of the employer).
- Keep up to date records of learning and discuss progress with the intern on a regular basis.
- Apply fair disciplinary, grievance and dispute resolution procedures to the worker.
- Prepare an orientation/ induction course to introduce worker/ learner to the workplace and specific workplace requirements.
- Ensure the daily attendance register is signed by the worker.

7. DURATION.

This agreement commences on: _____

and

expires on: _____

8. BREACH.

If either party commits any breach of the terms of this contract (and fails to rectify it within 30 days of receipt of a written notice calling it to do so, then) the other party shall be entitled to terminate the contract or to claim specific performance without prejudice to any of its other legal rights, including its rights to claim damages.

9. CONDITIONS OF EMPLOYMENT

9.1. Meal Breaks

9.1.1 A worker may not work for more than five hours without taking a meal break of at least thirty minutes duration.

9.1.2 An employer and worker may agree on longer meal breaks.

9.1.3 A worker may not work during a meal break. However, an employer may require a worker to perform duties during a meal break if those duties cannot be left unattended and cannot be performed by another worker. An employer must take reasonable steps to ensure that a worker is relieved of his or her duties during the meal break.

9.1.4 A worker is not entitled to payment for the period of a meal break. However, a worker who is paid on the basis of time worked must be paid if the worker is required to work or to be available for work during the meal break.

9.2. Special Conditions for Security Guards (Only applicable to security Guards)

9.2.1 A security guard may work up to 55 hours per week and up to eleven hours per day.

9.2.2 A security guard who works more than ten hours per day must have a meal break of at least one hour or two breaks of at least 30 minutes each.

9.3. Weekly Rest Period

Every worker must have two days off every week. A worker may only work on their day off to perform work which must be done without delay and cannot be performed by workers during their ordinary hours of work ("emergency work").

9.4. Work on Sundays and Public Holidays

9.4.1 A worker may only work on a Sunday or public holiday to perform emergency or security work.

9.4.2 Work on Sundays is paid at the ordinary rate of pay.

9.4.3 A task-rated worker who works on a public holiday must be paid;

- (a) the worker's daily task rate, if the worker works for less than four hours;
- (b) double the worker's daily task rate, if the worker works for more than four hours.

9.4.4 A time-rated worker who works on a public holiday must be paid

- (a) the worker's daily rate of pay, if the worker works for less than four hours on the public holiday;
- (b) double the worker's daily rate of pay, if the worker works for more than four hours on the public holiday.

9.5 Sick leave

9.5.1 Only workers who work more than 24 hours per month have the right to claim sick-pay in terms of this clause.

9.5.2 A worker who is unable to work on account of illness or injury is entitled to claim one day's paid sick leave for every full month that the worker has worked in terms of a contract.

9.5.3 A worker may accumulate a maximum of twelve days' sick leave in a year.

9.5.4 Accumulated sick-leave may not be transferred from one contract to another contract.

9.5.5 An employer must pay a task-rated worker the worker's daily task rate for a day's sick leave.

9.5.6 An employer must pay a time-rated worker the worker's daily rate of pay for a day's sick leave.

9.5.7 An employer must pay a worker sick pay on the worker's usual payday.

9.5.8 Before paying sick-pay, an employer may require a worker to produce a certificate stating that the worker was unable to work on account of sickness or injury if the worker is

- (a) absent from work for more than two consecutive days; or
- (b) absent from work on more than two occasions in any eight-week period.

9.5.9 A medical certificate must be issued and signed by a medical practitioner, a qualified nurse or a clinic staff member authorised to issue medical certificates indicating the duration and reason for incapacity.

9.5.10 A worker is not entitled to paid sick-leave for a work-related injury or occupational disease for which the worker can claim compensation under the Compensation for Occupational Injuries and Diseases Act.

9.6 Maternity Leave

9.6.1 A worker may take up to four consecutive months' unpaid maternity leave.

9.6.2 A worker is not entitled to any payment or employment-related benefits during maternity leave.

9.6.3 A worker must give her employer reasonable notice of when she will start maternity leave and when she will return to work.

9.6.4 A worker is not required to take the full period of maternity leave. However, a worker may not work for four weeks before the expected date of birth of her child or for six weeks after the birth of her child, unless a medical practitioner, midwife or qualified nurse certifies that she is fit to do so.

9.6.5 A worker may begin maternity leave as follows;

- (a) four weeks before the expected date of birth; or
- (b) on an earlier date
 - (i) if a medical practitioner, midwife or certified nurse certifies that it is necessary for the health of the worker or that of her unborn child; or

- (ii) if agreed to between employer and worker; or
 - (c) on a later date, if a medical practitioner, midwife or certified nurse has certified that the worker is able to continue to work without endangering her health.
- 10,6 A worker who has a miscarriage during the third trimester of pregnancy or bears a stillborn child may take maternity leave for up to six weeks after the miscarriage or stillbirth.

9.7. Family responsibility leave

9.7.1 Workers, who work for at least four days per week, are entitled to three days paid family responsibility leave each year in the following circumstances;

- (a) when the employee's child is born;
- (b) when the employee's child is sick;
- (c) in the event of a death of
 - (i) the employee's spouse or life partner;
 - (ii) the employee's parent, adoptive parent, grandparent, child, adopted child, grandchild or sibling.

9.8. Keeping Records

9.8.1 Every employer must keep a written record on site for the duration of the project and three (3) year after completion records should consists of at least the following;

- (a) the worker's name and position;
- (b) copy of an acceptable worker identification
- (c) in the case of a task-rated worker the number of tasks completed by the worker;
- (d) in the case of a time-rated worker, the time worked by the worker;
- (e) payments made to each worker in a form of Proof of Payment, Payroll registers and the acknowledgement of payment receipt signed by the worker.

9.8.2 The employer must keep this record for a period of at least three years after the completion of the EPWP.

9.9. Payment

9.9.1 An employer must pay all wages at least monthly in cash or by cheque or into a bank account.

9.9.2 A worker may not be paid less than the Ministerial Determination wage rate.

9.9.3 A task-rated worker will only be paid for tasks that have been completed.

9.9.4 An employer must pay a task-rated worker within five weeks of the work being completed and the work having been approved by the manager or the contractor having submitted an invoice to the employer.

9.9.5 A time-rated worker will be paid at the end of each month.

9.9.6 Payment must be made in cash, by cheque or by direct deposit into a bank account designated by the worker.

9.9.7 Payment in cash or by cheque must take place

- (a) at the workplace or at a place agreed to by the worker;
- (b) during the worker's working hours or within fifteen minutes of the start or finish of work;
- (c) in a sealed envelope which becomes the property of the worker.

9.9.8 An employer must give a worker the following information in writing

- (a) the period for which payment is made;
- (b) the numbers of tasks completed or hours worked;
- (c) the worker's earnings;
- (d) any money deducted from the payment;
- (e) the actual amount paid to the worker.

9.9.9 If the worker is paid in cash or by cheque, this information must be recorded on the envelope and the worker must acknowledge receipt of payment by signing for it.

9.9.10 If a worker's employment is terminated, the employer must pay all monies owing to that worker within one month of the termination of employment.

9.10. Inclement weather

If no work has begun on site, and if an employee has reported for work, the employee will be paid for four hours. Should work be stopped after the first four hours, the employee will be paid for the hours worked. Where the employer has given employees notice on the previous working day that no work will be available due to inclement weather, then no payment will be made.

9.11. Deductions

9.11.1 An employer may not deduct money from a worker's payment unless the deduction is required in terms of a law.

9.11.2 An employer must deduct and pay to the SA Revenue Services any income tax that the worker is required to pay.

9.11.3 An employer who deducts money from a worker's pay for payment to another person must pay the money to that person within the time period and other requirements specified in the agreement of Law; court order or arbitration

9.11.4 It is the responsibility of the employers to arrange for all persons employed on a Project to be covered in terms of the Unemployment Insurance Fund Contributions Act, 2002 (Act No. 4 of 2002)

9.11.5 An employer may not require or allow a worker to

- (a) repay any payment except an overpayment previously made by the employer by mistake;

- (b) state that the worker received a greater amount of money than the employer actually paid to the worker; or
- (c) pay the employer or any other person for having been employed.

9.12. Health and Safety

9.12.1 Employers must take all reasonable steps to ensure that the working environment is healthy and safe.

9.12.2 A worker must;

- (a) work in a way that does not endanger his/her health and safety or that of any other person;
- (b) obey any health and safety instruction;
- (c) use any personal protective equipment or clothing issued by the employer;
- (d) report any accident, near-miss incident or dangerous behaviour by another person to their employer or manager.

9.13. Compensation for Injuries and Diseases

9.13.1 It is the responsibility of the employers to arrange for all persons employed on a Project to be covered in terms of the Compensation for Occupational Injuries and Diseases Act, 130 of 1993 as amended by COIDA Act 61, 1997.

9.13.2 A worker must report any work-related injury or occupational disease to their employer or manager.

9.13.3 The employer must report the accident or disease to the Compensation Commissioner.

9.13.4 An employer must pay a worker who is unable to work because of an injury caused by an accident at work 75% of their earnings for up to three months. The employer will be refunded this amount by the Compensation Commissioner. This does NOT apply to injuries caused by accidents outside the workplace such as road accidents or accidents at home.

9.14. Termination

9.14.1 The employer may terminate the employment of a worker for good cause after following a fair procedure.

9.14.2 A worker will not receive severance pay on termination.

9.14.3 A worker is not required to give notice to terminate employment. However, a worker who wishes to resign should advise the employer in advance to allow the employer to find a replacement.

9.14.4 A worker **who is absent for more than three consecutive days** without informing the employer of an intention to return to work will have terminated the contract. However, the worker may be re-engaged if a position becomes available.

9.14.5 A worker who does not attend required training events, without good reason, will have terminated the contract. However, the worker may be re-engaged if a position becomes available.

Notice procedure is as follows;

- One week if employed for four weeks or less
- Two weeks if employed for more than four weeks but not more than a year
- Four weeks of employed for one (1) year or more

9.15. Certificate of Service

9.15.1 On termination of employment, a worker is entitled to a certificate stating;

- (a) the worker's full name;
- (b) the name and address of the employer;
- (c) the Project on which the worker worked; the work performed by the worker;
- (d) any training received by the worker;
- (e) the period for which the worker worked on the Project; and
- (f) any other information agreed on by the employer and worker.

9.16. DOMICILE

The address to which notices and all legal documents may be delivered or served are as follows:

Employee Details

Name & Surname: _____

ID No: _____

Residential Address: _____

Contact No: _____

Date of Employment: _____

To be supervised by:	Main Contractor:	<input type="text"/>
	or Sub Contractor:	<input type="text"/>
Category of employment:	Skilled:	<input type="text"/>
	Semi-skilled:	<input type="text"/>
	Unskilled:	<input type="text"/>

For Skilled & Semi-skilled state the trade: _____

Period of employment: Fixed for until when your services are still required on site

I confirm that I have been inducted and fully understand the condition of my appointment.

Employee Signature: _____ **Witness by SGB/CLO:** _____

Signature by Witness: _____

Employer Details

Name & Surname: _____

Designation: _____

Contact No: _____ **Signature:** _____



The Attendance Register for on-site Workers

Reporting month: _____ Cell No: _____
Surname: _____ First Name: _____

Project Name: **NYAVINI CLINIC: CONSTRUCTION OF SMALL CLINIC**

Project Code: **TBA** Tender No **ZNB 5549/2023-H**

IDENTITY NUMBER:

Day	Date	Time In	Signature	Time Out	Signature	Report On Any Formal Training Provided In The Reporting Month
WEEK 1						
MONDAY						
TUESDAY						
WEDNESDAY						
THURSDAY						
FRIDAY						
WEEK 2						
MONDAY						
TUESDAY						
WEDNESDAY						
THURSDAY						
FRIDAY						
WEEK 3						
MONDAY						
TUESDAY						
WEDNESDAY						
THURSDAY						
FRIDAY						
WEEK 4						
MONDAY						
TUESDAY						
WEDNESDAY						
THURSDAY						
FRIDAY						
Total Days worked						

BUSINESS PLAN

Reference No	
Profile ID	
Project Name	
Project Details	
Project Name	
Project Reference Number	
Project description	
Project Start Date	
Project End Date	
Estimated Budget	
Project Location	
Province	
District/Metro Municipality	
Local Municipality/Metro Region	
Latitude (in decimal format)	
Longitude (in decimal format)	
Public Body Details	
Public body sphere	
Reporting public body that is the project owner (and will report on the project)	
Implementing public body type	
Public body that will implement the project	
IDP reference number allocated to the project	
EPWP Details	
EPWP Sector	
EPWP Program	
EPWP Sub programme	
Budget Amount	
April 2014/March 2015	
April 2015/March 2016	
Total Budget Amount	
Wages	
UIF	
COIDA	
Training	
Administration	
Equipment and materials	
Other	
Describe other	
Outputs and Training	
First Name	
Surname	
Email	
Tel (Office)	
Fax Number	
Cell Number	
Physical Address 1	
Physical Address 2	
Physical Address 3	
Physical Address 4	
Postal Address 1	
Postal Address 2	
Postal Address 3	
Postal Address 4	

KZN DEPARTMENT OF HEALTH
Monthly Data collection for LOCAL Labour



Name of Contractor: _____

Project Code: _____ - _____

Project location name (area): _____

Name of Project: _____

NYAVINI CLINIC: CONSTRUCTION OF SMALL CLINIC

Reporting month: _____

Project location (Ward No.): _____

No	First Name	Initial	Surname	ID number	Beneficiary Details			Total days worked	Job description	Registered on UIF (Y/N)	Registered with CODA (Y/N)	Are you registered with a grant? (Y/N)	1st Language (Y/N)	Experience/Literacy			Location Details			Household Details			
					D.O.B	Gender F/M	Disability Y/N							Start Date on the current month	End Date on the current month	Other Language 1	Other Language 2	Education Level (See Codes below)	Highest Level of Education	Address	Ward No.	Cell No.	Nationality
1																							
2																							
3																							
4																							
5																							
6																							
7																							
8																							
9																							
10																							

• Education Levels—use the codes (1,2,3) on the excel spreadsheet
(3) Grade 1-3 (Sub A – Std 1) **(6)** Grade 5-6 (Std 3-4) ABET 2 **(7)** Grade 9 (Std 7) ABET 4 **(9)** Grade 12 (Std 10)
(4) Grade 4 (Std 2) ABET 1 **(8)** Grade 7-8 (Std 5-6) ABET 3 **(8)** Grade 10-11 (Std 8-9) **(10)** Post Matric

Contractor sign: _____
 Designation: _____
 Date: _____
 Contact no: _____

DPW Official/Consultant sign: _____
 Designation: _____
 Date: _____
 Contact no: _____

EPWP Official sign: _____
 Designation: _____
 Date: _____
 Contact no: _____

KZN DEPARTMENT OF HEALTH



Worker payment capture form for LOCAL Labour

Name of Contractor: _____

Project Code: _____ -

Name of Project: **NYAVINI CLINIC: CONSTRUCTION OF SMALL CLINIC**

Reporting month: _____

Payment Upload										
No.	First Name	Initials	Surname	Identity No.	D.O.B	Job Description	Daily Wage Rate	Total Paid Days	Total Amount Paid	Total days Worked Days
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										

Contractor sign: _____
Designation: _____
Date: _____
Contact no: _____

DPW Official/Consultant sign: _____
Designation: _____
Date: _____
Contact no: _____

EPWP Official sign: _____
Designation: _____
Date: _____
Contact no: _____

KZN DEPARTMENT OF HEALTH
Worker Training capture form for LOCAL Labour



Name of Contractor: _____
Name of Project: **NYAVINI CLINIC: CONSTRUCTION OF SMALL CLINIC**

Project Code: _____

Reporting month: _____

Training														
No	Name	Surname	ID No.	Job description	Course Name	Was training Accredited or Non - accredited by a relevant SETA	Start date on current month	End date on current month	Training Days Paid	Training Days Not Paid	Total Number of Training Days	Cost per trainee	Is training complete or on - going	Name of Training Provider
1														
2														
3														
4														
5														
6														
7														
8														
9														
10														
11														
12														
13														
14														
15														

Contractor sign: _____

DPW Official/Consultant sign: _____

EPWP Official sign: _____

Designation: _____

Designation: _____

Designation: _____

Date: _____

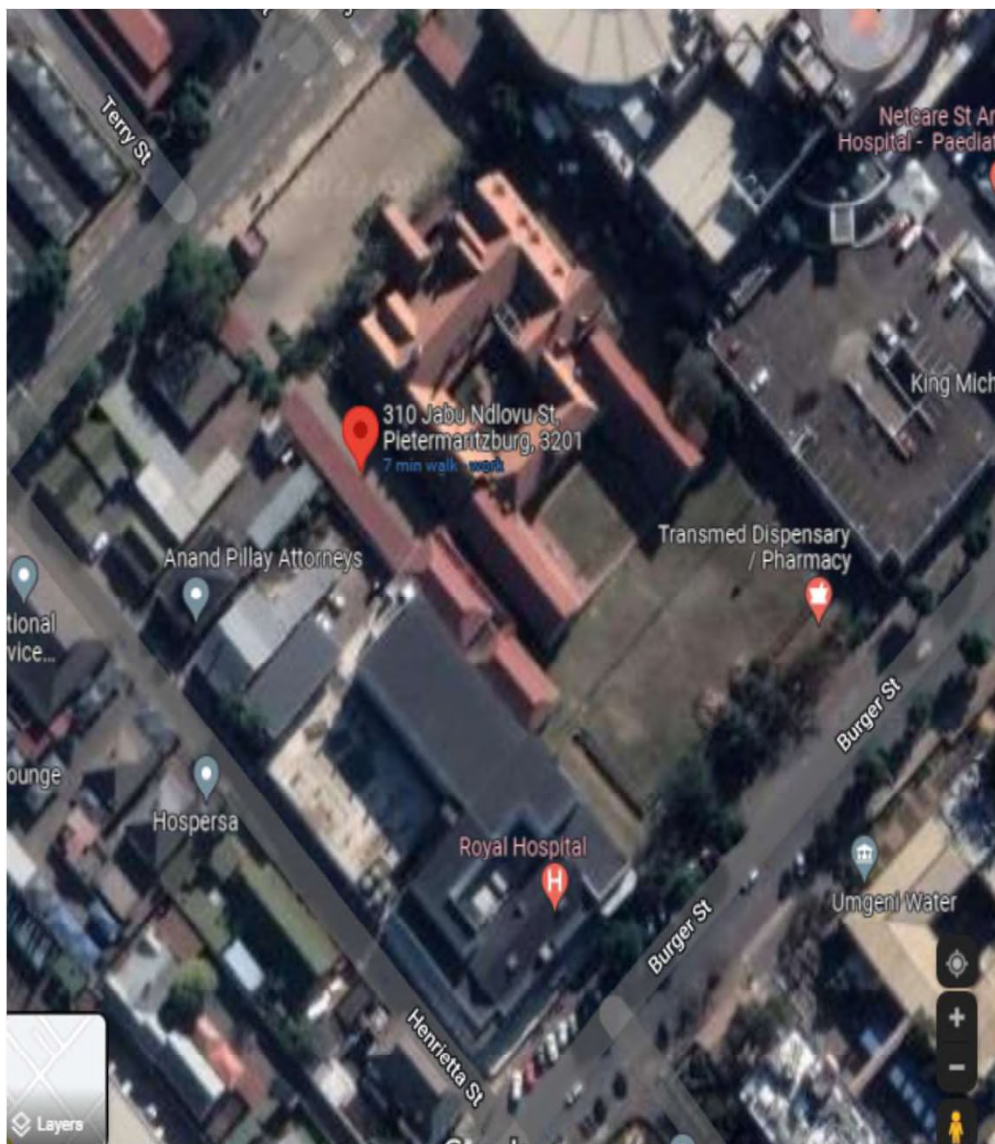
Date: _____

Date: _____

Contact no: _____

Contact no: _____

Contact no: _____



SPECIFICATIONS



health

Department:
Health
REPUBLIC OF SOUTH AFRICA

SPECIFICATION

VOLUME 1 ELECTRICAL INSTALLATION

PROPOSED

**DEPARTMENT OF HEALTH: IDEAL
CLINICS PROROTYPE ELECTRICAL
SPECIFICATION**



**DEPARTMENT OF HEALTH: IDEAL CLINICS PROTOTYPE
ELECTRICAL INSTALLATION**

DETAIL SPECIFICATION

MASTER INDEX

This document consists of the following:

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Part D – Schedules of Outlets	24
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Bills of Quantities	40

Section 3 : Volume 2 – Lightning Protection Installation

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--	----------	---

General Specification

	Part 2LP	8
	Bills Of Quantities	10

Section 4 : Volume 3 – Fire Detection Installation

Detail Specification

	Part 1FD	3
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General Specification

	Part 2FD	24
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Section 4.1 : Volume 3.1 – Nurse Call Installation & Public Address

Detail Specification

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General Specification

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Detail Specification

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--	----------	----

General Specification

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Section 6 : Volume 5 – Ancillary Installation

Detail Specification

	Part 1 ANC – Part A	2
	Part 1 ANC – Part B	3
	Part 1 ANC – Part C	3

General Specification

	Part 2 ANC	4
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Section 7 : Volume 6 – Central Television System Installation

Detail Specification

	Part A TV	4
	Part B TV	8
	Part C TV	4
	Bills of Quantities	7



health

Department:
Health
REPUBLIC OF SOUTH AFRICA

VOLUME 1

ELECTRICAL INSTALLATION

SECTION 2

GENERAL SPECIFICATION



DEPARTMENT OF HEALTH: IDEAL CLINICS PROTOTYPE

ELECTRICAL INSTALLATION

SECTION A

GENERAL ELECTRICAL SPECIFICATION

ALL IN CONTRACTS

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PART 2

GENERAL ELECTRICAL SPECIFICATION

(ALL IN CONTRACTS)

2.1 CONDUIT AND CONDUIT ACCESSORIES

2.1.1 Conduit

Conduit shall be of steel galvanized internally and externally, either solid drawn, or welded and not less than 20mm diameter, with all rough edges removed. All tube ends removed. All tube ends are to be reamed. With screwed conduit one threaded end is to be fitted with a coupling and the other end is to be protected against damage.

UPVC conduit may only be used if permitted by the Head: Works and only in those areas which he may specify. In this case this conduit shall be according to SANS 950.

Conduit accessories, which are secured to the conduit by means of lugs, screws or set screws, are not acceptable.

General requirements of conduiting to SANS IEC 60614 (1).

Metal conduits shall be fully in accordance with SANS 1065 PART I.

2.1.2 Conduit Accessories

All conduit accessories shall be galvanized both internally and externally and comply with SANS 1065 – PART II.

All screwed conduit fittings shall be of malleable cast iron.

Where fittings are fitted with covers, the covers shall be of galvanized pressed steel secured with brass screws.

2.1.3 Flexible Conduit

Flexible conduit shall be of the plastic covered metal type complete with brass connectors to the approval of the Head:Works.



2.1.4 General

Except where cables are specified for certain circuits, the installation(s) shall be tubed throughout in steel conduit. Split conduit is not permitted. All conduits shall, wherever possible, or unless otherwise specified or agreed, be concealed in the structural work.

Except where agreed or otherwise specified or indicated on the drawings, all conduit to points shall run via the ceiling and floor slabs or roof space. In damp situations and where exposed to the weather, the conduits shall be so installed as to avoid, as far as possible, the condensation of moisture within them. All running joints are to be painted with an approved metal primer.

Mechanical and Electrical continuity must be maintained throughout the installation. Each length of conduit and every conduit fitting must be inspected for defects and all sharp edges or burrs must be removed before it is installed. All joints are to be tightly fitted together.

Running joints with long threads, where used, are to be fitted with a lock nut and the running thread shall not be longer in length than a coupling and lock unit.

In conduits smaller than 32mm elbows and normal bends are not to be used but conduits are to be set to the required angles.

Flexible connections between conduit and appliance or other equipment shall be by means of flexible tubing (see Par 2.1.3).

No wiring shall be drawn into conduits until the conduits have been installed.

Where more than one socket outlet is connected on a circuit, the conduit shall be looped from the one outlet box to the following outlet box.

All switch-boxes, socket outlet boxes and any other purpose made metal box including distribution board trays shall be suitable treated against corrosion before installation with "Rustodian" or other approved metal primer.

All conduits shall be securely fixed into chases, and all flush switch and socket outlet boxes must be firmly embedded in cement mortar.

The Contractor shall make himself familiar with the positions of all fittings, such as blackboards, pinning boards, cupboards, shelving, work-tops, etc. before commencing the conduit installation. The position of switches and socket outlets as indicated on the drawings are approximate only. The Contractor must verify that the final position of these will not be covered by the installation of the fittings referred to above, or come midway between the junction of any dados and upper wall finishes.

No extras will be entertained for moving switches or socket outlets as a result of the Contractor's failure to verify the final positions of the fittings or type of wall finish.

2.1.5 In Roof Spaces

The conduit in roof spaces shall be installed parallel or at right angles to the roof truss members and shall be secured at centres not exceeding 1,2m by means of galvanized saddles nailed to the timbers with galvanized clout nails. Crampets will not be allowed.



Crossing of conduits is to be avoided wherever possible. Where unavoidable, one conduit must be neatly set over the other. Where a number of conduits have to run back to the distribution board or switchboard, they shall run parallel to the distribution board or switchboard, and at saddle distance to each other wherever possible.

Conduit runs from distribution boards shall terminate in fabricated sheet steel draw boxes installed in the roof above the distribution boards. Each draw box shall be fabricated from 1,60mm galvanized sheet steel with welded corners and suitably treated against corrosion with "Rustodian" or other approved primer and finished in aluminium paint.

Each draw box is to be fitted with slip-on lid with a 13mm skirt. The box shall be 75mm deep, shall be rectangular in shape and the size of conduits entering or leaving the box. Conduits shall be fixed to the box by means of couplings and brass male bushes or lock nuts and brass bush-nuts.

Conduit droppers shall be neatly cut into timber wall plates and set to face the right direction. All sets must be uniform. Conduits may be set at angles only where droppers or ceiling points are within 230mm of roof members.

No conduits are to be run over the top of gangplanks or trapdoors.

Draw-in boxes with metal covers shall be provided where required and shall be installed near the gangplanks, if any. All inspection conduit fittings in open roof spaces shall face upwards to facilitate wiring and to permit easy inspection. Three-way conduit boxes shall be used for tee-off purposed in open roof spaces. Inspection tees are not to be used except where otherwise agreed or specified.

All conduits extended into a roof space with a roof clearance of more than 900mm shall be set onto the beam and extended into the roof for a distance where there is sufficient clearance. Under flat roofs or where there is less than 900mm clearance, the conduit shall be installed as specified for tubing in concrete slabs, right angle bends should be kept to a minimum and the shortest route taken.

Where false ceilings occur, they shall be tubed as called for in the detailed specification. Conduits in restricted spaces and run as for concrete slabs must, however, be installed in a neat and orderly manner.

Conduits to ceilings points for all types of fittings must be firmly supported and shall terminate in a back entry conduit box. The conduit box shall be taken through to the face of the ceiling and finish flush. Where the ceiling branding interferes with the installation of the ceiling point specified, the Contractor must trim the branding to allow the conduit box to be taken through to the face of the ceiling as specified. Luminaries must be bonded to the conduit box by means of metal threaded screws.

2.1.6 In Concrete Slabs

In order not to delay building operations, the Contractor must ensure that all conduits and conduit fittings, which are to be cast in concrete, are laid in good time. The Contractor shall have a competent Electrical Artisan standing by during casting of concrete, etc. to ensure that the conduit boxes are not damaged during casting of concrete.

Draw boxes, expansion joints boxes and round conduit boxes are to be provided where necessary.



Deep type conduit boxes shall be used for side entering conduits and normal shallow boxes may be used for back entry conduits. No elbows, bends or sharp sets will be allowed in concrete slabs except in cases of conduits of 40mm diameter or when larger sweeping bends will be permitted.

Common drawn and/or inspection boxes shall be used where there is more than one circuit involved. They shall be installed in lavatories, storerooms, or other inconspicuous places. Covers shall be of hard Board neatly finished to match the finished ceiling or wall surface, and shall be fitted parallel to the wall or ceiling.

All boxes, etc. are to be securely fixed to the shuttering to prevent displacement when concrete is cast. All conduits must be laid off the deck, supported and secured at regular intervals and installed as close as possible to the neutral axis of concrete beams and slabs.

Expansion joints shall be shown on layout Drawing No. included in this General Specification Clause and shall consist of a metal box in which one conduit is fixed and the other capable of movement with the building's expansion and contraction. Earth continuity of these joints shall be maintained by means of stranded copper conductors bonded to the conduits in the box as shown on the drawing.

Earth conductors and clamps buried in concrete are not permitted.

Conduits must be spaced sufficiently apart to allow for proper concreting. All joints shall be painted with an approved metal primer after completion of the tubing installation, prior to the concreting. All exposed parts of the conduit installation shall be suitably, protected against corrosion at the discretion of the Head:Works.

Before any concrete slab is cast, all conduit droppers to switchboards shall be neatly spaced and rigidly fixed.

2.1.7 Surface Work

All conduit must be plumbed and levelled and only straight lengths shall be used.

In cases where doorframes are out of plumb, or fittings, beams etc. are out of level, the conduit shall be run parallel with the doorframes, fittings, beams etc.

No threads shall be visible when the conduit installation is complete, except on running couplings. Running couplings shall only be used where unavoidable and shall be fitted with a sliced coupling as a lock nut. No inspection or normal bends are to be used on surface work, except with the approval of the Works Inspector and where conduits of 32mm diameter or larger are used. Conduits shall be set uniformly and inspection couplings shall be used where necessary. Fittings, tees, boxes, couplings, etc. are to be cut into the surface to allow the conduit to fit flush against the surface or alternatively spacer bar saddles may be used. Conduit is to be bedded into any irregularities to avoid gaps between the surface and the conduit.

Double sets, where used, shall be parallel with no twists and shall be as short as possible. All conduits, which terminate at metal trays, boxes, industrial switches and plugs shall do so by means of couplings and male bushes. No couplings will be permitted in droppers of lengths less than 3.6m Where crossings of conduits are unavoidable, purpose made metal boxes shall be used. The length of the box is to be 8 times the diameter of the largest conduit, the width one and half times the sum of the diameter of all the conduits, and the depth one and half times the diameter of the largest conduit with a minimum depth of 50mm. The box shall be fitted with a neatly fitting cover and the finish shall be in keeping with the general layout.



Where a number of conduits are to be installed in parallel they shall be evenly spaced and grouped under one purpose made saddle. Conduit spacing shall not exceed 10mm. The purpose made saddle shall be made of 25mm x 2mm galvanized steel strip or other approved material, formed to suit the curvature of the various conduits and shall be drilled and fixed by means of screws between. Saddles shall be spaced at intervals not exceeding 1.8m, except for conduit droppers, which shall be saddled centrally between ceiling and accessory box. All saddles are to be secured to the wall by means of black japan or brass rounded head screws. Distribution boards, draw boxes, industrial switches and plugs, etc. shall be neatly recessed into the surface

of plastered walls to avoid double sets or alternatively spacer bar saddles may be used. On face brick walls the conduit shall be tightly set into the switch or plug.

In situations where there are not ceilings, the conduits are to be run along the wall plates and tie beams. No wiring is to be carried out until the tubing has been inspected and approved. Where spacer bar saddles are used, these shall be installed at centres of 1m for horizontal and 1.5m for vertical runs.

All conduits shall be painted with an approved enamel paint to match the background.

2.1.8 Future Extensions

In roof spaces with a minimum clearance of 900mm, switch and plug drips for future use are to be set 300mm in the correct direction and shall be threaded and fitted with plugged couplings. Where the roof over a slab is to be removed for future expansions, conduits for future use are to terminate 40mm above tie beams and shall be threaded and fitted with plugged couplings.

Where future extensions are to be below slabs, all switch, socket outlet and other conduit droppers are to terminate 130mm below slabs or beams with conduit ends threaded and fitted with plugged couplings.

Where provision is made for future extensions to a concrete slab, all conduits required for future use are to project 130mm from the slab. Conduit projections are to be painted with an approved anti-corrosive paint and must be fitted with plugged couplings.

All switch, plug and other outlet boxes required for future use shall be fitted with approved blank cover plates.

Unused lighting outlet boxes are to be fitted with round hard Board or plastic covers with brass cover screws, which shall fit flat on the finished ceiling.

2.1.9 Fixing of Conduits

Conduits shall be fixed to switch and socket outlet boxes by means of couplings and brass male bushes or lock nuts and brass bush nuts. Couplings and male bushes to be used on all surface work.

2.1.10 Chases and Building Work

Except where otherwise specified conduits, switch boxes, plug boxes and distribution boards are to be built into the brick walls by the Contractor. It will, however, remain the responsibility of the Contractor to ensure that the above-



mentioned boxes and distribution boards are correctly built in and are firmly bedded and cemented into the walls, plumb and square.

The Contractor shall, unless otherwise specified, do all necessary chasing and cutting of bricks. All electrical materials (e.g. conduits up to 40mm for UG cables, conduits, conduit boxes, distribution boards etc.) must be supplied by the Contractor who must arrange to have these onsite, and positioned when required for the building work. A competent Electrical Artisan must be in attendance and ensure that the conduits etc. are correctly installed and positioned.

The Contractor is to ensure that tubing installed in chases is securely nailed and covered by a layer of 5:1 mixture of coarse sand and cement, finished flush with brickwork and that switch and plug boxes finish flush with the finished wall surface.

The Contractor is to ensure that below distribution boards connected by means of underground cables, a 230mm wide by 115mm deep cavity in the wall from the cable pipe to the distribution board is to be provided by the Contractor, or alternatively, cable sleeves as specified.

2.2 PLUGGING OF WALLS

Only approved plastic plugs shall be used to secure conduit or equipment up to 5kg mass. The use of round-headed screws only will be permitted.

Heavier equipment shall be secured by means of approved expansion bolts wWood plugs and any plugs in the joints in brick walls are not permitted.

2.3 FIXING TO CONCRETE CEILINGS

Ceilings mounted equipment other than luminaries shall be secured to concrete ceilings by means of expansion bolts, shot bolts or "Robot" tools bolt or as expressly specified for the service.

2.4 WIRING

2.4.1 PVC Insulated Single Core Low Voltage Conductor

The conductor is to be of high conductivity copper wire insulated with Poly Vinyl Chloride. The cable shall be finished in the required colours and shall be in accordance with SANS 1507 and 1574.

Circuit wiring shall be of the Loop-in system and no wiring joints in the conduit or conduit fittings will be permitted. Not more than two conductors of a kind will be allowed at any outlet point. The end strands of cables, whether single or looped which have to be connected to terminals of switched, plugs, lamp-holders, fittings and distribution boards, etc. are to be tightly twisted together. Cutting away of wire strands of any cable will not be allowed. Only one circuit in any one conduit will be permitted unless otherwise specified.



Conductor sizes shall be as follows except where otherwise specified:

Lighting circuits	1,5mm ² or 2,5mm ²	
Bells circuits	1,5mm ²	
Clock circuits	1,5mm ²	
Incinerator circuits	2,5mm ²	
Ironing circuits	2,5mm ²	with 2,5mm ² insulated earthwire
Plug circuits	4,0mm ²	with 2,5mm ² insulated earth wire
Geyser circuits	4mm ²	with 2,5mm ² insulated earth wire
Heater circuits	4mm ²	with 2,5mm ² insulated earthwire
Stove	10mm ²	With 6mm ² insulated earth wire
Motor circuits		
Up to 4kW single phase	4mm ²	with 2,5mm ² insulated earth wire
Up to 11kWthree phase	4mm ²	with 2,5mm ² insulated earth wire

To avoid deformation of PVC insulated cables at temperatures in excess of 57 degrees C, they shall not be brought directly on to the terminals of appliances such as electric heaters, or any other electrical appliances or apparatus (including luminaries) which have a temperature in excess of 57 degrees C. They shall terminate in a suitable terminal box as near to the appliance or fittings as possible and connect up from thereon, with heat resistant conductor.

2.5 MOUNTING AND POSITIONING OF LUMINARIES

Luminaries and installation to comply with SANS 1464 Parts 1 to 22 and IEC 598-1 and IEC60598 as applicable.

The contractor shall, in the case of board and acoustic tile ceilings (i.e. as opposed to concrete slabs), ensure that the luminaries are symmetrically positioned with regard to the ceiling pattern.

The layout of the luminaries as indicated on the drawings shall be adhered to as far as possible. The exact positions must be confirmed on site with the Employer.

Except where otherwise specified, pendant luminaries are to be mounted with the bottom of the fittings 2,5m above finished floor level, mounted on either metal discs or wood blocks.

Under no circumstances shall cover strips be cut to accommodate wood blocks. Wood blocks must be neatly slotted to fit over cover strips and are to be secured by a minimum of two screws, which shall penetrate at least 25mm into solid wood. Ceiling cover strips shall be neatly cut to accommodate fluorescent luminaries.



Where ceilings are raked, all incandescent luminaries are to be mounted on shaped levelling wood blocks securely fixed to the ceiling. Batten holders shall be secured to wood blocks by suitable brass screws. Fluorescent luminaries are to be mounted direct on raked ceiling without levelling blocks.

Fluorescent luminaries to be mounted on concrete ceilings shall be screwed to the outlet boxes and additionally supported by means of 50mm x 6mm expansion bolts. The bolts are to be $\frac{3}{4}$ of the length of luminaries apart.

Where a number of luminaries are installed end to end, outlet points must be provided after every second luminaire unless otherwise indicated on the drawing. The luminaries are to be joined together by means of 20mm conduit nipples, lock nuts and male brass bushes, and the wiring led through the channels of the luminaries. The Contractor shall ensure that all such rows are correctly lined up and that the rows are parallel with the relevant building line.

The luminaries are to be jointed together by means of 20mm or 25mm conduit nipples, lock nuts and male brass bushes, and the wiring led through the channels of the luminaries. The Contractor shall ensure that all such rows are correctly lined up and that the rows are parallel with the relevant building line.

Incandescent luminaries are to be screwed directly to outlet boxes in concrete slabs and in board ceilings. In board ceilings the conduit box and the conduit shall be secured to the timberwork of the ceiling in such a manner that it shall support any incandescent luminaire, which is designed to be fixed to a normal conduit box.

Fluorescent luminaries shall be secured to board ceilings by means of the conduit box and 6mm bolts passing through the boards and banding.

2.6 **BATTEN HOLDERS**

B.C. batten holders shall be of brass or moulded plastic reinforced type complete with shade ring. The batten holders shall comply with SANS IEC 60238 and SANS IEC 61184. All lamp holders are to have brass terminals with screw type connection.

2.7 **LAMP HOLDERS**

Edison screw lamp holders	:	SANS IEC 60238
Bayonet lamp holders	:	SANS IEC 61184 Lamp
holders for tubular fluorescent lamps	:	SANS IEC 60400

B.C. screwed lamp holders shall be of brass 20mm E.T. complete with shade ring and shall comply with SANS IEC 60238 and SANS IEC 61184 with screw type connection terminals.

2.8 **SWITCHES AND SOCKET OUTLETS**

Switches SANS IEC 60669 as applicable and socket outlets SANS IEC 60884 as applicable shall be of the most modern manufacture and bear the SANS mark.

Flush switch and plug cover plates shall, unless otherwise specified, be of anodized aluminium of thickness not less than 0,9mm, satin or other approved finish as directed and otherwise to be fully in accordance with SANS IEC 1084 for cover plates and SANS 1085 for wall boxes.



2.9 **POSITIONS OF SWITCHES AND SOCKET OUTLETS**

Except where otherwise specified, lighting switches and socket outlets are to be installed 1,4m above finished floor level.

All mounting heights specified are to be measured from finished floor level to the bottom of the outlet box.

Where the lower portion of the wall consists of face brickwork and the upper portion of plastered finish, switches and socket outlets are to be mounted in the plastered surface, provided that the lower edge of the plasterwork does not exceed a height of 1,5m above finished floor level in which case the switches or socket outlets are to be installed in the face brick dado.

Where socket outlet and switch boxes have been installed with fixing lugs below finished wall surface, only approved distance pieces required to compensate for the recess shall be used. The lengths of distance pieces are not to exceed 15mm.

Unless otherwise approved, light switches adjacent to doors are to be installed at the lock side of the door. Where the lock position is not indicated on the drawings, its position shall be ascertained before the switch box is installed. Switches are to be installed 150mm from the reveal, or centrally if there is a fitting near the door.

All switch and socket outlet boxes shall be installed plumb and built into the wall with a 1:1 mixture of cement and sand.

Industrial type switches and socket outlets shall be neatly recessed into the surface of plastered walls to avoid sets or alternatively spacer bar saddles may be used.

Deep type boxes may be used where switches or socket outlets are back-to-back, but where one side only is to be utilized at the time and the other is for future use, the side for future use shall be suitably covered with a metal cover plate.

2.10 **LOW TENSION SWITCHBOARDS**

Low Voltage switchgear and control gear to comply with SANS 1473 and SANS IEC 60947 and SANS 60349.

Where switchboards are to be installed in switch rooms or switch cupboards, the Contractor must ensure that the boards are manufactured to suit the dimensions of the rooms or cupboards.

Low tension switchboards shall be specified in detail for each service, but shall generally conform to the following:

They are to be of strong and rigid construction, with suitable angle, channel or folded steel framework. They are to be flush fronted and totally enclosed with sheet steel panels suitably formed at the edges and reinforced to prevent distortion. Unless otherwise directed, all front panels must be at least 2mm thick and all other panels at least 1.6mm thick. Panels are to be secured to the framework with studs and chromium plated dome nuts (self-tapping and similar screws are not permitted).

Switches, are to be mounted on metal frames within the boards to give flush front panels. Equipment of normally surface mounted types such as energy meters, time switches and contractors, are to be mounted on inner metal trays behind hinged



front panels. In the case of supply authority meters, the hinged front panels must have transparent inserts.

All metal work of the boards must be thoroughly degreased, primed with PA 10 self-etching primer and finished with one coat of undercoat and two coats of electrical orange high gloss enamel, unless otherwise specified.

All accessible current carrying parts, bus-bars, connecting strips, collector bars, are to be adequately insulated in phase colours and suitably braced to withstand projected fault currents.

Connecting strips and collector bars must be of sufficient cross sectional area to carry full rated current of the switches served, irrespective of the fuse or trip rating.

The complete distribution board including bus-bars must be suitably constructed to withstand fault currents specified.

Connections to bus-bars are to be made by means of lugs suitably bolted and locked with high tensile bolts and connections to lugs must be effected by means of a crimping tools.

Incoming and outgoing bus-bar studs, where required, must be suitably insulated where they pass through panels of the board, and firmly supported within the board.

Where applicable, incoming, and outgoing collector bars for cables in parallel must so arrange that the multiple cable ends can be connected to the bars with reasonably short tails which do not have to cross.

Cable supports must be placed at suitable heights having regard to the bending radius of the cables concerned and convenience in making off.

Walls-mounting and floor-standing back to wall type boards must be provided with full easy access to all equipment and wiring without any necessity of disconnecting or removing of any of the equipment mounted in the board.

Clear visible indication of all switch positions must be provided, and the switches must be clearly labelled as directed by the Employer.

The details of construction proposed, and the Head: Works must approve all equipment of switchboards: Works before manufacture is commenced.

2.11 DISTRIBUTION BOARDS

2.11.1 Approval

The Head: Works must approve the details of construction proposed and all equipment within distribution boards: Works before manufacture is commenced.

2.11.2 Flush Mounting Distribution Boards

These shall be generally manufactured in accordance with SANS 1765. The board shall consist of two panels fitted side by side with common bonding tray and attached to a common architrave. One panel shall accommodate all single phase MCB's, and the second panel shall accommodate the main isolator, main bus-bars and the triple pole MCB's. Chassis shall be of rigid channel section rust proofed steel with clip-on trays for the single pole MCB's. The main isolator is to be mounted at the bottom of the second panel with the triple pole circuit breakers above.



2.11.3 Surface Mounting Distribution Boards

These shall be generally manufactured in accordance with SANS 1765, with two panels as for flush boards.

2.11.4 Single Phase Distribution Boards

Single Phase boards shall be generally constructed as three phase boards except they shall have a single panel. Single phase boards shall be mounted with the bottom of the architrave 1,5m above finished floor level unless specifically directed otherwise.

2.11.5 Distribution Board – In Roof Spaces

Where distribution boards are installed below a roof space, a minimum of 2 x 20mm and 1 x 25mm spare conduits are to be run from the distribution board into the roof space.

2.12 METER BOXES

The meter box shall be mounted with the top 1,7m above finished ground level. Surface mounted meter boxes shall be secured by at least 4 x 10mm expansion bolts.

Service cables entering the meter box shall be protected by means of a suitably sized galvanized pipe extended 450mm below the ground surface and securely saddled to the wall and bonded to the meter box.

2.13 CONNECTIONS TO OUTLETS

2.13.1 General

Where connectors are used to connect to the wiring of luminaries and other appliances, the connectors shall comply with SANS 1239.

2.13.2 Connection to Stoves

2.13.2.1 General

The connection to an electric stove, unless otherwise specified shall consist of 2 x 10mm² conductors and a 6mm² insulated earth wire in 25mm conduit. The stove shall be controlled by a 60 Amp micro gap switch of approved make and the connection shall be by means of a 45 Amp 3 pin stove plug. Cable ends, which are to be connected to the stove, shall be equipped with suitable soldered or crimped lugs. The connection between the stove plug and stove shall be by means of flexible conduit.

Except for as mentioned (see Clause 2.14.2.2), the conduit shall be chased into the wall and fitted with a switchbox for housing the micro gap switch and a 25mm circular conduit box over



which the stove plug will be mounted. The stove plug shall be fitted with an adaptor plate and shall be screwed directly to the conduit box by means of round head metal screws. The plug outlet shall face downward.

The stove plug and switch shall be mounted 430mm and 1,4m respectively above finished floor level unless otherwise specified or indicated on the drawings.

2.13.2.2 Stove Connections

Connections to stoves, where the stoves are situated in front of a fitting, shall be generally as specified in Clause 2.14.2.1 except that the 25mm diameter conduit shall be run in the floor slab, from the distribution board to a position to the right of the stove. A pedestal, which is complete with a 45 Amp 3 pin "Cape Town" type cooker plug, mounted on the back, shall be fitted over the conduit and securely bolted to the floor by means of expansion bolts. The plug circuit, which passes through the pedestal, is to be on a separate circuit.

2.13.3 Connections to Hot-water Cylinders

The connections to hot-water cylinders not exceeding 3kW loading shall consist of 2 x 4mm² PVC conductors and 1 x 2,5mm² earth wire in a 20mm diameter conduit from the distribution board. The conduits shall be chased in the wall and shall terminate at the side of the cylinder in a box over which is to be mounted a double pole isolator with pilot light.

The final connection between the isolator and cylinder shall be by means of silicon heat resistant conductors in 20mm diameter flexible conduit.

Connections to roof mounted hot-water cylinders shall generally be as specified above with an isolator with pilot light mounted adjacent.

2.13.4 Connections to Power Points

Connections to electric motors and fixed apparatus to vibration shall, unless otherwise specified or indicated on the drawings, have final connections consisting of conduit and flexible tubing or reinforced hose in accordance with Clause 2.1.3 of this specification and PVC cables and earth wire of the required size.

An isolator shall protect all fixed apparatus and where necessary a starter fitted with a non volt coil and overload protection adjacent to such apparatus.

Power points for connection of fixed apparatus to be installed by others, shall terminate in an approved type wall mounted switch unless otherwise specified.

The minimum conductor size for all power points shall be 4mm² unless otherwise specified.

2.1.1 Underground Service Connection

This clause refers to underground service connections not provided by the Supply Authority.

The service cable and earth wire to be connected at the supply point in accordance with Clause

2.15.8 of this specification, and unless otherwise specified, shall be laid 600mm below ground level throughout and otherwise fully in accordance with Clause 2.15 and all applicable sub- clauses thereof. Cable entries to meter boxes shall be in



accordance with Clause 2.13 and other entries shall be by pipe or duct as directed.

2.1.2 Connections to Outbuildings

Connections to outbuildings shall be made by means of underground cable only, laid in accordance with Clause 2.15 and all applicable sub-clauses.

Where the cable is run from the roof space of the main building, it shall be enclosed in suitably sized galvanized pipe built into the wall or run surface as directed. Surface run pipes shall be securely saddled at 1,8m centers. Where the cable connects to the conduit in the roof space, a suitable joint box shall be provided or alternatively the cable may be taken through the roof space, a suitable joint box shall be provided or alternatively the cable may be taken through the roof space with fixings at regular intervals, and down to the main board. At the outbuildings, the cable shall be enclosed in a suitably sized galvanized sleeve pipe built into the wall or run surface and terminated in the distribution board tray.

2.1.3 Connection and Mounting of Cable Fed Street/Site Lighting

Street/site lights shall in all cases, except where otherwise specified, be fed by underground cable. Unless otherwise directed, a suitable terminal board shall be provided in the base of the lighting pole for the connection of the incoming and outgoing cables, the feeds from the terminal board to the fitting shall be as specified.

“Surfix” cable and compression glands shall be installed between terminal board and cross arm/bracket mounted luminaries. The terminal board shall also accommodate a miniature circuit- breaker in the phase connection to the fitting. Poles intended for mounting directly in ground are to be provided with a 300 x 300mm base plate.

2.2 UNDERGROUND CABLES

1000 volt PVC SWA and 110 Volt PILCA cable and accessories shall be in accordance with the relevant SANS specifications to SANS 1507.

The storage, transportation, handling and laying of underground cables shall be according to the manufacturer’s requirements and the Contractor shall have adequate and suitable equipment and labour to ensure that no damage is done to cables during such operation. All cable pipes and ducts entering buildings are to be sealed against the ingress of vermin, water, etc.

2.13.5 Training

Cables, unless otherwise specifically directed, shall be laid at a depth of 60mm below ground level. Trenches shall not be less than 300mm wide for one to three cables, and the width shall be increased where more than three cables are to be laid together so that the cables may be placed at least 75mm throughout the run. The Contractor shall take all necessary precautions to prevent trenching work being in any way a hazard to the public and to safeguard all structures, roads, sewer works, or other property from risk of subsidence and damage.

2.13.6 Cable Joints

Joints in underground cable runs will not be permitted unless unavoidable and at the discretion of the Employer. Where cable joints are unavoidable, the cable jointer is to work efficiently and cleanly and so that each end of the cables to be joined may have



a minimum of 0,9m of slack disposed in a loop without stress. Back-filling under joints must be firmly tamped to prevent any subsequent settling.

2.13.7 Bedding

In trenches made in intermediate, hard rock, or boulder material, the cables shall be laid on a 75mm thick bed of earth and be covered with a 150mm layer of earth before the trench is filled in. The Contractor to supply all earth required for trench filling.

2.13.8 Laying

Cable shall be removed from the cable drum in such a way that no twisting, tension or mechanical damage is caused, and must be adequately supported at short intervals during the whole operation. Particular care must be exercised where it is necessary to draw cables through pipes and ducts, to avoid abrasion, elongation or distortion of any kind. The ends of such pipes and ducts shall be sealed to approval after the drawing in of the cables.

2.13.9 Back Filling

Back filling after bedding (see Clause 2.15.3) is to be carried out with a proper grading of the material to ensure settling without voids, and the material is to be tamped down after the addition of every 150mm. The surface is to be made good as required. Back filling of cable trenches must not be commenced until after the cable trenches and laid cable(s) have been inspected by the Employer. Where a Contractor fails to observe this requirement, he may, at the discretion of the Employer, be required to re-open such cable trenches for inspection at his own expense.

2.13.10 Protection of Cables

Where so directed by the Employer, concrete or other warning covers shall be placed over cables above the top bedding layer. Cable pipes when directed are to be installed at road and other crossings.

2.13.11 Marking of Cables

Cable marking tape is to be supplied by the Contractor and is to be laid 150mm below ground over a cable run and as may be directed by the Employer to give early indication of underground cable runs.

2.13.12 Joints and Termination of Cables

Joints in underground cables and terminations shall be made by means of "Scotch" Cast" or other approved epoxy-resin pressure type jointing kits. Low tension PVC cables are to be made off with sealing glands and materials designed for this purpose, which must be of approved make.

2.13.13 Sealing of Paper Insulated Cable Ends

Where cables are cut and not immediately made off, the ends must be sealed without delay. If cables are cut and the ends not immediately made off or sealed, the cable may be rejected and the Contractor will be required to replace it at his own expense.



2.13.14 Earth Wires

Except where specifically directed otherwise, earth continuity conductors are to be run with all underground cables constituting part of a low-tension distribution system. Such earth continuity conductors shall be bare copper wire of a cross sectional area in accordance with the Code of Practice 0142 but shall not be less than 4mm² nor more than 70mm². The earth continuity conductor is to be bonded to the cable armouring, and to the lead sheath if any, at each termination, as well as to the local earth bar. The earth wire must be secured to the cable at 1,8m centers.

2.13.15 Opening Up of Existing Cables

Where it is necessary to expose existing buried cables for any purpose, or to excavate in the vicinity of existing buried cables, pipes, etc. every care is to be exercised and only labourers experienced in such work, and duly warned by the Contractor, shall be employed thereon.

2.14 EARTHING

2.14.1 Main Earthing

The type of main earthing shall be as required by the Supply Authority, if other than the Administration and in any case as directed by the Head: Works who may require additional earthing to meet test standards.

Where required, an earth mat is to be provided, the minimum size, unless otherwise specified, being constructed from copper straps (950 x 25 x 3) mm at 230mm centers and braced at all intersections. Alternatively, or additionally earth rods or trench earths may be required, as the Head: Works may direct, and installed according to his instructions.

All earth electrodes and connections thereto must be approved "in-situ" by the Head: Works before back-filling.

The electrical installation shall not be earthed by means of the lightning arrester earth electrode, if such is included in the installation, but may be bonded thereto.

2.14.2 Earthing in Installations

The installation shall be effectively earthed in accordance with the relevant sections of the Code of Practice 0142 and the requirements of the Supply Authority.

All hot and cold water and waste pipes are to be effectively bonded by means of 12 x 1,5mm solid copper tape (perforated tape or wire will not be permitted), clamped by means of brass bolts and nuts. Bonding tapes exceeding 75mm in length must be fixed to the wall by means of No. 6 x 20mm brass screws and plastic plugs not exceeding 150mm centers. Main earth copper tapes where installed less than 2,5m from ground level, must be run in 20mm diameter conduit securely saddled to the wall.

Gutters and downpipes are to be bonded by means of 6mm round headed brass bolts, with nuts and washers. Self-tapping screws are not permitted.

Connections from the earth bar or terminal on the main board must be made to a visible



cold water main, the incoming service conductor, if any, and the earth mat or plate (where such is required) by means of either 12 x 1,5mm solid copper tape or bare 25mm² copper wire, or such larger conductor as the Employer may direct. From each distribution board separate earth conductors are to be taken to the main earth bar or terminal on the main board. Each conductor shall consist of two stranded copper conductors drawn into the conduit together with the distribution board feeders. The size of the earth conductors to be in accordance with the requirements of the Code of Practice 0142 or as specified.

Earthing clips shall be made of not less than 0,90mm thick copper strips not less than 12mm wide. They are to be complete with 25 x 7,7mm brass bolts, washers and nuts and must be constructed so that the clips will fit firmly to the conduit without any additional packing. Adjustable earth clips are not permitted.

2.15 EXISTING BUILDINGS

2.15.1 Occupied Buildings

Where work is to be carried out in occupied buildings the Contractor must arrange to carry out the installation with as little interruption to services and discomfort to the occupants as possible.

2.15.2 Temporary Connections

Temporary connections shall be provided where necessary for continuity of services, and as directed by the Employer. The contractor must ensure that such connections are both electrically safe and free from physical hazard.

2.15.3 Old Materials

Unless otherwise specified all existing materials removed by the Contractor shall remain the property of the Administration and are to be handed to the Administration.

2.15.4 Making Good

Any damage which may be done to the plaster work, floors, ceilings, wood and paint work, furniture and other equipment in the building, etc. during the progress of the electrical installation shall be repaired and made good by the Contractor to the satisfaction of the Head: Works.

2.16 COMPLETION

2.16.1 Balancing of Load

The Contractor is required to balance the load as equally as possible over multi-phase supplies.

2.16.2 Tests

The installation shall be tested by the Contractor as the service progresses or as required by the Employer and upon completion, for earth continuity and insulation. The final test before the taking over of the installation shall be made in the presence of the Head: Works.



The mandatory "Certificate of Compliance" shall be issued by the Contractor to the Supply Authority, with a copy to the Head: Works prior to first delivery being taken.

2.16.3 Labelling

All circuits and apparatus on switchboards shall be suitably correctly labelled by means of engraved plastic labels (white lettering on black), which are to be either bolted or screwed to the equipment panel or fitted in channelling provided below the switch gear.

Sub-circuits are to be numbered and a legend detailing the circuits is to be framed and fitted to the door of the distribution board. All other equipment is to be individually labelled to indicate the function.

All switchboards are to be fitted with a label on which the designation of the board is clearly indicated.

A separate engraved label depicting the origin and cable/conductor size shall be fixed below the main switch.

2.16.4 Finishes

Covers for all boxes, expansion boxes, etc., shall be finished to match the paint work of the ceiling or wall surface or as specified.

2.16.5 Site Drawing

On all completed new work or where specifically called for in the Tender Document, the Contractor shall, on completion of the works, submit to the Head: Works, a marked-up site plan indicating the exact underground cable reticulation.

2.17 SPEAKER AND MICROPHONE OUTLETS

Speaker and microphone outlets are to conform to the following details:

1. Speaker outlet – To have one flat and one round pin.
2. Microphone outlet – To have one round pin only.

Both female and male parts to be supplied and installed by the Contractor.

2.18 BELLS AND BUZZERS

2.18.1 Bells

Bells shall be 230 Volt AC or 24 Volt DC as specified for the service. They are to be of robust construction encased in a sturdy cast metal weather- proof case. They are to operate on the frequency of the supply. They shall have an adjustable stabilizing spring, gold- silver contact points and 150mm gongs.

2.18.2 Doorbells, Buzzers and Bell Transformers

These will be as specified for each service.



2.18.3 Bell Pushes

Except where otherwise specified, bell pushes shall be of the flush type suitable for mounting in a standard 100 x 50mm box. They shall be clearly marked as a bell push and shall be fitted with satin finished anodized aluminium cover plates.

2.19 SIGNAL TIMERS

2.19.1 Working Places / Buildings

Timers for these institutions shall generally be as for working but are to have at least 3 (three) separate programmers and be fitted with three push buttons for independent manual operations for testing of each programme, plus an on/off switch for each programme, which does not affect the running of the clock.

2.20 CLOCKS

Electric clocks shall be of the quartz electronic battery operated type, with a dial for 2500mm diameter. The dial shall be white, with distinctive minute markings and chapters shall be black Arabic figures. Time adjustment shall be simple. Where mains operated electronic clocks are specified, these shall be of the synchronous self-starting type, suitable for a 200 – 250 V 50 Hz AC supply

2.21 TIME SWITCHES

The time switch shall consist of a single pole switch with silver to silver or other approved contacts operated by a quartz movement with a 24-hour reserve.

A suitable 24 hours, night and day dial, with hour indicator and two adjustable strikers, one OFF and one ON must be provided. The whole mechanism is to be totally enclosed in a dust proof case.

The current rating shall be required and the switch is to be suitable for operation on 230 volt 50 Hertz AC supply. Time switches used for under floor heating are to be fitted with weekend cut-out.

2.22 MOULDED CASE CIRCUIT BREAKERS (INCLUDING MINIATURE)

Circuit breakers shall be of the size and type as directed and specified for the service. They shall comply with SANS Specification 156 and SANS IEC 60947-2.

2.23 SWITCHES: ON-LOAD FAULT MAKING (CIRCUIT BREAKERSTYPE)

The switches shall be triple pole, hand operated, panel mounting air break type, having continuous current rating as specified and suitable for operation of 380 – 440 Volt 50 Hz AC system.

The contacts are to be of silver alloy and the switch mechanism shall be of the quick-make, quick-break type.

2.24 SWITCHBOARD EQUIPMENT

Switchboard equipment such as switches, circuit breakers, etc., shall be as



directed and specified in the detail specification for the service Circuit breaker equipment of SANS IEC 60934.

2.25 FUSE-SWITCH UNITS (WITH HRC FUSES)

The fuse-switch unit is to be of the double pole, or triple pole or triple pole with neutral link type, and of the required current rating, as specified for the service and must be in accordance with BS EN 60947-3.

The fuse links must be fully isolated when the switch is in the open position, and interlocks must be provided to prevent the switch being operated with the cover open.

The fuse links shall comply with SANS Specification 172 and SANS IEC 60269-1 to 4.

2.26 BUS-BAR COPPER

Bus-bar copper must be fully in accordance with Tables A1 and A2 of SANS 1473-2 and SANS IEC 60439-2.

2.27 SPECIFICATION COMPLIANCE

The complete installation shall comply with the requirements of this specification. Should any differences or contradictions exist between this Specification and the detailed requirements for a specific installation, then the detailed requirements shall take precedence.



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PART A - DETAIL SPECIFICATION

ELECTRICITY SUPPLY, DISTRIBUTION BOARDS AND OTHER REQUIREMENTS

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ELECTRICITY SUPPLY, KIOSK, LV BOARDS AND OTHER REQUIREMENTS

A1. ELECTRICITY SUPPLY	➤ General: The Supply Authority is three phase.
	➤ Details of Supply: There's no existing supply
	➤ Low Voltage Supply: The Low Voltage Supply is 400v, 50Hz, 3-Phase, 4-Wire. It must be assumed that the voltage is +/- 10% within nominal.

A2. NEW ELECTRICITY SUPPLY	➤ An application must be filed with Eskom for a new 150kVA supply at the new Mahehle Clinic between Ixopo and Bulwer
	➤ The contractor shall note that payment for the supply connection shall only be certified once original documentation confirming the payment of the supply connection has been received.
A3. GENERATOR INSTALLATION	➤ A new Standby Generator will be installed as indicated in Volume 4
A4. CHANGE OVER	➤ Within 14 days of receipt of Letter of Acceptance, the Electrical Contractor shall submit to the Engineer for his approval, a programme showing in such form as may reasonably be required by the Engineer. The works would include the following.
	1. Standby Generator and Connection of Associated Cables to the New Main LV Board.
	2. The installation of the New Main LV Board and the making, disconnection and removal of the existing mains cable to the Existing Main LV panel.
	3. The contractor shall note that disruptions must at all times be avoided and the contractor shall make allowance in his price for the change-over to be done over weekends.



A5. EXISTING MAIN LV BOARD	<ul style="list-style-type: none"> ➤ General: The Electrical Contractor shall allow to supply and install a new
	<ul style="list-style-type: none"> ➤ Main LV Board. The electrical sub-contractor shall also allow to disconnect, make safe and remove the existing Main LV Board. Careful consideration must be given to the changing over to the new Main LV Board as not to cause any disruptions and shall only be done with written permission of the Electrical the Main LV Panel consist of the following
A6. NEW MAIN LV BOARD	<ul style="list-style-type: none"> ➤ General: The board shall be a floor standing board without doors, manufactured in accordance with the General Specification Section 2. This board shall have a non- essential and an essential section, electrically separated by means of a metal barrier. This Board shall make provision for top and bottom entry.
	<ul style="list-style-type: none"> ➤ The boards equipment and the relevant sections shall be rated as indicated, symmetrically at 400V per section. The colour finish of the board shall be “Electric Orange” in colour. The front panels shall be painted as follows:
	<ul style="list-style-type: none"> ➤ Non-Essential Front Panel-Electric Orange ➤ Essential Section-Signal Red
	<ul style="list-style-type: none"> ➤ The Electrical Contractor shall provide shop drawings and shall only manufacture the
	<ul style="list-style-type: none"> ➤ Main LV Board upon written approval from the Electrical Engineer.
	<ul style="list-style-type: none"> ➤ Labelling: In addition to the statutory labels as specified in the General Specification Section 2, the Contractor shall allow to supply and install engraved (Black on White) labels onto the board with the following information:
	<ul style="list-style-type: none"> ➤ Supply source information (i.e. Main LV Board fed from the transformer)
	<ul style="list-style-type: none"> ➤ Supply source cable size (i.e. 185mm² / 95mm² 4 core PVC cable).
	<ul style="list-style-type: none"> ➤ Respective cascading circuit breaker information (if applicable).
	<ul style="list-style-type: none"> ➤ Respective Distribution Boards fault level.
	<ul style="list-style-type: none"> ➤ Schedule of Equipment on Main LV Board: ➤ Refer to Single Line Diagram



A7. NEW KIOSK	<ul style="list-style-type: none"> ➤ General: The Electrical sub-contractor shall allow to install a free-standing weatherproof type kiosk.
	<ul style="list-style-type: none"> ➤ Final positioning of the kiosk shall be carried out on site in conjunction with the Electrical Engineer. The kiosk shall be manufactured from 3CR12 metal and shall also be vermin proof. The colour of the kiosk to be “Beige”, unless otherwise instructed by the engineer or architect.
	<ul style="list-style-type: none"> ➤ The electrical contractor shall provide shop drawings and shall only manufacture the New Kiosk upon written approval from the Electrical Engineer.
	<ul style="list-style-type: none"> ➤ Labelling: In addition to the statutory labels as specified in the general specification Section 2, the contractor shall allow to supply and install engraved (Black on White) labels onto the Kiosk with the following information: (i.e. Kiosk 1/1E fed from the MLVP) (i.e. 185mm² 4 core PVC cable).
	<ul style="list-style-type: none"> ➤ Respective cascading circuit breaker information (if applicable).
A8. DISTRIBUTION BOARD	<ul style="list-style-type: none"> ➤ General: Distribution boards shall be flush mounted and shall be located in positions as indicated on drawing. Electrical Contractor to allow 40% Spare way
	<ul style="list-style-type: none"> ➤ The exterior colour finish of these boards shall be off-white. The inside panel shall be painted as follows: <ul style="list-style-type: none"> ➤ Non-Essential - Electric Orange ➤ Essential Section – Signal Red
	<ul style="list-style-type: none"> ➤ The contractor shall provide shop drawings and manufacture the Distribution Boards upon written approval from the Electrical Engineer. The boards shall be manufactured from 1.6mm steel and shall be epoxy coated.
	<ul style="list-style-type: none"> ➤ In addition to the statutory labels as specified.
	<ul style="list-style-type: none"> ➤ The contractor shall allow to supply and install engraved labels onto the board with the following information:
	<ul style="list-style-type: none"> ➤ Supply DB information
	<ul style="list-style-type: none"> ➤ Feeder cables sizes (e.g. 50mm²/70mm² 4c core cable)
	<ul style="list-style-type: none"> ➤ Relative cascading circuit breakers (if applicable). ➤ Respective DB’s fault levels.



A9. BUS-BAR & SWITCHGEAR	<ul style="list-style-type: none">➤ General: The onus rest on the electrical contractor to ensure that the switchgear shall be adequately rated and suitable supported. Suitable terminals are to be provided for incoming and outgoing cables. Switchgear shall be of the type Merlin Gerin (Schneider) manufacture or other approved.
A10. CASCADING	<ul style="list-style-type: none">➤ General: Please note that cascading is not to be used, unless otherwise stated.
A11. TESTING	<ul style="list-style-type: none">➤ General: Please note that the Engineer shall inspect all the Distribution Boards.
	<ul style="list-style-type: none">➤ Kiosks at the manufacturers factory and approve before it is delivered to site. The Contractor shall provide the Engineer with certification that all boards have been tested by the manufacturer.



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MAINS CABLES

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MAINS CABLES

B1. LV CABLES	<ul style="list-style-type: none">➤ General: All cables shall be aluminium cored in accordance with SANS 1507
	<ul style="list-style-type: none">➤ The Contractor shall allow to supply and install the following cables fully in accordance with the General Specification. "Refer to the Single Line Diagrams and Site Reticulation Drawings.
B2. LV CABLE TERMINATIONS	<ul style="list-style-type: none">➤ The cable terminations shall be in accordance with the Code of Practice for the Wiring of Premises SANS 10142 as amended. The Contractor shall allow to supply and install cable identification tags to both cable ends. Both the source distribution board and feeder distribution board details shall be engraved on the cable tags.
B3. CABLE TESTS	<ul style="list-style-type: none">➤ All cables shall be tested in accordance with SANS 1507.
B4. CABLE ROUTES	<ul style="list-style-type: none">➤ All cable routes shall be confirmed with the Engineer on site prior to installation thereof.
B5. CABLE SLEEVES	<ul style="list-style-type: none">➤ All cable sleeves shall be installed by the Contractor as detailed on the drawings. All sleeves shall be left with at least one draw-wire per sleeve. The draw-wires shall be included in the rates for the sleeves as specified in the Bill of Quantities.➤ The Contractor shall ensure that the sleeves are installed timeously and in the correct positions as shown on the Site Plan.



B6. CABLE MANHOLES	<ul style="list-style-type: none">➤ The Contractor shall allow to build brick manholes for the cables as detailed on the drawings. The metal covers shall be cast iron manufactured covers. The Contractor shall ensure that the manholes are installed timeously and in the correct positions as shown on the Site Plan.
B7. TRENCHING AND BACKFILLING	<ul style="list-style-type: none">➤ The Contractor shall allow for trenching and backfilling. He shall allow to dig trenches along the cable routes as shown and to backfill these trenches once the cables are installed. Before backfilling the Contractor shall contact the Engineer for inspection of the cables. The trenching and backfilling shall be in accordance with the General Specification Part 2E.➤ Included in the rate for trenching and back filling, the Contractor shall allow for cable marker tape along the cable route at a depth of 300mm below ground level.
B8. CABLE MARKERS	<ul style="list-style-type: none">➤ Cable Markers shall be provided along LV Cable routes. Cable Markers shall consist of Concrete Blocks in the shape of truncated pyramids, approx. 300mm high, 150mm x 150mm at the top and 250mm x 250mm at the bottom.➤ Brass plates shall be cast into the top of the blocks in such a manner that they cannot be prized loose. The wording "ELECTRIC CABLE" shall be stamped on the brass plates as well as the direction arrows and the cable voltage rating.➤ Cable Markers shall be installed on the surface along all the underground cable routes and shall project 35mm above normal ground level unless the projected➤ Markers could be a hazard to pedestrian or other traffic in which case they shall be installed flush with the surface.



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PART C - DETAIL SPECIFICATION

LUMINAIRES, MATERIALS, EQUIPMENT AND INSTALLATION

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PART C

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**REQUIREMENTS FOR LUMINAIRES. SPECIAL ITEMS. MATERIALS. EQUIPMENT AND
INSTALLATION**

C1. LUMINAIRES	<ul style="list-style-type: none">➤ General: The Contractor is responsible for the purchase, delivery and safe storage of all luminaires required for this project. The Contractor shall confirm with the Electrical Engineer the exact numbers and type for each specific luminaire before placing confirming orders with the Suppliers. All lamps and ballast to be reputable ballasts – no name brands will not be accepted. Luminaires to be approved by Engineer Prior to installation➤ All luminaires supplied shall comply with the following SANS Specifications where applicable:
Luminaires - Fixed general purpose	➤ SANS IEC 60598 – 2 – 1 to 25
Flood Lighting	➤ SANS 1279
Interior Discharge Lamps	➤ SANS 1278
Interior Fluorescent Lamps	➤ SANS 1119
Electrical Safety of Luminaires	➤ SANS 1464 1 -25



Schedule of Luminaires:		
Type	Description	Image
A1+	2 x 18w Vapour Proof Double Tube LED Fitting.	
A2	2 x 18w T8 Tubes, 2480 Lumens, rated to IP65 & 3 Hour Maintained Emergency Back-Up.	
B1	36w 600x600mm or 1200x600mm, LED Panel Surface Mount Non Dimmable, 3600lm, 4000k	
B1.1	2x36w Fluorescent Fitting T8 with Prismatic Diffuser.	
C1.1	12/24v 50w with 4000hr Dichroic Reflector Lamp.	



Schedule of Luminaires:		
Type	Description	Image
E1	Round LED Bulkhead Light, 18w IP54.	
J1.1	Round LED Bulkhead Light, 18w IP54.	
O1	80w, Theatre Surgery Single Ceiling Mount, Shadow Less Operating Lamp with 240v/50Hz.	
P1.1	LED Post Top Luminaire Manufactured from powder coated die-cast, 36w pending post height. Lumens variance, 4000lm plus, 4000k.	
BO1	18w or 25w, LM 6 Die-cast Aluminium and extruded Aluminium Electronic or Magnetic Control gear, 220-240v, 50Hz	



C2. INSTALLATION OF LUMINAIRES:	<ul style="list-style-type: none">➤ The installation of the luminaires shall be as described in the General Specification. All lamps shall bear the SABS mark.
C3. CONDUITS:	<ul style="list-style-type: none">➤ General: All conduit work shall conform with the Code of Practice for Wiring of Premises SANS 10142 as amended and to SANS 950 for uPVC conduit and metal conduits shall comply with SANS IEC 60614-2-1 Part 2 and SANS 1065 Parts 1 and 2. All conduit are to be installed flush and the Contractor shall ensure that all wiring and draw wires are installed timeously, prior to final building finishes being applied. Rectification of any damage caused by building finishes arising out of blocked conduits will be for the Contractor's account.➤ Only uPVC conduit shall be used for this installation.
C4. LABELLING:	<ul style="list-style-type: none">➤ All circuits, apparatus, switchgears, equipment, etc. shall be suitably and➤ correctly labelled by means of engraved labels (white lettering on black), which are to be either bolted or screwed to the equipment panel. A sample of the labelling shall be provided to the Engineer before manufacturing.➤ The labelling is to be submitted, in detail, to the Engineer for scrutiny and permission to proceed before installation.
C5. TELEPHONE INSTALLATION:	<ul style="list-style-type: none">➤ The Contractor shall supply and install all telephone DB's, conduits and outlet boxes for telephone services as shown on the drawings.➤ All conduits shall be 25mm diameter unless otherwise specified on the drawings. All outlet boxes shall be 100 x 50 x 50mm deep complete with blank cover plates. All conduits shall be installed with draw wires. All telephone DB's shall be flush 450 x 450 boards with architraves and hard board backing. The contractor is to refer to Volume 8 of the Electrical Specification.
C6. DATA INSTALLATION:	<ul style="list-style-type: none">➤ The Contractor shall supply and install the data DB, conduits and outlet boxes for data services as shown on the drawings. All conduits shall be 32mm diameter unless otherwise specified on the drawings. All outlet boxes shall be 100 x 50 x 50mm deep complete with blank cover plates. All conduits shall be



	<p>installed with draw wires. All data DB's shall be flush 450 x 450 boards with architraves and hard board backing. The contractor is to refer to Volume 6 of the Electrical Specification.</p>
C7. WIRING CHANNEL:	<ul style="list-style-type: none">➤ The Contractor shall allow to supply and install wire baskets, galvanized steel wiring channel complete with galvanized covers in accordance with the General Specification Part 2E and positioned as indicated on the drawings. The wiring channel shall be supported, at intervals not exceeding 1,5m, to roof perlins by means of threaded rod hangers, or on fixing brackets. The rates for the various wiring channels in the Bills of Quantities shall include any threaded rods, adaptors, hangers clamps and accessories required for the installation.
C8. POWERSKIRTING INSTALLATION:	<ul style="list-style-type: none">➤ The Contractor shall allow to supply and install PVC 2 compartment 2 cover power skirting as Legrand or other approved. The colour of the power skirting shall be specified by the Architect during the contract period.➤ The power skirting shall be installed in the positions as shown on the drawings.➤ The rates for the power skirting in the Bills of Quantities shall include any internal or external bends, end caps, covers and blank cover plates and cradles.➤ It shall be noted that the specified colour may not correspond to the manufacturers standard colour range.
C9. EXTRACTOR FAN INSTALLATION:	<ul style="list-style-type: none">➤ The Contractor shall allow to supply, install and connect an electrical outlet adjacent to the extractor fans in accordance with the General Specification Part 2E and as specified in the schedule of outlets and as indicated on the drawings. The supply and installation of the extractor fans are specified and measured elsewhere in the document. The Contractor shall do the final connection of the extractor fan.
C10. STANDBY GENERATOR INSTALLATION:	<ul style="list-style-type: none">➤ The Electrical Contractor shall allow to supply and install the supply cables as from the Main LV Board Non-Essential Section to the Standby Generator➤ Automatic Mains Failure (AMF) Panel and from the AMF Panel to the Main LV Board Essential Section, in the cable ducts provided. The contractor is to refer



	to Volume 4 of the Electrical Specification.
C11. PVC TRUNKING:	<ul style="list-style-type: none">➤ The Contractor shall allow to supply and install all PVC trunking as specified, complete with covers, fixed internal and external bends, etc. The trunking shall be securely fixed to the wall and ceiling surfaces at intervals not exceeding 500mm.➤ It shall be noted that the specified colour may not correspond to the manufacturers standard colour range.
C12. HYDROBOILS:	<ul style="list-style-type: none">➤ The hydro boils shall be supplied and installed by the Electrical Subcontractor. The Electrical Sub-Contractor shall provide the required isolators and make the final connection to the Hydro boils.
C13. COMPLIANCE CERTIFICATE:	<ul style="list-style-type: none">➤ The Contractor shall issue a Compliance Certificate for the new Electrical Installations.➤ The Original Certificate shall be handed to Engineer on completion of this Contract. It shall be noted that First Delivery will not be taken until a Completion Certificate and “As-Built” documentation has been furnished.
C14. BEDHEAD DUCTING INSTALLATION:	<ul style="list-style-type: none">➤ The Contractor shall allow to supply and install Bedhead ducting units. The Service System shall consist of horizontal wall mounted trunking suitable for the conveyance of medical gas, power, lighting and communication services to outlets adjacent to bedheads in a safe, convenience, hygienic and pleasing manner. The Trunking is specified as GLS/HUTZ H10➤ All areas as indicated above shall include the following:➤ The Electrical Installation to the Bedhead Ducting shall be pre-wired by the Manufacturers prior to delivery on Site. Lengths of Ducting as indicated on the drawings. The Contractor shall provide the Engineer with Shop drawings of all bedhead trunking installations and the Engineer shall approve it before manufacturing.➤ All electrical wiring shall comply with the latest issue SANS 10142. All electrical and communication components and materials shall comply with the relevant SANS-IEC Standards.



	<ul style="list-style-type: none">➤ The designer, construction and finishers of all system components shall be in accordance with the latest Clean Room Technology Standards.
C15. PUBLIC ADDRESS INSTALLATION:	<ul style="list-style-type: none">➤ The Contractor shall allow to install all conduits, conduit boxes and accessories for the Public Address Systems in accordance with the General Specification Part 2E and as indicated on the drawings. All conduits shall be provided with draw-wires.➤ The Public Address Equipment cabling shall be supplied and installed as specified and measured elsewhere in the document.
C16. CALL INSTALLATION:	<ul style="list-style-type: none">➤ The Contractor shall allow to install all conduits, conduit boxes and accessories for the Call Installation in accordance with the General Specification Part 2E and as indicated on the drawings. All conduits shall be provided with draw-wires.➤ The Call Installation cabling shall be supplied and installed as specified and measured elsewhere in the document. The contractor is to refer to Volume 5 of the Electrical Specification.
C17. CUT-OUT IN CEILING:	<ul style="list-style-type: none">➤ The Contractor shall cut all holes in the ceiling board for the Recessed Light Fitting, Public Address Speakers and Fire Detectors.➤ If cut outs are made by the Contractor, without written confirmation being obtained from the Electrical Consultant, the Contractor shall be responsible for the EXTENSION AND ALTERATIONS of the ceiling material, to the satisfaction of the Electrical Consultant, if the position of the cut outs proves to be incorrect, patching of ceiling will not be accepted. The contractor shall be responsible for marking out of the physical size of the cut outs. The Electrical Sub-Contractor shall replace damage or broken ceiling tiles.➤ Patching of ceiling will not be accepted. The contractor shall be responsible for marking out of the physical size of the cut outs.



<p>C18. MATERIALS:</p>	<ul style="list-style-type: none">➤ All materials and fittings used shall be approved and conform to those specified in the schedules of this specification. Any variance from these standards will not be allowed, except with the written consent of the Engineer prior to closing of tender.➤ In all cases, reference shall be made to the relevant S.A.N.S. specifications where such specifications apply and are available for general application. The Electrical Contractor shall place orders for specified materials and equipment promptly upon being awarded the contract. No excuse or proposed substitution will be considered for materials and equipment due to unavailability unless proof is submitted that firm orders were placed within 14 days of the contract being awarded.➤ Delay in the works owing to non-delivery of materials will be considered as a cause for delay in completing the contract works.➤ The Electrical Contractor shall, if called upon to do so, submit samples of materials, equipment or individual components for examination or testing to the Engineer and/or other parties as instructed.
<p>C19. GENERAL EQUIPMENTS:</p>	<ul style="list-style-type: none">➤ The complete installation shall be carried out in accordance with the Occupational Health and Safety Act 85/1993 and to the satisfaction of the Municipality.➤ The work shall at all times be carried out under the supervision of a competent representative of the Contractor, who will be able and authorized to receive and carry out instructions on behalf of the Contractor.➤ All apparatus, component parts, fittings and materials employed in the execution of the Contract shall be new and unused and shall be the latest type or pattern of the particular manufacture employed. S.A.N.S. mark bearing items shall be used wherever possible.➤ The complete installation must be guaranteed against defective parts and workmanship for a period of twelve months after the date of issue of the Completion Certificate.



C20. ENVIRONMENT MANGEMENT & EIA:	<ul style="list-style-type: none">➤ The complete installation shall be carried out in accordance with National Environmental Management Act (Act 107 of 1998)➤ The Electrical Sub-Contractor shall familiarize himself/herself with the said Act and shall as far as possible take reasonable measures to prevent any negative impacts to the Environment.➤ An Environmental Specialist Consultant shall perform the EIA, the Contractor to allow for this provision.
C21. CABLE JOINTING:	<ul style="list-style-type: none">➤ General: All cables shall be supplied and installed free of joints. Should any circumstances arise beyond the control for cable jointing the Contractor shall note the following.➤ During outdoor jointing operations, the joint bays shall be adequately covered by tents of waterproof material suitably supported. Where necessary a trench shall be excavated around the bay to prevent the ingress of moisture. The sides of the hole shall be draped with small tarpaulin or plastic sheeting to prevent loose earth from falling during jointing operations.➤ The joint shall not impair the anti-electrolysis characteristics of the cable. The Contractor shall notify the Engineer timeously of the day on which jointing is to be carried out in order that an inspection may be arranged if so required. Any cable joint not inspected by the Engineer because of insufficient notice being given, shall be opened for inspection and re-done at the discretion of the Engineer at the cost of the Electrical Contractor.
	<ul style="list-style-type: none">➤ LV CABLE JOINTS SHALL BE OF THE EPOXY-RESIN TYPE➤ Joints shall be fully water and air tight shall be free of voids and air pockets and the crossing of cores in joints will not be permitted under any circumstances.➤ Competence of Personnel: It is a definite requirement that the Contractor shall only employ personnel fully conversant with the cable manufacturer's recommendations for joining and terminating cables.



	<ul style="list-style-type: none">➤ <u>Heat-Shrinkable Material:</u>➤ General:➤ Heat-shrinkable materials may not be used in exceptional circumstances with the written permission of the Department.
C22. VARIATION ORDERS:	<ul style="list-style-type: none">➤ Under no circumstances will claims for extras be paid for unless the Client approves a Variation Order. The Tenderers are advised to acquaint themselves with the whole document and site conditions as no claims on the grounds of want of knowledge will be entertained.
C23. DOCUMENTATION:	<ul style="list-style-type: none">➤ The Electrical Contractor shall issue the Electrical Engineer Shop Drawings for approval and Operating, Maintenance and Instruction Manuals upon completion of the Contract.
C24. PROGRAMME:	<ul style="list-style-type: none">➤ Within 14 days of receipt of the Letter of Acceptance, the Contractor shall submit to the Electrical Engineer for his approval, a programme showing in such form as may reasonable be required by the Engineer, the order of procedure in which he proposes to carry out the works, including the delivery to site, erection and commissioning thereof.➤ The submission and approval by the Engineer of such program shall not relieve the Contractor of any of his duties or responsibilities under the Contract.
C25. REGISTRATION:	<ul style="list-style-type: none">➤ Within 7 days of receipt of the Letter of Acceptance, the Contractor shall submit proof of Professional Registration with the Electrical Contracting Board of South Africa (ECB).➤ <u>NO WORK SHALL COMMENCE BY THE ELECTRICAL SUB-CONTRACTOR UNLESS THE ECB IS SUBMITTED TO THE ENGINEER AND APPROVED.</u>
C26. LIGHT INSPECTION:	<ul style="list-style-type: none">➤ The Electrical Contractor shall supply and install a wall mounted Lights.➤ The light shall be suitable for use in facility and private practice.➤ The lamp housing shall be a double wall construction from 2,0mm thick deep drawn aluminium casings. The finish shall be powder coat paint or natural anodized as specified. A plastic hand grip shall be provided on the casing for safe positioning of the lamp.



C27. CCTV & ACCESS CONTROL
INSTALLTION:

- The Contractor shall allow to install all conduits, conduit boxes and accessories for the whole electrical Installation in accordance with the
- General Specification Part 2E and as indicated on the drawings. All conduits shall be provided with draw-wires.
- The CCTV and ACCESS Control Installation shall be supplied and installed as specified and measured elsewhere in the document. The contractor is to refer to Volume 7 of the Electrical Specification.



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DEPARTMENT OF HEALTH: IDEAL CLINICS PROTOYPE

VOLUME 1

**ELECTRICAL INSTALLATION
DETAIL**

BILL OF QUANTITIES



DEPARTMENT OF HEALTH: IDEAL CLINICS PROTOTYPE

ELECTRICAL INSTALLATION

BILLS OF QUANTITIES

GENERAL NOTES

1. The descriptions in the bills of quantities shall be read in conjunction with the specification.
2. The unit rate for each item in the Bills of Quantities shall include for all materials, labour, profit, transport, etc., everything necessary for the execution and complete installation of the work in accordance with the description.
3. The Bills of Quantities shall not be used for ordering purposes. The Contractor shall check the lengths of cables and overhead conductors on site before ordering any of the cables. Any allowance for off-cuts shall be made in the unit rates.
4. The rates shall exclude Value-Added Tax.
5. All material covered by this **Specification** shall, wherever possible, be of South African manufacture.



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SPECIFICATION

VOLUME 2 LIGHTNING PROTECTION

PROPOSED

**DEPARTMENT OF HEALTH: IDEAL
CLINICS PROROTYPE ELECTRICAL
SPECIFICATION**



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VOLUME 2

**LIGHTNING PROTECTION
INSTALLATION**

PART 1LP

DETAIL SPECIFICATION



DEPARTMENT OF HEALTH: IDEAL CLINICS PROTOTYPE

VOLUME 2 – LIGHTNING PROTECTION INSTALLATION

PART 1LP – DETAIL SPECIFICATION

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DEPARTMENT OF HEALTH: IDEAL CLINICS PROTOTYPE

VOLUME 2 – LIGHTNING PROTECTION INSTALLATION

PART 1LP – DETAIL SPECIFICATION

1.1	<u>SCOPE OF PROJECT</u>	The Detail specification covers the technical requirements for the Ideal Clinics Prototype. Contractors are to read the Detail Specification in conjunction with the Bills of Quantities and drawings issued for this contract.
1.2.	<u>SPECIALIST CONTRACTORS</u>	The Contractor shall note that only Specialists in Lightning and Earthing Protection may undertake this work and shall produce proof of previous work completed by the SANS Code of Practice 10313 and 10313A.
1.3	<u>DEFINITIONS :</u>	Where the following terms are used in this Specification they shall be taken to mean the following: (a) <u>Lightning Protection System</u> : The whole system of conductors used to protect a structure from the effects of lightning. (b) <u>Air Terminal</u> : The part of a lightning protection system that is intended to directly intercept lightning discharges (air terminals include metallic roofs, roof conductors and finials). (c) <u>Down-Conductor</u> : A conductor that connects the air terminal(s) to the earth terminal(s).



- (d) Earth Terminal: The part of a lightning protection system that is intended to discharge lightning currents into the general mass of the earth.
- (e) Bond: A conductor that provides electrical connection between the lightning protection system and the metal work of the structure to be protected (or between various parts of this metal work).
- (f) Joint: A mechanical junction between two conductors for the purpose of providing electrical continuity between two parts of the lightning protection system.
- (g) Earthing Electrode: The part of an earth terminal which makes direct electrical contact with the earth.
- (h) Testing Joint: A joint in a down-conductor or in a bond connecting two parts of the earth terminal so designed and situated as to enable measurements to be made of the resistance to earth or of continuity of parts of the lightning protection system.

1.4 TESTING

Each earth point shall be tested for resistance to earth readings. These readings shall be logged and the actual method of test shall be recorded in detail so that future test may be carried out under similar conditions. A copy of all logged readings shall be forwarded to the Director for approval and record. On completion the Contractor shall be required to carry out testing in accordance with SANS Code of Practice 0313/99 and in terms of the Standard Preambles.



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VOLUME 2

**LIGHTNING PROTECTION
INSTALLATION**

PART 2LP

GENERAL SPECIFICATION



**DEPARTMENT OF HEALTH: IDEAL CLINICS PROTOTYPE
VOLUME 2 – LIGHTNING PROTECTION INSTALLATION**

PART 2LP - GENERAL SPECIFICATION

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**DEPARTMENT OF HEALTH: IDEAL CLINICS PROTOTYPE
VOLUME 2 – LIGHTNING PROTECTION INSTALLATION**

PART 2LP - GENERAL SPECIFICATION

2.1 SATISFACTORY INSTALLATION

The whole of the installation shall be carried out in accordance with:

- (a) The latest S.A.N.S. Code of Practice for the Protection of Structures against Lightning S.A.N.S. 10313; SANS IEC 61024 (1), 61024 (1 -1); SANS IEC 61312 (1); SANS IEC 61662 & NRS 042.
- (b) Department of Health General Electrical Specification
- (c) By-Laws and any other special requirements as deemed necessary by the Local Supply Authority;
- (d) Local Fire Regulations.

2.2 S.A.N.S. APPROVED DRAWINGS

SANS Approved drawings are not required for this project.

2.3 TEST ON COMPLETION

Upon completion of the lightning protection system, the following tests shall be witnessed by an appointed representative of the Employer. The results shall be recorded on suitable test certificates which must be signed by both the Contractor and the Employers representative. A sketch must be included on each test certificate indicating the positions of each earth electrode in relation to some permanent reference point. It must also indicate: -positions at which tests were carried out, the type of test and the results of these.

2.3.1 Earth Resistance Test

The Earth Resistance Test shall involve measuring the resistance to earth of each rod-type electrode, or group of rod-type electrodes, or trench earth which would normally be connected to one down-conductor or earth terminal. This test must be made with the electrodes completely disconnected from any part of the structure or lightning protection system.

2.3.2 Electrical Continuity Tests

- (a) External Down-Conductors - (Clause A1.3.1)

Electrical continuity between the lower ends of external down-conductors which must all be disconnected from the earthing system during the test shall not exceed 1 (one) ohm.

- (b) Metallic Services

Electrical continuity between any metallic structures of services (e.g. rainwater pipes) which form an integral part of the lightning protection system shall not exceed 1 (one) ohm. These tests should be carried out with all other components of the lightning protection system disconnected from the component being tested.



2.4 **DESCRIPTION OF MATERIAL**

2.4.1 Air Terminals and Down-conductors

All conductors must be in accordance with the requirements of BSS 1474 or American Standards Specification 6063. All aluminium conductors shall have a cross-section area of not less than 30 mm² (domestic dwelling only) or 50 mm² for all other applications. The dimensions of flat section conductors to be 20 mm x 3 mm. Where conductors are mounted in stand-off guides, the cross-section area of the conductor must be not less than 70 mm² to give adequate mechanical strength.

2.4.2 Conductor Guides

The conductor must be mounted in aluminium alloy guides conforming with the material specification given in Clause A1.3.1 above. The guides must allow for free longitudinal movement of the conductor to cater for expansion and contraction of the system caused by temperature variation. The minimum thickness of any part of the guide shall not be less than 3 mm. The guides must be securely attached to the structure using two stainless steel screws and plugs, the use of plated screws is not permitted.

The conductor system shall be supported in guides so that an air gap exists at all times between the aluminium and the surface of the structure, the guides being seated upon plastic or other similar insulating material. Should conductors be installed directly upon the surface of concrete or cement plaster, an insulating strip is to be installed over its whole length to prevent contact between the two surfaces. Guides shall be installed to support the conductor at intervals not exceeding 1,2 metres horizontally or 1,5 metres vertically.

N.B.: No part of an aluminium conductor system must be allowed to come into direct contact with concrete or cement plaster as this may cause the aluminium to corrode.

2.4.3 Expansion Loops

Where conductors are installed horizontally without deviation from a straight line over long distances, expansion loops must be provided at distances not exceeding 30 metres. These expansion loops must have a cross-sectional area which is at least equal to that of the conductor.

2.4.4 Protection of Down-conductors

Where external down-conductors are installed in areas which are readily accessible to the public, the lower ends of the conductors shall be enclosed in a semi-rigid insulating material.

Clause A1.5. In the case of a circular section conductor this shall comprise a 2 metre length of 20 mm diameter P.V.C. conduit. This conduit shall be securely attached to the wall by means of galvanized steel saddles fixed with stainless steel screws and plugs, spaced at intervals not exceeding 1 m. Where a flat section conductor is used this shall be covered by a similar length of 25 mm P.V.C. conduit. The lower end of the conduit shall be positioned as close as practicable to ground level, i.e. immediately above an aluminium to copper joint. The ends of the conduit shall not be sealed.



2.4.5 Earthing Electrodes - (Clause A1.3.3)

Earthing electrodes must consist of either copper-clad steel rods not less than 12 mm in diameter and having a minimum copper thickness of 0,20 mm driven into the ground, or a 50 mm² (35 mm² for domestic dwellings) bare copper conductor buried in a trench, or a combination thereof. Where copper clad steel electrodes are used they must have a suitable bond between the steel core and copper exterior to prevent moisture ingress between the two metals. Where it is necessary to extend earth rods, an electrolytically compatible corrosion resistant, coupling device, which prevents ingress or moisture into the joint shall be used. The copper conductor below the down-conductor joint shall be covered by a semi-rigid P.V.C. conduit for a distance of approximately 200 mm above ground and 400 mm below ground.

2.4.6 Joints Above Ground - (Clause A1.4)

Circular section aluminium conductors shall be joined by aluminium ferrules or lugs which are securely crimped into place. Aluminium lugs must be bolted together using 10 mm diameter aluminium bolts and washers. The material specification for these components must conform with that laid down. Alternatively, heavily tinned copper lugs and ferrules may be used. The lugs should be joined together by means of 10 mm diameter copper, brass or bronze bolts and washers. Care should be taken to inhibit corrosion where dissimilar metals are used by thoroughly cleaning the surfaces of the metal before assembly and subsequently sealing the joint with an inert tenacious compound or tape.

Flat section aluminium conductors shall be joined by double rivetting, using aluminium rivets which comply with the material specification laid down in (Clause A1.3.1). Alternatively, 2 x 6 mm diameter stainless steel bolts, nuts and washers may be used. Fold over type bends will not be permitted.

Down-conductors are to be terminated approximately 200 mm above finished ground level. Circular section aluminium is to be jointed to a 50 mm² (35 mm² in the case of domestic dwellings) stranded copper conductor by securely crimping in place two heavily tinned lugs and bolting these together using 10 mm diameter copper, brass or bronze nuts, bolts and washers.

N.B.: Under no circumstances shall aluminium conductors be buried in the ground.

2.4.7 Joints Below Ground

A joint in the stranded copper conductor which forms part of the earthing system must be made by using a crimped copper ferrule clamping (not lugs) using two copper line taps of suitable dimensions, or exothermic welding. The copper earth conductor must be joined to an earth rod by either clamping, using a standard earth rod clamp or copper line tap or by exothermic welding. Joints which are made between dissimilar metals (i.e. copper conductor to galvanized steel water main), must be thoroughly cleaned before assembly. They shall be rendered watertight using waterproof adhesive tape on a suitable compound for a minimum distance of 200 mm in all directions from the joint.

2.4.8 Bonds

Where it is necessary to bond the aluminium conductor to any other metallic surface, this must be done by bolting or rivetting. When attaching aluminium to a dissimilar metal the joints are to be thoroughly cleaned and sealed to prevent corrosion.



2.5 **GENERAL INSTALLATION PROCEDURE**

2.5.1 Air Terminals for Non-metallic Pitched Roofs

Aluminium conductors are to be installed along all ridges of roofs and projections such as dormer windows, etc., terminating at the ends with conductors running downwards over the surface of the roof and the eaves. Non-metallic chimneys must be protected by means of a finial of sufficient length to cover the chimney within a 45 degree struck downwards from its point. Alternatively, it should have a conductor installed in the form of a closed loop upon the upper surface. The conductors are to follow the outer contour of the stack and must be bonded at a convenient point to the nearest component of the air terminal system.

N.B.:

This bond may run in a horizontal or downward direction, but under no circumstances must any part of it run above horizontal.

Conductors may be dead-ended (i.e. have one end free and unbounded), providing that the length of such a conductor does not exceed 10 metres and that the unbounded end is either at the same level or higher than the bonded end. This technique may be used where ridge conductors are installed over dormer windows, etc.

In all cases where metallic gutters have been installed along the eaves of a pitched roof, these must be bonded to the air terminal system. Where metallic gutters do not exist, however, a conductor must be installed over the surface of the roof at eaves level to which the remainder of the air terminal system is to be bonded, with the following exceptions:

- (a) Where the maximum distance from ground level to the eaves of the building is less than 4 metres and the pitch of the roof is more than 1 in 2. (27 degrees from the horizontal).
- (b) Where the maximum distances from ground level to the eaves is less than 7 metres and the pitch of the roof is more than 1 in 1,5 (34 degrees from the horizontal).
- (c) Where the distance from the ground level to the eaves is more than 7 metres and the pitch of the roof is more than 1 in 1, (i.e. the included angle at the apex of the roof is less than 90 degrees). Under these circumstances eaves conductors need not be installed.

Any non-metallic objects which protrude above the general roof lines, such as Cape Dutch gable ends, must be protected as described above with a suitable air terminal system. Any metallic objects which protrude above the general roof line, such as hot water expansion pipes must be bonded as directly as possible to the nearest eaves conductor, gutter or other part of the lightning system.

N.B.: These bonding conductors must run in a horizontal or preferably a downward direction, from the vent pipe, etc., to the lightning protection system.

2.5.2 Air Terminals for Metallic Pitched Roofs

Buildings with roofs covered with electrically continuous metal sheets do not require separate air terminals but must be earthed via down conductors generally as described



in Clause A1.3.1 and Clause A1.4. Any non-metallic objects projecting above the general roof line must be separately protected and bonded to the metal roof covering.

2.5.3 Air Terminals for Non-metallic flat or Mono-pitched Roofs

For flat or mono pitched roofs of non-metallic construction the air terminal system must consist of aluminium alloy conductors installed around the outer perimeter of each section of the roof structure. These conductors must be installed on top of parapet walls if these exist. Lift motor rooms, tank rooms, penthouses, etc., which protrude above the general roof line must have air terminal conductors installed around the outer perimeter of each roof slab or parapet wall. Any metallic objects which protrude above the roof line, such as expansion pipes, signs, flag poles, handrails, etc., must be bonded directly to the nearest component of the lightning protection system.

N.B.: It is not permissible for the ends of conductors to be bonded directly to the perimeter air terminal system if the latter is installed upon a parapet wall having a height exceeding 500 mm above roof slab level. In these circumstances the conductors are to be bonded directly to the down conductors.

2.5.4 Air Terminals for Metallic flat or Mono Pitched Roofs

Metallic flat or mono pitched roofs do not require separate air terminal conductors, providing that there is electrical continuity between the metallic roofing sheets, (see Clause A1.3.1). A metallic roof surrounded by a non-metallic parapet wall shall have conductors installed at the top of the parapet wall and these must be bonded to the metallic roof at intervals not exceeding 20 m. If the parapet wall is clad with metal over its upper surface or a handrail is installed which affords good electrical continuity, separate air terminal conductors need not be installed. Under these circumstances the metal handrail or cladding must be bonded to the metal roof covering at intervals not exceeding 20 metres.

All non-metallic covering such as slates, tiles, asbestos cement sheeting, etc., supported by a steel structure being electrically continuous throughout may be treated as being of a complete metal construction. In these circumstances no separate air terminal system need be installed providing the steel roof structure is bonded to earth at intervals.

2.5.5 Down Conductors for Non-metallic Structures

Down conductors must be installed at regular intervals around structures and to run as directly as possible between the air terminal and earthing system. They must, where practicable, be positioned at the external corners of the structure. The maximum separating distance between down conductors around the perimeter of the structure must not exceed 30 metres. In the case of very tall buildings having a slender base (i.e. chimney stacks, water towers, etc.), a minimum of two down conductors must be installed.

The lower ends of down conductors are to be terminated and bonded to the earthing system approximately 200 mm above finished ground level. Under no circumstances must aluminium conductors be buried underground. Test joints must be provided between the down conductors and earthing system. Down conductors must run vertically between the air terminal and earthing systems. Where this is impracticable, their course may be deviated to run at any angle up to and including horizontal.

Where it is necessary to run conductors horizontally over the upper surface of a structural protrusion, such as an exposed concrete slab, the conductor may run down vertically over the edge of the slab and return to the main structure, so that the distance between the upper and lower conductors exceeds one third of the length of the horizontal run. Looped down conductors are not permitted. Down conductors must



not run over the underside of large overhangs which are less than 6 metres above ground level, or other areas where people are likely to be present during a thunderstorm.

External or internal metallic rainwater pipes may be used as down conductors providing these are of substantial section and are joined by screwing one length into another or welding. Thin gauge galvanized steel pipes whose sections are held together by friction, rivets or screws must not form part of a lightning protection system.

2.5.6 Down Conductors for Reinforced Concrete framed structures

The steel reinforcement of this type of structure may be used in place of down conductors. Where the reinforcing system is used the air terminal system must be bonded to it at a maximum of 30 metre intervals using steel clamps. This bond may be achieved by clamping, with a steel clamp, a steel conductor to a selected reinforcing bar, the opposite end of this conductor must terminate at a corrosion resistant metallic terminal such as Grade 316 stainless steel.

The reinforcing system of prefabricated concrete buildings must not be used unless special provision is made for bonding the various prefabricated sections together.

The terminals should be mounted flush with the face of the concrete. An aluminium alloy bond must then be taken from the air terminal system and be connected to the stainless steel terminal by means of a heavily tinned crimp lug for circular section aluminium, or a suitable bi-metallic joint in the case of flat section aluminium. A similar system must be used to bond the reinforcing system at ground level to the earthing system at points directly below the air terminal bonds. Here copper conductors must be used as the external bonding material.

Under no circumstances must copper, or other non-ferrous material be allowed to come into contact with steel reinforcing bars, as this may cause severe corrosion and subsequent structural damage. The lightning protection system must not be bonded to any part of the structure which is electrically isolated from the remainder of the building, i.e. cantilevered sections. In these circumstances, or where it is otherwise impracticable to use the reinforcing system, external down conductors must be installed as described in Clause A1.3.1.

2.5.7 Down Conductors for steel framed structures

Where the framework of a building is constructed of structural steel columns, these may be used in place of down conductors providing the separating distance between them does not exceed 30 metres. The upper ends of the columns must be bonded to the air terminal systems and the lower ends to the earthing system.

2.5.8 Earthing by means of vertically installed rod type electrodes

Rod-type electrodes must be driven into the ground at a position directly below each down connector. The maximum earthing resistance of each electrode or number of electrodes bonded to any one down conductor shall not exceed $N \times 30$ ohms, where N equals the total number of down conductors which are bonded to a common air terminal system, or 200 ohms whichever is the lower value.

The minimum horizontal separating distance between rod-type electrodes bonded together must not be less than their installed depth. The upper ends of installed rod-type electrodes are to be terminated approximately 500 mm below finished surface level. A 50 mm² copper bonding conductor must be installed to run between each earthing electrode system and the lower ends of the adjacent down conductors. A joint is to be made between each of these bonding conductors and the down conductors at a position approximately 200 mm above finished ground level.



These bonding conductors must be installed in P.V.C. conduit securely affixed to the wall (see Clause A1.3.1). The length of this P.V.C. conduit must be approximately 600 mm and must be installed so that approximately 200 mm protrudes above ground level, the remainder being buried into the soil.

2.5.9 Earthing by means of metallic water mains

Where two or three down conductors are installed the water mains may serve as an earth terminal for one of these. Where three or more down conductors are installed the water mains may serve as an earth terminal for two of these. Regardless of whether the water mains are used as an earth terminal or not, the incoming metal water pipe must be bonded to the lightning protection earthing system underground.

2.5.10 Earthing by means of trench type electrodes

Where the soil conditions prevent the satisfactory installation of rod-type electrodes, a trench earth system must be installed. This method is to comprise a 50 mm² stranded copper conductor installed horizontally into a trench at a depth of 500 mm below finished ground level. The conductor is to follow the general outline of the structure to be protected and be installed 1 metre away from the outside walls.

Where the building stands on rocky ground, the trench earth may be attached to the lower part of the wall in areas where rock protrudes through the soil. The conductor must, however, be buried wherever possible as described above.

Each down conductor must be bonded to the trench earth system as directly as possible by means of a copper conductor.

Trench earth systems must have a maximum earth resistance of 30 ohms. An isolated length of trench earth mat must be bonded to the down conductor system in such a way as to reduce the length of dead ends to the minimum.

Should trench earths be installed beneath pathways where people are likely to be present during a thunderstorm, a plastic, bitumastic or ceramic pipe must be installed having a length similar to the width of the pathway and the trench earth conductor run inside it.

N.B.: The maximum useful length of a dead-ended trench earth is 80 metres.



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VOLUME 2

LIGHTNING PROTECTION
INSTALLATION

BILL OF QUANTITIES



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SPECIFICATION

VOLUME 2 LIGHTNING PROTECTION

PROPOSED

**DEPARTMENT OF HEALTH:
RESIDENCES REVISION 2
ELECTRICAL SPECIFICATION**



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VOLUME 2

**LIGHTNING PROTECTION
INSTALLATION**

PART 1LP

DETAIL SPECIFICATION



DEPARTMENT OF HEALTH: RESIDENCES REVISION 2

VOLUME 2 –LIGHTNING PROTECTION INSTALLATION

PART 1LP – DETAIL SPECIFICATION

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DEPARTMENT OF HEALTH: RESIDENCES REVISION 2

VOLUME 2 –LIGHTNING PROTECTION INSTALLATION

PART 1LP – DETAIL SPECIFICATION

- 1.1 SCOPE OF PROJECT The Detail specification covers the technical requirements for the Residences Revision 2. Contractors are to read the Detail Specification in conjunction with the Bills of Quantities and drawings issued for this contract.
- 1.2. SPECIALIST CONTRACTORS The Contractor shall note that only Specialists in Lightning and Earthing Protection may undertake this work and shall produce proof of previous work completed by the SANS Code of Practice 10313 and 10313A.
- 1.3 DEFINITIONS : Where the following terms are used in this Specification they shall be taken to mean the following:
- (a) Lightning Protection System: The whole system of conductors used to protect a structure from the effects of lightning.
 - (b) Air Terminal: The part of a lightning protection system that is intended to directly intercept lightning discharges (air terminals include metallic roofs, roof conductors and finials).
 - (c) Down-Conductor: A conductor that connects the air terminal(s) to the earth terminal(s).



- (d) Earth Terminal: The part of a lightning protection system that is intended to discharge lightning currents into the general mass of the earth.
- (e) Bond: A conductor that provides electrical connection between the lightning protection system and the metal work of the structure to be protected (or between various parts of this metal work).
- (f) Joint: A mechanical junction between two conductors for the purpose of providing electrical continuity between two parts of the lightning protection system.
- (g) Earthing Electrode: The part of an earth terminal which makes direct electrical contact with the earth.
- (h) Testing Joint: A joint in a down-conductor or in a bond connecting two parts of the earth terminal so designed and situated as to enable measurements to be made of the resistance to earth or of continuity of parts of the lightning protection system.

1.4 TESTING

Each earth point shall be tested for resistance to earth readings. These readings shall be logged and the actual method of test shall be recorded in detail so that future test may be carried out under similar conditions. A copy of all logged readings shall be forwarded to the Director for approval and record. On completion the Contractor shall be required to carry out testing in accordance with SANS Code of Practice 0313/99 and in terms of the Standard Preambles.



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VOLUME 2

**LIGHTNING PROTECTION
INSTALLATION**

PART 2LP

GENERAL SPECIFICATION



DEPARTMENT OF HEALTH: RESIDENCES REVISION 2
VOLUME 2 – LIGHTNING PROTECTION INSTALLATION

PART 2LP - GENERAL SPECIFICATION

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DEPARTMENT OF HEALTH: RESIDENCES REVISION 2

VOLUME 2 – LIGHTNING PROTECTION INSTALLATION

PART 2LP - GENERAL SPECIFICATION

2.1 SATISFACTORY INSTALLATION

The whole of the installation shall be carried out in accordance with:

- (a) The latest S.A.N.S. Code of Practice for the Protection of Structures against Lightning S.A.N.S. 10313; SANS IEC 61024 (1), 61024 (1 -1); SANS IEC 61312 (1); SANS IEC 61662 & NRS 042.
- (b) Department of Health General Electrical Specification
- (c) By-Laws and any other special requirements as deemed necessary by the Local Supply Authority;
- (d) Local Fire Regulations.

2.2 S.A.N.S. APPROVED DRAWINGS

SANS Approved drawings are not required for this project.

2.3 TEST ON COMPLETION

Upon completion of the lightning protection system, the following tests shall be witnessed by an appointed representative of the Employer. The results shall be recorded on suitable test certificates which must be signed by both the Contractor and the Employers representative. A sketch must be included on each test certificate indicating the positions of each earth electrode in relation to some permanent reference point. It must also indicate: -positions at which tests were carried out, the type of test and the results of these.

2.3.1 Earth Resistance Test

The Earth Resistance Test shall involve measuring the resistance to earth of each rod-type electrode, or group of rod-type electrodes, or trench earth which would normally be connected to one down-conductor or earth terminal. This test must be made with the electrodes completely disconnected from any part of the structure or lightning protection system.

2.3.2 Electrical Continuity Tests

- (a) External Down-Conductors - (Clause A1.3.1)

Electrical continuity between the lower ends of external down-conductors which must all be disconnected from the earthing system during the test shall not exceed 1 (one) ohm.

- (b) Metallic Services

Electrical continuity between any metallic structures of services (e.g. rainwater pipes) which form an integral part of the lightning protection system shall not exceed 1 (one) ohm. These tests should be carried out with all other components of the lightning protection system disconnected from the component being tested.



2.4 **DESCRIPTION OF MATERIAL**

2.4.1 Air Terminals and Down-conductors

All conductors must be in accordance with the requirements of BSS 1474 or American Standards Specification 6063. All aluminium conductors shall have a cross-section area of not less than 30 mm² (domestic dwelling only) or 50 mm² for all other applications. The dimensions of flat section conductors to be 20 mm x 3 mm. Where conductors are mounted in stand-off guides, the cross-section area of the conductor must be not less than 70 mm² to give adequate mechanical strength.

2.4.2 Conductor Guides

The conductor must be mounted in aluminium alloy guides conforming with the material specification given in Clause A1.3.1 above. The guides must allow for free longitudinal movement of the conductor to cater for expansion and contraction of the system caused by temperature variation. The minimum thickness of any part of the guide shall not be less than 3 mm. The guides must be securely attached to the structure using two stainless steel screws and plugs, the use of plated screws is not permitted.

The conductor system shall be supported in guides so that an air gap exists at all times between the aluminium and the surface of the structure, the guides being seated upon plastic or other similar insulating material. Should conductors be installed directly upon the surface of concrete or cement plaster, an insulating strip is to be installed over its whole length to prevent contact between the two surfaces. Guides shall be installed to support the conductor at intervals not exceeding 1,2 metres horizontally or 1,5 metres vertically.

N.B.: No part of an aluminium conductor system must be allowed to come into direct contact with concrete or cement plaster as this may cause the aluminium to corrode.

2.4.3 Expansion Loops

Where conductors are installed horizontally without deviation from a straight line over long distances, expansion loops must be provided at distances not exceeding 30 metres. These expansion loops must have a cross-sectional area which is at least equal to that of the conductor.

2.4.4 Protection of Down-conductors

Where external down-conductors are installed in areas which are readily accessible to the public, the lower ends of the conductors shall be enclosed in a semi-rigid insulating material.

Clause A1.5. In the case of a circular section conductor this shall comprise a 2 metre length of 20 mm diameter P.V.C. conduit. This conduit shall be securely attached to the wall by means of galvanized steel saddles fixed with stainless steel screws and plugs, spaced at intervals not exceeding 1 m. Where a flat section conductor is used this shall be covered by a similar length of 25 mm P.V.C. conduit. The lower end of the conduit shall be positioned as close as practicable to ground level, i.e. immediately above an aluminium to copper joint. The ends of the conduit shall not be sealed.



2.4.5 Earthing Electrodes - (Clause A1.3.3)

Earthing electrodes must consist of either copper-clad steel rods not less than 12 mm in diameter and having a minimum copper thickness of 0,20 mm driven into the ground, or a 50 mm² (35 mm² for domestic dwellings) bare copper conductor buried in a trench, or a combination thereof. Where copper clad steel electrodes are used they must have a suitable bond between the steel core and copper exterior to prevent moisture ingress between the two metals. Where it is necessary to extend earth rods, an electrolytically compatible corrosion resistant, coupling device, which prevents ingress or moisture into the joint shall be used. The copper conductor below the down-conductor joint shall be covered by a semi-rigid P.V.C. conduit for a distance of approximately 200 mm above ground and 400 mm below ground.

2.4.6 Joints Above Ground - (Clause A1.4)

Circular section aluminium conductors shall be joined by aluminium ferrules or lugs which are securely crimped into place. Aluminium lugs must be bolted together using 10 mm diameter aluminium bolts and washers. The material specification for these components must conform with that laid down. Alternatively, heavily tinned copper lugs and ferrules may be used. The lugs should be joined together by means of 10 mm diameter copper, brass or bronze bolts and washers. Care should be taken to inhibit corrosion where dissimilar metals are used by thoroughly cleaning the surfaces of the metal before assembly and subsequently sealing the joint with an inert tenacious compound or tape.

Flat section aluminium conductors shall be joined by double rivetting, using aluminium rivets which comply with the material specification laid down in (Clause A1.3.1). Alternatively, 2 x 6 mm diameter stainless steel bolts, nuts and washers may be used. Fold over type bends will not be permitted.

Down-conductors are to be terminated approximately 200 mm above finished ground level. Circular section aluminium is to be jointed to a 50 mm² (35 mm² in the case of domestic dwellings) stranded copper conductor by securely crimping in place two heavily tinned lugs and bolting these together using 10 mm diameter copper, brass or bronze nuts, bolts and washers.

N.B.: Under no circumstances shall aluminium conductors be buried in the ground.

2.4.7 Joints Below Ground

A joint in the stranded copper conductor which forms part of the earthing system must be made by using a crimped copper ferrule clamping (not lugs) using two copper line taps of suitable dimensions, or exothermic welding. The copper earth conductor must be joined to an earth rod by either clamping, using a standard earth rod clamp or copper line tap or by exothermic welding. Joints which are made between dissimilar metals (i.e. copper conductor to galvanized steel water main), must be thoroughly cleaned before assembly. They shall be rendered watertight using waterproof adhesive tape on a suitable compound for a minimum distance of 200 mm in all directions from the joint.

2.4.8 Bonds

Where it is necessary to bond the aluminium conductor to any other metallic surface, this must be done by bolting or rivetting. When attaching aluminium to a dissimilar metal the joints are to be thoroughly cleaned and sealed to prevent corrosion.



2.5 **GENERAL INSTALLATION PROCEDURE**

2.5.1 Air Terminals for Non-metallic Pitched Roofs

Aluminium conductors are to be installed along all ridges of roofs and projections such as dormer windows, etc., terminating at the ends with conductors running downwards over the surface of the roof and the eaves. Non-metallic chimneys must be protected by means of a finial of sufficient length to cover the chimney within a 45 degree angle struck downwards from its point. Alternatively, it should have a conductor installed in the form of a closed loop upon the upper surface. The conductors are to follow the outer contour of the stack and must be bonded at a convenient point to the nearest component of the air terminal system.

N.B.:

This bond may run in a horizontal or downward direction, but under no circumstances must any part of it run above horizontal.

Conductors may be dead-ended (i.e. have one end free and unbounded), providing that the length of such a conductor does not exceed 10 metres and that the unbounded end is either at the same level or higher than the bonded end. This technique may be used where ridge conductors are installed over dormer windows, etc.

In all cases where metallic gutters have been installed along the eaves of a pitched roof, these must be bonded to the air terminal system. Where metallic gutters do not exist, however, a conductor must be installed over the surface of the roof at eaves level to which the remainder of the air terminal system is to be bonded, with the following exceptions:

- (a) Where the maximum distance from ground level to the eaves of the building is less than 4 metres and the pitch of the roof is more than 1 in 2. (27 degrees from the horizontal).
- (b) Where the maximum distances from ground level to the eaves is less than 7 metres and the pitch of the roof is more than 1 in 1,5 (34 degrees from the horizontal).
- (c) Where the distance from the ground level to the eaves is more than 7 metres and the pitch of the roof is more than 1 in 1, (i.e. the included angle at the apex of the roof is less than 90 degrees). Under these circumstances eaves conductors need not be installed.

Any non-metallic objects which protrude above the general roof lines, such as Cape Dutch gable ends, must be protected as described above with a suitable air terminal system. Any metallic objects which protrude above the general roof line, such as hot water expansion pipes must be bonded as directly as possible to the nearest eaves conductor, gutter or other part of the lightning system.

N.B.: These bonding conductors must run in a horizontal or preferably a downward direction, from the vent pipe, etc., to the lightning protection system.

2.5.2 Air Terminals for Metallic Pitched Roofs

Buildings with roofs covered with electrically continuous metal sheets do not require separate air terminals but must be earthed via down conductors generally as described



in Clause A1.3.1 and Clause A1.4. Any non-metallic objects projecting above the general roof line must be separately protected and bonded to the metal roof covering.

2.5.3 Air Terminals for Non-metallic flat or Mono-pitched Roofs

For flat or mono pitched roofs of non-metallic construction the air terminal system must consist of aluminium alloy conductors installed around the outer perimeter of each section of the roof structure. These conductors must be installed on top of parapet walls if these exist. Lift motor rooms, tank rooms, penthouses, etc., which protrude above the general roof line must have air terminal conductors installed around the outer perimeter of each roof slab or parapet wall. Any metallic objects which protrude above the roof line, such as expansion pipes, signs, flag poles, handrails, etc., must be bonded directly to the nearest component of the lightning protection system.

N.B.: It is not permissible for the ends of conductors to be bonded directly to the perimeter air terminal system if the latter is installed upon a parapet wall having a height exceeding 500 mm above roof slab level. In these circumstances the conductors are to be bonded directly to the down conductors.

2.5.4 Air Terminals for Metallic flat or Mono Pitched Roofs

Metallic flat or mono pitched roofs do not require separate air terminal conductors, providing that there is electrical continuity between the metallic roofing sheets, (see Clause A1.3.1). A metallic roof surrounded by a non-metallic parapet wall shall have conductors installed at the top of the parapet wall and these must be bonded to the metallic roof at intervals not exceeding 20 m. If the parapet wall is clad with metal over its upper surface or a handrail is installed which affords good electrical continuity, separate air terminal conductors need not be installed. Under these circumstances the metal handrail or cladding must be bonded to the metal roof covering at intervals not exceeding 20 metres.

All non-metallic covering such as slates, tiles, asbestos cement sheeting, etc., supported by a steel structure being electrically continuous throughout may be treated as being of a complete metal construction. In these circumstances no separate air terminal system need be installed providing the steel roof structure is bonded to earth at intervals.

2.5.5 Down Conductors for Non-metallic Structures

Down conductors must be installed at regular intervals around structures and to run as directly as possible between the air terminal and earthing system. They must, where practicable, be positioned at the external corners of the structure. The maximum separating distance between down conductors around the perimeter of the structure must not exceed 30 metres. In the case of very tall buildings having a slender base (i.e. chimney stacks, water towers, etc.), a minimum of two down conductors must be installed.

The lower ends of down conductors are to be terminated and bonded to the earthing system approximately 200 mm above finished ground level. Under no circumstances must aluminium conductors be buried underground. Test joints must be provided between the down conductors and earthing system. Down conductors must run vertically between the air terminal and earthing systems. Where this is impracticable, their course may be deviated to run at any angle up to and including horizontal.

Where it is necessary to run conductors horizontally over the upper surface of a structural protrusion, such as an exposed concrete slab, the conductor may run down vertically over the edge of the slab and return to the main structure, so that the distance between the upper and lower conductors exceeds one third of the length of the horizontal run. Looped down conductors are not permitted. Down conductors must



not run over the underside of large overhangs which are less than 6 metres above ground level, or other areas where people are likely to be present during a thunderstorm.

External or internal metallic rainwater pipes may be used as down conductors providing these are of substantial section and are joined by screwing one length into another or welding. Thin gauge galvanized steel pipes whose sections are held together by friction, rivets or screws must not form part of a lightning protection system.

2.5.6 Down Conductors for Reinforced Concrete framed structures

The steel reinforcement of this type of structure may be used in place of down conductors. Where the reinforcing system is used the air terminal system must be bonded to it at a maximum of 30 metre intervals using steel clamps. This bond may be achieved by clamping, with a steel clamp, a steel conductor to a selected reinforcing bar, the opposite end of this conductor must terminate at a corrosion resistant metallic terminal such as Grade 316 stainless steel.

The reinforcing system of prefabricated concrete buildings must not be used unless special provision is made for bonding the various prefabricated sections together.

The terminals should be mounted flush with the face of the concrete. An aluminium alloy bond must then be taken from the air terminal system and be connected to the stainless steel terminal by means of a heavily tinned crimp lug for circular section aluminium, or a suitable bi-metallic joint in the case of flat section aluminium. A similar system must be used to bond the reinforcing system at ground level to the earthing system at points directly below the air terminal bonds. Here copper conductors must be used as the external bonding material.

Under no circumstances must copper, or other non-ferrous material be allowed to come into contact with steel reinforcing bars, as this may cause severe corrosion and subsequent structural damage. The lightning protection system must not be bonded to any part of the structure which is electrically isolated from the remainder of the building, i.e. cantilevered sections. In these circumstances, or where it is otherwise impracticable to use the reinforcing system, external down conductors must be installed as described in Clause A1.3.1.

2.5.7 Down Conductors for steel framed structures

Where the framework of a building is constructed of structural steel columns, these may be used in place of down conductors providing the separating distance between them does not exceed 30 metres. The upper ends of the columns must be bonded to the air terminal systems and the lower ends to the earthing system.

2.5.8 Earthing by means of vertically installed rod type electrodes

Rod-type electrodes must be driven into the ground at a position directly below each down connector. The maximum earthing resistance of each electrode or number of electrodes bonded to any one down conductor shall not exceed $N \times 30$ ohms, where N equals the total number of down conductors which are bonded to a common air terminal system, or 200 ohms whichever is the lower value.

The minimum horizontal separating distance between rod-type electrodes bonded together must not be less than their installed depth. The upper ends of installed rod-type electrodes are to be terminated approximately 500 mm below finished surface level. A 50 mm² copper bonding conductor must be installed to run between each earthing electrode system and the lower ends of the adjacent down conductors. A joint is to be made between each of these bonding conductors and the down conductors at a position approximately 200 mm above finished ground level.



These bonding conductors must be installed in P.V.C. conduit securely affixed to the wall (see Clause A1.3.1). The length of this P.V.C. conduit must be approximately 600 mm and must be installed so that approximately 200 mm protrudes above ground level, the remainder being buried into the soil.

2.5.9 Earthing by means of metallic water mains

Where two or three down conductors are installed the water mains may serve as an earth terminal for one of these. Where three or more down conductors are installed the water mains may serve as an earth terminal for two of these. Regardless of whether the water mains are used as an earth terminal or not, the incoming metal water pipe must be bonded to the lightning protection earthing system underground.

2.5.10 Earthing by means of trench type electrodes

Where the soil conditions prevent the satisfactory installation of rod-type electrodes, a trench earth system must be installed. This method is to comprise a 50 mm² stranded copper conductor installed horizontally into a trench at a depth of 500 mm below finished ground level. The conductor is to follow the general outline of the structure to be protected and be installed 1 metre away from the outside walls.

Where the building stands on rocky ground, the trench earth may be attached to the lower part of the wall in areas where rock protrudes through the soil. The conductor must, however, be buried wherever possible as described above.

Each down conductor must be bonded to the trench earth system as directly as possible by means of a copper conductor.

Trench earth systems must have a maximum earth resistance of 30 ohms. An isolated length of trench earth mat must be bonded to the down conductor system in such a way as to reduce the length of dead ends to the minimum.

Should trench earths be installed beneath pathways where people are likely to be present during a thunderstorm, a plastic, bitumastic or ceramic pipe must be installed having a length similar to the width of the pathway and the trench earth conductor run inside it.

N.B.: The maximum useful length of a dead-ended trench earth is 80 metres.



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SPECIFICATION

**DEPARTMENT OF HEALTH: IDEAL CLINICS
PROTOTYPE**

VOLUME 3.1

NURSE CALL INSTALLATION

PART 1 NC

DETAILED SPECIFICATION



DEPARTMENT OF HEALTH: IDEAL CLINICS PROTOTYPE

VOLUME 3.1 – NURSE CALL INSTALLATION

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NURSE CALL INSTALLATION

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DETAIL SPECIFICATION – PART 1NC

PART A



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DEPARTMENT OF HEALTH: IDEAL CLINICS PROTOTYPE

VOLUME 3.1 – NURSE CALL INSTALLATION

PART 1NC - DETAILED SPECIFICATION

PART A



<p>A1. SCOPE OF THE PROJECT</p>	<ul style="list-style-type: none"> ➤ The Detail specification covers the technical requirements for the Ideal Clinics Prototype. Contractors are to read the Detail Specification in conjunction with the Bills of Quantities and drawings issued for this contract.
	<ul style="list-style-type: none"> ➤ This section of the Contract covers the supply, delivery, installation; commissioning and handing over in good operating condition of the complete Nurse Call and part Public Address Installation.
<p>A2. GENERAL REQUIREMENTS</p>	<ul style="list-style-type: none"> ➤ The complete installation shall be carried out in accordance with the Occupation Health and Safety Act 85/1993 and to the satisfaction of the Engineer.
	<ul style="list-style-type: none"> ➤ All new Nurse Call and Public Address equipment, shall be of the same make.
	<ul style="list-style-type: none"> ➤ The work shall at all times be carried out under the supervision of a competent representative of the Contractor, who will be able and authorized to receive and carry out instructions on behalf of the Contractor.
	<ul style="list-style-type: none"> ➤ All apparatus, component parts, fittings and materials employed in the execution of the Contract shall be new and unused and shall be the latest type or pattern of the particular manufacture employed. SABS. mark bearing items shall be used wherever possible and suppliers to be ISO 9001 compliant.
	<ul style="list-style-type: none"> ➤ Rates shall include all anti-vibration equipment necessary to ensure that the installation is acceptable to the Engineer.
	<ul style="list-style-type: none"> ➤ The complete installation shall be maintained for a period of twelve months' after acceptance in writing by the Engineer.



	<ul style="list-style-type: none"> ➤ The complete installation must be guaranteed against defective parts and workmanship for a period of twelve months after the date of issue of the ➤ Completion Certificate. This period shall run concurrently with the maintenance period.
	<ul style="list-style-type: none"> ➤ Rates shall include commissioning and testing of the complete installation and handing over in working order to the satisfaction of the Engineer.
	<ul style="list-style-type: none"> ➤ Rates shall include all equipment, electrical wiring and controls necessary to complete the installation.
	<ul style="list-style-type: none"> ➤ All work shall be carried out by competent workmen skilled in their trade. All workmanship will be subject to the approval of the Engineer.
A3. OPERATING AND MAINTENACE MANUALS	The following sections shall be included in the Operating and Maintenance Manuals:
	<ul style="list-style-type: none"> ➤ Description of the system. ➤ Operation of the system. ➤ Schedule of Equipment Installed. ➤ Spare parts list. ➤ Copies of final commissioning data. ➤ Pamphlets and information relating to the equipment installed, with names of agents and suppliers. ➤ Complete set of "As-Built" drawings. ➤ Name, address and telephone number of Contractor and after hours' service. ➤ Planned Service and Maintenance Programme.
A4. EMPLOYER INSTRUCTION	<ul style="list-style-type: none"> ➤ The Contractor shall allow for instruction of a designated official from the user's organisation in the operation of the equipment. This shall take place after the submission of the Operating and Maintenance Manuals. Any additional information required to supplement the manual requested during this instruction shall be provided by the Contractor.



A5. CONTRACTORS GRADING	<ul style="list-style-type: none">➤ All work specified in this section of the Contract shall be carried out by an approved specialist in Nurse Call, Patient Call, Intercom, Access Control. System, Public Address System & Alarm Installations.
A6. STATUTORY REQUIREMENTS	<ul style="list-style-type: none">➤ The entire Nurse Call, Patient Call Intercom, Access Control System, Public.➤ Address System & Alarm Installations shall conform fully to the requirements of the Occupational Health and Safety Act № 85 of 1993, as amended.



VOLUME 3.1 – ANCILLARY INSTALLATION

PART 1A - DETAILED SPECIFICATION

PART B – NURSE CALL SYSTEM

B1. GENERAL: The Contractor shall allow to supply and install a complete Micro Sound Nurse Call System to the areas as shown on the Drawings. The Contractor shall use the Nurse Call System for the entire installation.

B2. POWER SUPPLY: The power supply shall be housed in a corrosion proofed box suitable for wall mounting. All terminations shall be on the exterior of the unit using an approved method of terminating. Terminations shall be clearly marked. The unit shall be fused and fuse replacement shall be possible without opening the unit. An indicator shall be provided to indicate that the unit is switched on. Failure of the fuse shall cause this indicator to be extinguished. A double wound transformer with earthed screen shall be used. Suitably rated rectifying and smoothing components shall be used and all components shall be sturdily mounted preferably using a printed circuit board. Wires entering the unit from the connecting strip shall be protected from damage with a rubber or plastic grommet. The power supply shall make provision for connection to 220 or 250 VAC/50Hz + 10%. Output shall be unregulated 24V 5A DC.

B3. AUDIBLE ALARM .1 **General**: Three different self-contained units shall be available each built into housing to match the reset of the system. These units shall be custom built for the system.

(i) Alert Tone Unit (Continuous)

This unit shall operate on 24V DC \pm 25%. The alarm shall operate while any call button in the system is depressed and subsequently depressions of any call button shall reactivate the alarm. An interrupted signal shall sound continuously when an emergency unit is operated.

(ii) Interrupted Alarm Unit

This unit shall operate on 24V DC \pm 10% and the alert tone shall sound approximately 1 (one) second on and 1 (one) second off until the call has been attended to.

(iii) Chime Unit

This chime unit shall be activated by a call from any call point connected to it. The unit shall emit a pleasant single,



two tone or three tone chime every 10 (ten) seconds until the call is cancelled. The volume shall be adjustable by means of a volume control on the front panel. It shall not be possible to turn the volume down to zero. The unit shall provide for connection to a remote loudspeaker.

B4. MIMIC PANEL

Mimic panels are to be custom made. A graphic representation of the ward floor plan is to indicate the exact location of the calls. The mimic is to be wall mounted. The front panel to consist of reverse printed material with a textured finish to prevent glare. On the inside a control printed circuit board mounted to the base, to house the electronics and connections to external circuits. The control PCB is to be connected via plug-in ribbon cables to the display PCB mounted behind the front panel.

The display PCB to serve as a mounting platform for high bright LED's which, when illuminated, are to be visible on the front panel to indicate the location of the call. Normal calls are to be announced by a steady light while emergency calls are to be announced by a flashing light.

B5. BEDHEAD UNIT FOR .1
PEAR PUSH:

Construction: This unit shall consist of:

- A pear push (white ABS plastic) connected via 1.5m white flexible cord which is connected to an approved RCA type plug moulded to the cord.
- A single bedhead unit with an approved RCA type socket mounted independently on the reset key. When requiring assistance, the patient shall depress the pear push button which shall cause:
 - The reassurance lamp on the bedhead unit (which shall be clearly visible under normal and interior lighting conditions) to light up.
 - The overdoor lamp above the door to light up.
 - Zone lamps where required to light up.
 - The relevant LED on the mimic panel to light up.
 - An alarm (depending on which alarm unit used) to sound as specified



B6. EMERGENCY

CALL UNIT (WHERE
INDICATED)

This unit shall be identical to the bedhead unit with wall/reset excepting that all the lamps and LED's will flash in sympathy with an interrupted emergency tone.

B7. PULL CORD UNIT
(WHERE INDICATED):

This unit shall consist of:

A single unit with reassurance lamp and a 1.5m nylon cord and shall be suitable for wall or ceiling mount.

When requiring assistance, the patient will pull the cord which shall cause:

- The reassurance lamp on the single unit as well as the reassurance on the associated reset unit for bathroom and toilet complex to light up.
- The overdoor lamp above the door of the toilet complex to light up.
- Zone lamp/s where required to light up.
- The relevant LED on the MIMIC panel to light up.
- An alarm (depending on which alarm unit is used) to sound as specified.

The resetting of this call shall only be possible at the reset unit associated with the pull cord unit.

B8. PUSH CORD UNIT
(TOILET):

This unit shall consist of:

A single key unit with reassurance lamp.

When requiring assistance, the patient shall depress the single key which causes:

- The reassurance lamp on push call unit as well as the reassurance lamp on the associated reset unit for Bathroom/Toilet complex to light up.
- The overdoor lamp above the door of the toilet complex to light up.
- Zone lamps where required to light up.
- The relevant LED's at the mimic panel to light up.
- An alarm (depending on which alarm unit is used) to sound as specified. The resetting of this call shall only be possible at the reset unit associated with the push call.



B9. RESET UNIT FOR
BATHROOM TOILET
COMPLEXES:

This unit shall consist of:

A single key with reassurance lamp.

The reassurance lamp shall light up when a call has been made from an associated toilet, Bathroom or Shower in the complex.

The call shall be reset at this unit.

B10. OVERDOOR LAMP:

This unit shall allow for replacement of globe from the front as it is usually mounted out of reach of patients. The globe shall be mounted inside the lens which shall protrude so as to be clearly visible down a passage. The lamp shall be of sufficient wattage to allow clear indication in normal interior lighting conditions. A red triangular light inclusive of light base, red diffuser, cradle cover as per Type Legrand shall be used.

B11. PEAR PUSH:

This unit shall be manufactured from high impact plastic material and be extremely robust. A 1.5m flexible cord suitably anchored or knotted inside the housing of the pear push shall prevent strain on the terminations. The cord shall connect to the bedhead unit via the RCA plug which shall be moulded to the cord.



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NURSE CALL INSTALLATION

VOLUME 3.1

DETAIL SPECIFICATION – PART 1NC

PART 2 NC

GENERAL SPECIFICATION



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DEPARTMENT OF HEALTH: IDEAL CLINICS PROTOTYPE

VOLUME 3.1 – NURSE CALL INSTALLATION

PART 2NC - GENERAL SPECIFICATION

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DEPARTMENT OF HEALTH: IDEAL CLINICS PROTOTYPE

VOLUME 3.1 – NURSE CALL INSTALLATION

PART 2NC - GENERAL SPECIFICATION

1. ELEMENTS OF THE NURSE CALL SYSTEM:

The Nurse Call system shall comprise the following elements:

 - (a) Power supply
 - (b) Annunciator panel, located at the nurse station
 - (c) Call initiation at the patient position
 - (d) General call indication light for an area, eg. a ward
 - (e) Emergency call initiation, generally one per ward
 - (f) Wire ways and cabling

2. OPERATION OF THE NURSE CALL SYSTEM:

The Nurse Call system shall function in the following elements:

 - (a) A call is initiated at the patient position, eg. a bed, or ablutions.
 - (b) An audible alarm and a light identifying the call positions is activated on the annunciator panel.
 - (c) The general call indication light is energised in the continuous mode, identifying the area where the call was originated.
 - (d) The call is cancelled at the position where it was initiated.
 - (e) The emergency call, where this is provided, is initiated in each area by Pushbutton. The emergency call activates a light on the annunciator panel identifying the area where the call was initiated, an audible alarm different to the patient call audible alarm, and causes the general call indication light to flash, over-riding the continuous illumination by a patient call.
 - (f) The emergency call may be cancelled only from the call position.



- (g) Where specified in the detailed specification, the system shall permit the provision of more than one annunciator panel.
3. POWER SUPPLY:
- (a) The nurse call system shall operate off a single phase, 230V \pm 10% 50Hz mains supply. The entire system, including all lights and audible alarms, shall be fed off the low voltage output of the power supply.
 - (b) The power supply shall provide direct current output at a voltage not exceeding 24V.
 - (c) The power shall provide full isolation between the mains supply and the output by means of a double-wound mains isolating transformer.
 - (d) Both the input and output of the power supply shall be protected by suitably rated fuses.
 - (e) The power supply shall be accommodated in a suitable housing to prevent accidental contact with live components.
 - (f) The power supply shall be connected to the mains supply by means of a 1000mm long cord and 16A plug top.
4. ANNUNCIATOR PANEL:
- (a) The annunciator panel shall comprise a 4mm thick anodised aluminium plate with the plan of the area covered by the system printed on the face. Each patient and emergency call position shall be indicated by a red light emitting diode (LED), which shall light up on initiation of a call.
 - (b) The panel shall incorporate two audible alarms which are activated on receipt of a call either from a patient position, or an emergency call. The audible alarms shall cancel only when the call is cancelled from the call position.
 - (c) The panel shall be built into a console, or installed in a metal box and either mounted on the wall or placed loose on the desk-top. In the latter case, the box shall be fitted with stands to keep the panel at approximately 45 degrees relative to the desk top, and the connecting cables into the box shall be flexible. The type of annunciator panel required is indicated in the detailed specification.
5. CALL INITIATOR
- (a) The call initiation equipment shall comprise a



EQUIPMENT

- means of initiating a call
- (a) pear push in the case of patient call, and a push- button in the case of emergency call), a cancel button and a light which illuminates when a call is initiated, and extinguishes on cancelling of the call. This light may be incorporated in the cancel button.
 - (b) The pear push shall be fitted with a 600mm long flexible lead and shall plug into the call initiating circuitry by means of a sturdy plug.
 - (c) The call initiating circuitry shall be accommodated in bedhead trunking or a suitable box, as specified in the detailed specification.

6. GENERAL CALL INDICATION

- (a) The general call indication for an area shall comprise lamp fitted with a red lens such that it can be clearly seen from any direction of approach.
- (b) It shall be installed in a position which clearly identifies the area to which it pertains, such as above the entrance door to the area. The exact position is specified in the detailed specification.
- (c) The general call indication shall be activated by either a patient call or an emergency call. In the case of an emergency call it shall flash. The general call indication shall give preference to the indication of emergency calls.

7. WIREWAYS AND CABLING

- (a) The wire ways for the installation are specified in the detailed specification.
- (b) The cabling shall comprise telephone cable having the appropriate number of twisted pairs.
- (c) The cabling shall be sized to provide 30% spare cores.
- (d) The cabling shall be terminated on Krone blocks.
- (e) The equipment at the call point shall plug in.

8. DOCUMENTATION:

- (a) Three copies of the documentation on the installation shall be provided.
- (b) The documentation shall cover system operation, description of the system, a component list and



wiring schedules.

9. COMPLIANCE CERTIFICATE: (a) Where applicable, the Contractor shall issue an electrical compliance certificate for any electrical work forming part of the installation.
- Work and material to be supplied by SANS ISO 9001 compliant suppliers
10. TESTING AND COMMISSIONING: (a) Where applicable, the Contractor shall issue an electrical compliance certificate for any electrical work forming part of the installation.
11. FIRST DELIVERY: (a) It shall be noted that first delivery of the installation will not be taken until the testing and commissioning has been completed, and until the documentation and compliance certificate (if applicable) has been submitted.



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NURSE CALL INSTALLATION

VOLUME 3.1

BILLS OF QUANTITIES



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SPECIFICATION

VOLUME 4 STANDBY GENERATOR

PROPOSED DEPARTMENT OF HEALTH: IDEAL CLINICS PROROTYPE ELECTRICAL SPECIFICATION



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VOLUME 4

STANDBY GENERATOR

PART 1 SBG

DETAILED SPECIFICATION

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DEPARTMENT OF HEALTH: IDEAL CLINICS PROTOTYPE

VOLUME 4 – STANDBY GENERATOR INSTALLATION

PART 1 SBG – DETAILED SPECIFICATION

1. GENERAL: The stand-by generating set herein specified is to be installed in the generator room at Ideal Clinics Prototype.
2. SCOPE OF CONTRACT: The contract comprises supply and installation of a new self contained set associated control panel and the design, manufacture, assembly, delivery to site and handing over in first class working order of a complete standby diesel generating set and all ancillary equipment necessary to comply with the requirements of this specification. The plant generally shall comprise a diesel engine coupled to an alternator mounted on a common base, a set of starting batteries, automatic charging unit, interconnecting cables, a control panel housing the generator M.C.C.B. and all necessary switchgear, including the changeover equipment and onload bypass switch. A bulk fuel tank installed in the base suitable sized to run the generator for 72 hours is also required.
3. PLANT ROOM: No plantroom will be provided, however the contractor needs to have a suitable concrete base for the generator set.

Tenderers are advised to acquaint themselves with the site conditions as no claim on the grounds of want of knowledge will be entertained.

4. PLANT DUTIES: The diesel generating plant and its ancillary equipment shall normally operate as an automatic main failure unit. It shall be capable of delivering its full rated output at any time and any ambient conditions likely to occur at the site. The generating set will not be required to be synchronized with the main supply.
5. SYSTEM: The system to which the plant is to be connected is 3 phase, 4 wire, 400 volts between phases and 240 volts between phase and neutral, with a frequency of 50 Hz.

- 6.1 RATING: **NOTE: THE UNIT SHALL BE CAPABLE OF DELIVERING 200 KVA PRIME POWER @ 0.8 POWER FACTOR**
The rating of the diesel generating set shall be based on operation of the set when equipped with all necessary accessories such as radiator fan, lubricating oil pump, fuel transfer pump, fuel injection pump, water pump, and battery charging alternator.

The generator set shall be capable of delivering the specified output continuously under the site conditions without overheating. The engine shall capable of delivering an output of 110% of the specified output for one hour any period of 12 hours consecutive running.



7. DIESEL ENGINE: .1 **Type:** The engine shall be of the multi cylinder, four stroke cycle, cold starting, direct injection, compression ignition type, suitable for operation on diesel fuel.
- .2 **Cooling System:** The engine shall be of the water cooled type and the cooling system shall be of sufficient capacity to cool the engine when the set is delivering its full rated load in the ambient conditions specified in Clause
- The engine shall be equipped with a heavy duty type radiator complete with engine driven fan and centrifugal water circulating pump and a thermostat to maintain the engine at the makers recommended temperature level.
- A thermostatically controlled immersion heater shall be provided and fitted in the engine cooling circuit to ensure easy starting of the engine at any ambient temperature.
- The heater shall be so fitted that it can easily be withdrawn without having to drain the system. The heater shall be suitable for a 240 volt 50 Hz supply.
- A low radiator level shutdown sensor switch shall be fitted in the radiator header tank. A separate sensor must be fitted on the block for the normal high engine temperature shutdown and gauge
- .3 **Speed:** The engine speed shall not exceed 1 500 R.P.M. at normal full load conditions.
- .4 **Fuel:** The engine shall be capable of satisfactory performance on a commercial grade of distilled petroleum fuel oil such as No. 2 fuel oil. (Commercial grade diesel fuel).
- .5 **Rating:** The engine shall be suitable for continuous running at the specified speed, delivering its rated output at the specified site conditions.
- In addition, the engine shall be capable of delivering 75 % load for one hour, after the set has been running at full load for a period of six hours and shall, after the overload period of one hour be capable of maintaining the rated output continuously without any undue mechanical strain, overheating, incomplete fuel combustion or other ill effects.
- The engine shall have sufficient capacity to start up and shall within 15 seconds from mains failure, supply the full rated load at the specified voltages and frequency.
- .6 **Governor:** The engine shall be controlled by a governor to maintain governed speed for 50 Hz operation. Class A governing in accordance with B.S. 5514 as amended is required.
- Fuel System: See note 2 above**
- (a) Day Tank: The fuel tank shall be an integral part of the base frame of the generator set. The tank shall have sufficient capacity to run the engine on full load for a minimum period of 12 hours.
- .7



The tank shall be fitted with a suitable filter, gauge, removable inspection cover, drain, filler cap, low level and extra low shutdown alarm sensors.

These shall supply an audible and visible signal on the control panel.

Automatic pump starts and stop sensors for the automatic starting and stopping of the fuel transfer pump shall also be installed, complete all the necessary wiring and controls.

The set shall be supplied with a hand operated "wing pump" and a suitable length of oil resistant hose. The hose shall be of the "push lock" type and shall be sufficient in length to extend to the door for filling from 350 litre drums.

(b) Day Tank: A 350 litre composite bulk underground tank together All interconnecting supply and return pipes, low alarm, breather and automatic filling system shall be provided. This installation shall be carried out by a specialized petrochemical installation contractor in accordance with SABS 0131 part 2/1979 and SABS 089 part 3/1991. bulk tank position will be confirmed at the site meeting.

Note: The E.I.A. will be handled by the CONTRACTOR

The automatic filling of the day tanks, from the bulk tanks, shall be controlled by level switches mounted in the day tank. These switches shall start and stop the electric self-priming pump.

In addition to the electric pump, a manual hand operated "wing pump" complete with isolating valves shall be provided. It shall be possible to fill the day tank from the bulk tank with this pump, in the event of a problem with the automatic filling system.

Allowance must be made for the first fill of both the "day" and "bulk" tanks.

Lubricating: The engine shall be provided with a forced feed lubricating system with a gear type lubricated oil pump for supplying oil under pressure to the main bearings, crank pin bearings, pistons, piston pins, timing gears, camshaft bearings, valve rocker mechanism and all other moving parts.

Full flow replaceable element type oil filters, conveniently located for servicing, shall be provided. Filters shall be provided with a spring loaded by-pass valve to ensure circulation if the filters become clogged.

8.

Cylinder Liners: The engine shall be provided with removable wet or dry type cylinder liners of close grained alloy iron.

9.

10. **Air Cleaners:** The engine shall be provided with one or more dry type air cleaners which shall provide positive air filtration.

11. **Exhaust System:** The engine shall be fitted with an efficient Stainless Steel exhaust system. Flexible bellows shall be fitted between the exhaust outlet and the silencer. The flexible piping must on no account be used to form a bend or compensate for misalignment. The silencer shall be located in the plant room and the discharge pipe run from the silencer out through



the wall. The silencer shall be of the highly efficient type suitable for use in residential areas and shall be capable of providing 20 to 30 decibels of suppression.

The silencer and discharge piping shall be suitably supported. The exhaust silencer shall be suitably lagged then clad in polished stainless steel sheet.

Openings through the wall are to be neatly drilled by the Standby Plant Contractor and stainless steel flashing plates must be fitted both sides.

12. **Flywheel:** The flywheel shall be designed to limit the cyclic irregularities to within the limits laid down in B.S. 5514 as amended.

Engine Starting: The engine shall be equipped with a 12/24 volt starting system of sufficient capacity to crank the engine at a speed, which will allow starting of the engine.

The starting equipment shall include a 12/24 volt D.C. starter motor engaging directly on the flywheel ring gear. A heavy duty battery charging alternator and maintenance free batteries of the Delco/Deltec type shall be supplied. The batteries shall be mounted in a battery box.

The batteries shall be connected to the engine with suitably rated P.V.C. insulated flexible leads.

The batteries shall have sufficient capacity to provide three automatic attempts to start immediately followed by three manual attempts without any appreciable drop in voltage. The automatic attempts to start shall each be of not less than 10 seconds duration with 10 second intervals between and the manual attempts shall be based on the same cranking period.

A device shall be provided to limit the cranking time of each automatic attempt to start, to the 10 seconds specified above and to provide three automatic attempts after which the automatic starting mechanism will cut out until manually reset and at the same time sound an audible alarm and illuminate the L.E.D. on the AMF 120 controller. The engine driven battery charging alternator shall have sufficient capacity to recharge the batteries back to normal starting requirements in not more than six hours.

A battery charging unit of the trickle charge type shall be provided to maintain the batteries at full capacity. The charging equipment shall be connected so that the battery is normally charged from the mains, but is also charged under mains failure conditions from the diesel generating plant and if required via an inhibitor relay to prevent dual charging. The unit shall be complete with voltmeter, push button test, D.C. and A.C. protective gear. The charging unit shall be incorporated in the diesel generator control cabinet.

- 13.



RADIATOR
EXTRACT
DUCTING:
A.C. GENERATOR:

- .14 **Engine Instruments:** The following instruments with suitable limit markings shall be provided on the generator panel: -
- (a) Water temperature gauge. The gauge shall be calibrated at the lower part of the temperature range, so that when the engine is inoperative the temperature of the water is readable when heated by the immersion heater only. The temperature range shall extend beyond the operating range of the engine.
 - (b) Lubricating oil pressure gauge.
- .15 **Safety Controls:** The engine shall be equipped with the safety controls as specified in 11.4.
- .16 **Engine/Alternator Coupling and Base:** The engine and alternator shall be direct coupled and arranged for operation at 380/240 volt, 50Hz & 1500 RPM.
A steel fabricated base-frame (incorporating the day fuel tank) with ant vibration mounts between the engine / alternator combination and base shall be provided and must be able to be placed directly on the plant-room floor.
A galvanized duct shall be provided and installed between the radiator face and outlet louver to positively duct the hot expelled air out of the plant room.
- .1 **Rating:** The generator shall be a 380/240 volt, 3 phase, 4 wire 50 Hz machine rated 200kVA at 0.8 power factor. The generator rating shall be applicable for continuous service application.
- .2 **Construction and Manufacture**
- The generator shall be a revolving field type, coupled directly to the engine flywheel through a flexible disc for positive alignment. The generator housing shall bolt directly to the engine flywheel housing and shall be equipped with a heavy duty ball bearing support for the rotor. The motor shall be dynamically balanced up to 75 % overspeed.
- The generator shall be of heavy duty compact design. Insulation shall be Class H as recognized by B.S.5514.
- The generator field excitation shall be performed by a rotating exciter mounted on the generator motor shaft through a brushless rotating diode system. The voltage regulator shall be of the static-magnetic type with silicon diode control. It shall be mounted on the top or side of the generator and enclosed in a drip proof enclosure. A built in voltage adjusting rheostat shall provide 10 % voltage adjustment.
3. **Performance:** The generator shall be capable of continuously delivering the full rated load specified in Clause 9.1 and of providing a 10 % overload for the period and in the manner specified for the engine in Clause 7.5.



- .4 **Wave Form:** The shape for the voltage and current wave shall be within the limits laid down by B.S. 5000.
- .5 **Voltage Regulation and Response:** The alternator shall be self-regulated and shall incorporate an automatic voltage regulator.

The voltage regulation shall not exceed $\pm 2\frac{1}{2}\%$, from no load to full load, including cold to hot variations at any power factor between 0,8 lagging and unity and inclusive of speed variations within the limits stated in Clause 7.6.

Upon application of full load at a power factor of 0,8 lagging the alternator voltage shall recover to within $2\frac{1}{2}\%$ of the steady state value within approximately 300 milliseconds.

Upon application of any load specified in transient, maximum voltage dip shall not exceed 20% of the nominal voltage when measured at the alternator terminals.

- .6 **Windings:** The generator stator windings shall be star connected with the star point brought out and connected to the neutral terminal in the terminal box on the generator to provide a 380/240-volt supply.
- .7 **Terminal Box:** The terminal box shall be fitted to suit the cable route. It shall be large enough to allow for glanding and connecting the cables specified in Clause 13.1.
- .8 **Radio and T.V. Interference:** The generating set shall be suitably suppressed within the limits of B.S. 800 against radio and television interference.

10. DIESEL
GENERATOR

CONTROL PANEL:

- .1 **Type and Construction:** The panel shall be designed for the control of the Diesel generating set with instrumentation and protective devices to meet Both manual and automatic mode requirements

The panel shall be designed for the control of the diesel generating set with instrumentation and protective devices to meet both manual and automatic mode requirements. The control panel shall be of robust construction, floor mounted, totally enclosed and dust proof. It shall be of folded 1,6 mm thick cold rolled sheet steel construction suitable for front entry through hinged doors. Internal chassis plates, circuit breaker pans and gland plates shall be provided. Special attention shall be given to vermin proofing and dust sealing.

Prior to painting all steelwork must be thoroughly degreased and de-rusted and then primed with a zinc chromate primer. All internal steel chassis plates, gland plates and switchgear brackets shall be painted with white powder epoxy paint and all exterior steel surfaces finished with orange powder epoxy paint. The front control panel shall be painted with the best quality Signal Red "Twin Pack" epoxy paint.

- .2 **Bus-Bars, Wiring, Switchgear, Etc.:** All bus-bars and wiring shall be adequately rated and suitably supported, and control wiring shall be neatly laced and numbered with durable plastic ferrules, for easy tracing. Suitable terminals are to be provided for incoming and outgoing cables. Suitably sized holes shall be punched in the gland plates for the required number of cable terminations for both incoming and outgoing cables. The



cables shall be secured to the gland plate by means of cable glands as Pratley, C.C.G. or other approved. The gland plate shall be suitably braced to prevent distortion after the cables are glanded thereto. Circuit breakers are to be of moulded case construction.

All instrumentation shall be of 1,5 % accuracy and their performance shall comply with B.S. 89. The instruments shall be flush mounted and the dial dimensions shall be 96 mm x 96 mm.

Tenderers must give an assurance with their tender that replacements for the equipment, switchgear and instruments used in the construction of the panel are readily available from stock held in the Republic of South Africa.

11. CONTROL PANEL:

The changeover control panel is to be situated in the stand-by plant room. The Contractor is to install all interconnecting cables between the alternator and control panel. The main supply cables to and from the AMF Control panel shall be supplied, installed and connected by others.

Control Panel Components

.1 Change Over Board Components

(Fault current level to be provided for - 30 K.A.)

1 x Generator MCB. The MCB shall be rated to suit the generator offered and shall have both adjustable thermal and instantaneous overload elements.

1 x Motorised change-over switch with appropriate auxiliary and control contacts with electrical and mechanical interlocking to the approval of the Engineer. The units shall be a Stromberg or approved.

1 x On load hand operated by pass switch suitably rated of the isolator type with three operating positions labelled "NORMAL", and "BYPASS" to enable the changeover switch and control circuitry be by passed for maintenance purposes. The unit shall also be or other approved.

3 x Open ring CT's suitably scaled. Load, neutral and earth bus-bars.

.2 Control Section

Automatic constant voltage battery charger. Electronic governor control (if required). Control C/B for instruments. Control relays for change over contacts. 12/24 Volt fuel relays. Terminal strips.

.3 Door Mounted Components

3 x Flush mounted M.D.I. 96 x 96mm dial ammeters suitably scaled

1 x Flush mounted 96 x 96 mm dial voltmeter, 0 - 500VAC.

1 x Flush mounted voltmeter selector switch with off, phase to phase and phase to neutral positions. 1xFlush mounted 96 x 96 mm dial, frequency meter, scaled 47 -50 -53 Hertz. (e) 1xFlush mounted voltmeter 0 - 30VDC - Battery volts. 1xFlush mounted running hour meter. 1 x Manual start push button. (i) 1 x Manual stop push button. 1xEmergency stop push button - "Latching type". 1xEngine alternator charge indication.

4 Control Equipment Requirement: Control systems may not consist of the electromagnetic relay type. Only the AMF120 Mk3 or equivalent solid state programmable systems complying with the following specification will be accepted.

The solid state control systems shall be of South African Manufacture, be available "off the shelf" and shall have a proven local operating history of at least five years. Imported or specially made solid state control systems or engine control and/or management systems will not be acceptable under any circumstances. The control system shall consist of a single unit including all indicators/switches and allow for quick installation using locking connectors.

The solid state controller and associated systems wiring shall be to the control system manufacturer's guidelines and shall be adequately



protected against transient over voltages arising from lightning effects, switching surges, power system surges or mains and alternator borne noise/interference. Full details of the suppression systems are to be provided at tender. Wiring to and from the solid state programmable controller is to be screened as necessary to prevent electrostatic and magnetic interference from adjacent wiring/systems.

SPECIFICATION

FRONT PANEL INDICATORS

CONDITION		ALARM
SHUTDOWN		
HIGH TEMPERATURE	X	X
LOW OIL PRESSURE	X	X
OVERSPEED	X	X
UNDERSPEED	X	X
MANUAL/TEST MODE		
HEATER FAULT	X	
LOW FUEL	X	
NO FUEL	X	X
LOW WATER	X	X
LOW BULK TANK/SPARE2	X	
MODEM REMOTE START		
START FAIL	X	X
MANUAL START		
EMERGENCY STOP	X	X
MAINS PHASE ROTATION FAULT		
HIGH MAINS VOLTS		
LOW MAINS VOLTS		
MAINS ON		
MAINS ON LOAD		
ALTERNATOR ON		
ALTERNATOR ON LOAD		
ALTERNATOR PHASE ROTATION X		X
FAULT		
HIGH ALTERNATOR VOLTS X LOW		X
ALTERNATOR VOLTS X X		
BATTERY VOLTS FAULT	X	X
ALTERNATOR CHARGE FAULT X		
CONTROL SYSTEM ON		

Front Panel Switches: The following switches shall be included on the control system front panel.

- Lamp test push button
- Alarm mute push button
- Four position mode selector switch: "off/reset, auto, manual, test" 12.



PLANT OPERATION: The mode selector switch functions shall be as follows:

Off/Reset	Control system off and alarm condition reset.
Auto	Automatic starting and stopping of the set dependent on the mains supply
Manual	Starting and stopping activated manually (two panel mount push-buttons) for maintenance purposes. In this mode the load will not be transferred in the event of a mains failure.
Test	The set will start automatically in this position. The load will be taken by the alternator in the event of a mains failure.

Logging Events: All events relating to the status of the generator set shall be logged with date and time in a non-volatile memory (which can retain information for a period of 6 months in the absence of power to the controller) and the user shall be able to obtain a hard copy on site.

Buffer erased on	97/03/24 at 08H26.53
Mains on load	97/04/17 at 07H44.34
Unit switched ON	97/04/17 at 07H44.29
Unit switched OFF	97/04/17 at 06H30.55
Low Fuel Level	97/04/16 at 23H26.55
Alternator on load	97/04/16 at 21H44.53
Start attempts = 01	97/04/16 at 21H44.21
Mains phase 3 Low	97/04/04 at 09H59.21
Mains on load	97/04/04 at 09H59.17
Unit Mode = Auto	97/04/04 at 09H59.17
Manual Stop	97/04/04 at 09H50.00
Start attempts = 03	97/04/04 at 08H53.10
Manual Start	97/04/04 at 08H53.10
Unit Mode = Manual	97/04/04 at 08h53.03
Alt. Phase 1 Min = 221	
Alt. Phase 2 Min = 224	
Alt. Phase 3 Min = 222	
Alt. Phase 1 Max = 236	
Alt. Phase 2 Max = 237	
Alt. Phase 3 Max = 238	
Alternator off	97/03/27 at 10H31.03
Mains on load	97/03/27 at 10H29.03



Alternator on load 97/03/27 at
Start attempts = 02 10H06.14

USER PROGRAMMABLE: The controller shall be user programmable on site via a menu system with clear prompts for the required data and shall incorporate the following parameters:

Enter the Unit Access Code “####”

System configuration for Unit No. 1111

Current Unit Time is:

97/08/14 at 10h27.58

Is this a Service? (0=No. 1=Yes)

Change this Unit ID Code? (0=No. 1=Yes)

Low Battery Crank Level (02.0-50.0V)

Low Battery Stby Level (08.0-50.0V) High

Battery Stby Level (08.0-50.0V)

Mains Low Voltage Sense Level

Mains High Voltage Sense Level

Alt. Low Voltage Sense Level

Alt. High Voltage Sense Level

Engine Underspeed RPM. (0001 – 1500 RPM)

Engine Overspeed RPM. (0001 – 1500

Speed Input (0=RPM, RPM)

1=Alt.)

Number of Flywheel Teeth (001 – 180)

Spare Sensor No.1 (0=NO, 1=NC)

Spare Sensor No. 2 (0=NO, 1=NC)

Start/Pre-Heat Delay (0.5 to 60
seconds)

Crank Time/Delay (0.5 to 30
seconds)

Number of attempts to (1 – 20)
Start

Run up Delay (0.5 to 30
seconds)

Load transfer delay (0.5 to 60
seconds)

Mains return Timer (0.5 to 30
minutes)

Run on Timer (0.5 to 30
minutes)

High Engine Temp. Sensor (0=NO, 1=NC)

Low Oil Pressure Sensor (0=NO, 1=NC)

Heater Fault Sensor (0=NO, 1=NC)

Low Fuel Sensor (0=NO, 1=NC)

No Fuel Sensor (0=NO, 1=NC)

Manual Start Switch (0=NO, 1=NC)

Manual Stop Switch (0=NC, 1=NC)

Emergency Stop Switch (0=NO, 1=NC)

Alternator Charge Sensor (0=NO, 1=NC)

Phase Fault Check (0=Single, 1=Three)

Set the Date & Time? (0=NO, 1=Yes)

Change Unit Access (0=NO, 1=Yes)
Code?

NO for normally open and NC for normally closed contacts.



Keyboard and Printer: The optional plug in printer and keyboard used to obtain a hard copy of the log and to program the control system must be able to operate from internal rechargeable batteries or 12-24VDC, allowing operation in the event a mains supply is not available.

Control System DC Supply Voltage: The control system must be able to operate with a minimum DC supply voltage of 4 volts (without making use of either an internal or an external auxiliary battery) to allow cranking and starting under conditions of low battery capacity.

Remote Alarms: The remote alarms option must have potential free relay contacts which duplicate all the front panel indicators of the control system, either local to the set or at a remote site, for connection to a mimic panel.

The cable between the remote alarms is to be a two pair signal cable with and this option must be able to operate from a 12/24V dc supply so that it can be powered from the generator set batteries.

This option must be capable of operating at a maximum distance of 50m from set.

13. **ELECTRICAL:**
- .1 **Cable Feeders:** All cables between the Set and AMF panel will be supplied and installed by the Contractor.
 - .2 **Terminations:** The cables are to be made off with suitable cable glands as C.C.G., Pratley or other approved. The cable glands at the control panel shall be secured to the gland plate in the base section of the panel and at the generator end to the terminal box.

The cable conductors shall be terminated with suitably rated pressure crimped cable lugs.
 - .3 **Earthing:** The neutral point of the generator shall be solidly connected, by means of an appropriate size of insulated earth conductor, to the earth bar in alternator and in the panel. All plant, ancillary equipment and steel work in the stand-by plant room shall be suitably bonded together with an appropriate size of bare copper tape which shall also be connected to the earth bar.
 - .4 **Phase Rotation:** The Contractor shall ensure that the mains and generator phase rotations are identical.
14. **PAINTING:**
- The engine and generator shall be painted with best quality grey "Twin Pack" epoxy paint.
- The control panel shall be painted with best quality Signal Red "Twin Pack" epoxy paint.
15. **TESTING:**
- .1 **Testing at Contractor's Premises:** An acceptance test shall be carried out at the Contractor's works to establish that the diesel generating plant and its ancillary equipment meets with the requirements of the specification. The Contractor shall give the consultant at least seven days' notice prior to testing the plant. In the event of the plant failing the test and having to be re-tested, at some future date, all expenses (including travelling) incurred by the consultant in attending the second test will be to the Contractor's account.



Simulate a mains failure to automatically start the plant from cold to test its ability to attain full rated speed and voltage and assume the full load in the specified time of ten seconds. Test run the plant at full load for a period of one hour.

Immediately after the above specified run, without stopping the plant, run it for a further hour at 75 % load. Test the plant with regards to voltage dip, voltage and frequency recovery, with a sudden application of various loads. Test the plant for its ability to assume full rated load immediately on failure of the normal supply.

Test and demonstrate (by simulation only where actual Conditions could damage the plant and its ancillary equipment) the correct operation of the engine safety controls and alarms together with other alarms as specified. Any other tests the client may consider necessary to establish that the diesel generator and its ancillary equipment as a whole is functioning correctly and in accordance with the specification.

NB: The Contractor shall provide necessary instruments and equipment for carrying out the tests. The test equipment shall be capable of producing 75 % load for one hour and 75 % load for a further hour continuously without interruption. The test load shall be adjustable and balanced over three phases.

The instrumentation shall be capable of recording and producing printed data pertaining to transient voltage dips, recovery time, applied load, etc., as specified in Clause 9.5.

2. Tests On Site

On completion of the installation of the plant, the following test shall be carried out. Automatic starting and stopping with load change over. The load in this instance will be provided by the client. Test by simulation only of the operation of the engine protection and alarm devices. Many other tests which the consultant may require on site.

15. NOTICES:

- .1 **Warning Notice:** The Contractor shall provide and install in a conspicuous position in the plant room a clearly legible and indelible notice 450 x 450mm made from non-deteriorating material, preferably plastic with red letters on a white background worded to read as follows:

DANGER

THIS ENGINE WILL START WITHOUT NOTICE. TURN STATUS SELECTOR SWITCH ON CONTROL PANEL TO "OFF" POSITION BEFORE WORKING ON THE PLANT.

17. OPERATING

The Contractor shall supply three complete comprehensive sets of operating



AND MAINTENANCE MANUALS, ETC.: and maintenance manuals complete with schematic control diagrams and complete spare parts list for both engine and generator.

The above manuals are to be handed to the Authorised representative on completion of the installation.

In addition, a complete schematic sepia diagram of the power and control circuitry is to be mounted in a glass fronted wooden or non-ferrous metal frame and fixed to the plant room wall alongside the control cubicle.

The Contractor is to provide a schedule containing particulars and part numbers of all major components e.g. relays, timers etc. of the control circuitry to facilitate the ordering of spares.

NOTE: Under no circumstances will first delivery be taken of the plant unless these requirements have been completed.

18. DRAWINGS:

Within one month of the receipt of order the successful Tenderer shall submit prints of each of the following drawings for approval: -

- (a) General arrangement of the stand-by plant switchboard front panel.
- (b) Schematic of the complete electrical systems, including starter motor, battery and automatic battery charger.
- (c) Dimensioned layout of all plant in the stand-by room.

19. SPARE PARTS:

Tenderers must give with their tender an assurance that spare parts for the plant offered by them as a whole are readily available within the Republic of South Africa and to state where these are available.

20.

GUARANTEE AND MAINTENANCE .1 **General:** The Contractor shall guarantee and maintain the Contract Works for: period of twelve months after first delivery of the plant. During the maintenance period the Contract Works shall be maintained as specified in Clause 21 by the Contractor and any defective material, equipment or workmanship (excepting proven, wilful or accidental damage, or fair wear and tear) shall be made good with all possible speed at the Contractor's expense and to the satisfaction of the client.

.2 **Making Good:** When called upon by the client the Contractor shall make good on site and shall bear all expense incidental thereto including making good of work by others, arising out of removal or reinstallation of equipment. All work arising from the implementation of the guarantee or maintenance of equipment shall be carried out at times which will not result in any undue inconvenience to users of the equipment or occupants of premises.

If any defects are not remedied within a reasonable time the client may proceed to do the work at the Contractor's risk and expense, but without prejudice to any other rights which the client may have against the Contractor.



21. **.4 Qualification by Tenderer:** Should any specified materials or equipment in the Tenderer's opinion be of inferior quality, or be unsuitably employed, rated or loaded, the Tenderer shall prior to the submission of his tender advise the consultant accordingly. His failure to do so shall mean that he guarantees the work including all materials or equipment as specified.

MAINTENANCE: At quarterly intervals during the guarantee period of twelve months the Contractor shall adjust and maintain the standby plant and its ancillary equipment in proper working order. As a minimum requirement he shall: Check and top-up if necessary, the fluid levels in the radiator, engine sump, fuel oil tank and batteries. Test run the standby plant and ancillary equipment for a period of 15 minutes. Wipe down the standby plant and its ancillary equipment and report on any evidence of any fluid leaks or other defects.

Fill in the standby plant logbook.

The cost of such inspections, maintenance, adjustments, repairs, etc., shall be included in the tender price, but the cost of renewing any part which may become worn through fair wear and tear, or damaged beyond the control of the Contractor (provided this is not due to unsuitable design) shall be excluded.

If during the guarantee and maintenance period the standby plant is not in working order for any reason for which the Contractor can be held responsible, then the Contractor will be notified and immediate steps shall be taken by him to remedy the defects. Should the standby plant defects be so frequent as to become objectionable or should the equipment otherwise prove unsatisfactory during the guarantee period of twelve months, the Contractor shall, if called upon by the client, at His own expense replace the whole or such parts thereof as the client may deem necessary with equipment to be specified by the client. Approval - tacit or otherwise - of the equipment installed shall be considered as provisional only and shall not invalidate the clients right as indicated above.



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VOLUME 4

STANDBY GENERATOR

PART 2 SBG

TECHNICAL SPECIFICATION



DEPARTMENT OF HEALTH: IDEAL CLINICS PROTOTYPE

VOLUME 4 – STANDBY GENERATOR INSTALLATION

PART 2 SBG – TECHNICAL SPECIFICATION

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DEPARTMENT OF HEALTH: IDEAL CLINICS PROTOTYPE

VOLUME 4 – STANDBY GENERATOR INSTALLATION

PART 2 SBG – TECHNICAL SPECIFICATION

1. SCHEDULE OF

INFORMATION:

.1 **General:** The technical specification for the Generator is given below:

.2 **Diesel Engine**

a)	Make and Model	BPD200S3
b)	Type (two or four stroke)	Water cooled, Turbo &
c)		After cooled Diesel Engine
d)	All rating at sea level	25 ⁰ c Ambient Temp
e)	Governed speed	1500 RPM
f)	Number of cylinders	Six cylinder, vertical, water cooled Diesel Engine
g)	Diameter of cylinders	144 mm
h)	Stroke of piston	165 mm
i)	Piston speed	498 m/minute
j)	Type of air cleaner	DRY
k)	Type of lubricating oil filter	15W40
l)	Make and type of injection system	Datakom D300
m)	Type and number of fuel filters	2 X SPIN ON
n)	Manufacture and type of turbo-charger	Datakom D300
o)	Manufacturer and type of governor.	Datakom D300
p)	Max cyclic variations	TO BS5514 i) Temporary to BS5514 ii) Permanent to BS5514
q)	Speed variation for sudden release or application of load: Max percentage of rated load that may be applied immediately after start 75%	
r)		75% Rated full load may be applied seconds after initiation of starting sequence + - 20 SECONDS
s)		



- t) Specific fuel consumption
at full load. 350 Litres/HR
(submit curves)
- u) Air quantity required for engine cooling 564 cu.m/min.
- v) Cross sectional area of radiator air
discharge outlet required 1500 X 1500 MM

.3 Starting Battery

- a) Manufacturer DELTEC
- b) Type MAINTENANCE
FREE
- c) Capacity 70 AMP / HR
- d) Voltage 2 X 12 VOLT

.4 Alternator

- a) Make DPC274C
- b) Type
- c) Type of bearings ROLLER
- d) Method of lubrication PRE-LUBRICATED
- e) Rated load at 0.8 power factor
at 380/220 volt 50Hz 200 KVA
- i) Continuous rating. 200 K.V.A./AMPS 334
- f) Efficiency of alternator at full load 75%
- g) Output voltage within governed speed range at:
 - i) No load 380 Volts
 - ii) 50%load 380 Volts
 - iii) 100% load 380 Volts
 - iv) 110% load 380 Volts
- h) Method of voltage regulation AVR
- 5. Mass of Plant 2312 kg's
- 6. Overall Dimensions of Plant
 - Length 3260 mm
 - Height 1840 mm
 - Width 11230 mm



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VOLUME 4

STANDBY GENERATOR

BILL OF QUANTITIES



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SPECIFICATION

VOLUME 5 DATA & TELEPHONE

PROPOSED DEPARTMENT OF HEALTH: IDEAL CLINICS PROROTYPE ELECTRICAL SPECIFICATION



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VOLUME 5

DATA & TELEPHONE

SECTION 2

PART 1 DATA & TEL
DETAILED SPECIFICATION



DEPARTMENT OF HEALTH: IDEAL CLINICS PROTOTYPE

VOLUME 5 - DATA INSTALLATION

PART 1D - DETAIL SPECIFICATION

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DEPARTMENT OF HEALTH: IDEAL CLINICS PROTOTYPE

VOLUME 5 - DATA INSTALLATION

PART 1D - DETAIL SPECIFICATION

D1. SCOPE OF PROJECT

The Detail specification covers the technical requirements for the Ideal Clinics Prototype. Not all the blocks may require installation in this particular contract and therefore not all the materials and equipment described in the various sections of the Detail Specification would be required. Contractors are to read the Detail Specification in conjunction with the Bills of Quantities and drawings issued for this contract.

Specifically excluded from this tender are the computers, servers, routers, peripheral equipment and application software, all of which will be provided by others. Installation as follows.

- Fibre Optic Cable (Fibrework/Krone or other approved) in wire ways. Wire way to be provided under the electrical installation.
- Outlets as indicated on drawings.
- Factory terminated fly and patch leads for all the outlets.
- 1-off 24 Port Internet switches (3-Com or other approved) housed in a 15U cabinet.
- 1-off 24 Port patch panels (Krone or other approved) housed in same 15U cabinet.

Multi-mode fibre optic cables shall be installed from switch in Admin building. One fibre optic cable to 24-Port switch in Offices and one to 24-Port switch in Guard kiosks building. Cable runs to be free of any joints.

- The termination of the fibre optic cables in the 15U cabinets.
- Switches shall be powered from dedicated socket outlets in relevant areas.

D2. SPECIALIST CONTRACTORS

Only specialized Contractors are to supply and install the network cabling and equipment. The contractors shall be members of the Data Cabling Association of SA. It is a requirement that the data installer has to be registered with SITA. No other contractors will be considered for the data installation.

The Contractor selected for this installation shall be approved and certified by the manufacturer of the products, adhere to the engineering installation and testing procedures and utilise the authorised manufacturers components and distribution channels in provisioning for this installation.

The Contractor shall be experienced in all aspects of the work and shall be required to demonstrate direct experience of similar systems of similar type and size. He shall further own and maintain tools and equipment necessary for the



successful installation and testing of Category 5 Enhance distribution systems and employ personnel who are adequately trained in the use of such tools and equipment.

D3. COMPUTER CABLES:

All data cabling and components shall comply with all ANSI/EIA/TIA Commercial Building Telecommunication Cabling standards and addendums.

The data cabling shall be at the category 5UTP four pair type (CAT 5UTP) or fibre optic installed along the routes as specified and indicated on the drawings. The supply and installation of the 3-compartment power skirting cable trays and conduits is measured elsewhere in the document.

The Contractor shall install the data cabling and outlet RJ45's in the middle compartment of the power skirting. Where the computer cables cross power cables, the Contractor shall ensure that the computer cabling is at right angles to the power cables.

Computer cabling on cable trays shall be laced to the cable trays every 500mm with approved PVC type cable ties.

No bunching or twisting of computer cables in cable trays or rising ducts will be allowed. Krone or other approved cabling to be utilised.

D4. COMPUTER OUTLETS:

The Contractor shall allow to install the RJ45 connections onto the data outlet cover plates. The supply and installation of power skirting and cover plates are measured elsewhere in the document. Krone or other approved outlets to be used.

D5. SCHEDULE OF COMPUTER OUTLETS:

The Contractor shall allow to install the RJ45 connections as indicated on the Electrical Power Layouts

D6. CABINETS

(a) Cabinets must have at minimum of a 5-way power supply with its own breaker.

(a) Each cabinet must have a minimum of 1 free shelf.

(b) Each cabinet must have a minimum of 2 fan units.

(c) Main Cabinet must be 15u x 600mm, fitted with a rear swing frame.

7.1 The Tenderer shall be capable of supplying the following services

- Concept and Design
- Project planning and management
- Cable and equipment installation
- Certification and documentation
- Performance analysis

D7. NETWORK TOPOLOGY



- Maintenance and support

The following are the minimum requirements of the devices:

Equipment must be capable of a stated growth path to the following technologies:

- ATM
- Switched Ethernet
- Fast Ethernet
- FDDI/CDDI

If stackable Hubs are used, they must connect via the backplane (proper stacking cables) and not via the Ethernet ports. If stackable Hubs are used, they must have a common look and feel (i.e. all Hubs in the stack must look the same). Hubs/devices must have support for bridging and must be capable of bridging different technologies. Please indicate between which technologies.

The tenderer must consider virtual LANs using switching technology. The solution must fully support SNMP, MIB I, MIB II, repeater MIB (RFC 1516) and have a commitment to move to SNMP II. All equipment must be manageable and tenderers must indicate which network management systems support the components and what level of support is done by the various network management systems.

All the MIBS for the managed equipment installed must be supplied on a separate diskette. Memory on all intelligent devices must be upgradeable. Ideally they should have a RISC processor. Hubs/devices must be flash upgradeable.

(1) It is required that the successful tenderer render a support service with a maximum response time of six hours from the logging of a call for the duration of the guarantee period where after a one (1) year maintenance support agreement will be considered. The Tenderer must therefore prove that he has sufficient trained personnel to perform this function and that they are based in South Africa.

(2) Hubs/devices and Transceivers must be covered by a one-year guarantee.

(3) Future support contracts could be negotiated for one (1) year periods.

D8. TECHNICAL SUPPORT

D9. DOCUMENTATION

(a) As part of this tender it is required that original manuals for all hardware be supplied



- (l) Any changes made to settings other than that stated in the manuals during installation shall be noted by the tenderer in the relevant manuals.

On completion of the installation each cabinet will be issued with a file containing the following documentation

- Colour drawing indicating all data points and numbering for that cabinet
- A plan view drawing of the interlinking cable back to the computer room
- All UTP test certifications pertaining to the cabinet.
- All changes made under point D9(b) above

D10. TRAINING

The Contractor shall undertake to train the User Departments operating and maintenance staff to be fully competent in operation, maintenance and fault finding. Before or on completion of the installation, when the system is in running order, the Contractor shall instruct operators in the operation of the system until they are fully conversant with the equipment and the functioning thereof.

D11. LABELLING OF COMPUTER CABLES

(ε) Only PVC heat shrink labels (PVC clear type) will be acceptable for this installation. Cables must be labelled with the termination point number at both ends. The labels shall be typed on a white background and must be clear.

(b) Fibre Optic cable installed in the riser shaft or in underground ducting must clearly be marked every 5m on each floor or in manholes with a RED neon type marker, with the marker reading "FIBRE OPTIC CABLE".



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VOLUME 5

DATA & TELEPHONE

PART 2 DATA & TEL

GENERAL SPECIFICATION



DEPARTMENT OF HEALTH: IDEAL CLINICS PROTOTYPE

VOLUME 5 - DATA INSTALLATION

PART 2D - GENERAL SPECIFICATION

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DEPARTMENT OF HEALTH: IDEAL CLINICS PROTOTYPE

VOLUME 5 - DATA INSTALLATION

PART 2D - GENERAL SPECIFICATION

General Requirement

Tenderers shall propose and submit a comprehensive Structured Cabling Solution to define the Telecommunications infrastructure (cables, faceplates, patch panels, outlets and frames, etc.) necessary to build a uniform premises distribution system, which will function for a multi-media telecommunications solution to meet and exceed 1,000 megabits, and to provide a warranted system that will present a Zero "0" bit error rate.

The solution should also define the method(s) of flexible patching for the telecommunications services to enable simple Moves, Adds & Changes, (MAC's) without frequent rewiring of locations and re-training of staff and to provide easy to follow trouble shooting steps and procedures.

Conformity to Standard

The Structured Cabling System is developed for

- To fit most Ideal Clinics Prototype requirements for services provided to the workstation.
- To provide for easy installation, minimizing the installation timeframe
- A robust system for various environments and applications
- To meet cabling standards and local construction and telecommunication regulations
- To provide a user friendly environment with less technical support and lower maintenance cost. □ To allow space for service providers and active equipment and future expansion
- Easy performance upgrade
- The Following standards are to be complied with unless otherwise specified:

Standards

- Commercial Building Communications Wiring Standard ISO11801
- European Commercial Building Communications Wiring Standard EN50 173
- Electronic Industries Association Telecommunication Industries Association EIA/TIA
- Telecommunications Systems Bulletins, TSB 36 and TSB 40
- Commercial Building Standard for Telecommunications Pathways and Spaces EIA/TIA-586 and 569;
- Institute of Electrical and Electronics Engineers, IEEE 802.3;
- Institute of Electrical and Electronics Engineers, IEEE 802.5;
- Institute of Electrical and Electronics Engineers, IEEE 802.6; □ American National Standards Institute, ANSI X3T9.5.

1. TIA/EIA TSB 75

Additional horizontal cabling practices for open office (August 1996)

2. TIA/EIA TSB 95 (TBA end 1999)

Additional transmission performance guidelines for 100 ohm 4-pair Category 5 Cabling

B STRUCTURED CABLING SYSTEM (SCS)

General – All IDC connector shall be of the same technology type for all subsystems.
(to reduce the variety of different termination tools)



B.1 Work Area System

Tenderer's shall supply the wiring or interconnect that connects active terminal devices to telecommunication outlets. This includes patch cords, connectors, faceplate, as well as terminal fly leads needed to make connections.

1.2 Telecommunication Outlets –

- All telecommunication outlets supplied by the tenderer shall be universal RJ45 type, accepting most phone and data plugs.
- POWERSUM NEXT compliant ISDN 8-position / 8-conductor standard type and shall be capable of receiving conventional 4, 6 and 8 pin jack/plug of 24 AWG solid wire.
- Surface or flush mounted, single or dual sockets.
- Multi-vendor supportive and shall be able to be reconfigured to different applications when required.
- Able to support
 - 10/100Mbps Ethernet,
 - Mbps /16 Mbps Token Ring applications,
 - ATM 155 Mbps,
 - Gigabit Ethernet,
 - Broadband Video and future applications.
- Comply to Under-Writer's Laboratories (UL) listed, and with FCC part 68.
- made from high-impact, flame-retardant, UL-rated 94 VO thermoplastic.
- shall meet ISO/IEC 11801 Cat.5, EN 50173 Cat.5 and EIA/TIA TSB 40A category 5 requirements and shall fully support proposed 100 Mbps TP-PMD data rate @ 100 meter over UTP as per ANSI X3T9.5 standards (or ATM 155 Mbps).
- shall apply the cross-over lead concept using crosstalk cancellation techniques to provide superior Near End Crosstalk (NEXT) performance of 44 dB without the need for printed wiring boards or other additional components. – LEADFRAME Technology
- The telecommunication outlet shall be of the insulation displacement connector (IDC) wiring termination. Minimum of 4 mechanical forces must be applied to the axis of the wire to provide a reliable and stress-free resistant connection. IDC termination must be having an angular configuration when connecting with the cable conductor to reduce the effect of metal fatigue.
- The IDC contact element shall be spring special brass with 0.5-micron silver plating to reduce conductivity, angularly arranged across the axis of conducting wire to maximize the gas tight connection. The contact range shall be 5 micron silver-plated to ensure minimum oxidization impact.
- The insulation displacement connectors of the outlets shall accept two insulated solid conductors of 22 to 26 AWG (0.40 - 0.65 mm) of the same size.
- The RJ45 jack offered should confirm to EIA-T568A or EIA-T568B wiring schemes.



- The telecommunication outlet shall meet the following electrical performances: -
 - (a) RJ Interface resistance: ≤ 20 Mohms
 - (b) Insulation resistance $\square 100$ Mega ohms at 500 VDC.
 - (c) Contact resistance of 20 Mohms maximum. (≤ 1 Mohm typical)
 - (d) Current rating of $\square 2A$ at 68 deg.F (20 deg.C) per IEC Publication 512-3. Test 5b.
- The telecommunication outlet shall meet the following mechanical performance:
 - (e) Insertion life of 1250 cycles minimum.
 - (f) Plug/Jack contact force: 100g minimum per contact using FCC-approved plug.
 - (g) Plug retention force: 30 lb (133 N) minimum. (d) Temperature range: -40 to 150 deg. F.

1.3 Station Patch Cord

- consists of 8 stranded copper conductors terminated with RJ45 plugs at both ends.
 - meet transmission performance and comply to EIA/TIA 568A and ISO / IEC 11801 – CAT 5E minimum standard.
 - Factory terminated with options for 1.2 metre, up to 12.8 metres with a long flexible boot. The boot material should be injected into the plug to retain the position of the conductors.
- Should have Characteristics impedance (ohms @ 100 MHz): 100 +/- 3%**

B.2 Horizontal Cabling

- Tenderer shall supply POWERSUM NEXT compliant horizontal 4 pair to connect each telecommunication outlet (TO) or consolidation point (CP) to the backbone subsystem on the same floor.
- The type of horizontal cables used shall be 4-pair 100-ohm high performance POWERSUM NEXT compliant unshielded twisted pair (UTP) cable, Cat 5E, preferred use within the building environment.
- The UTP cable shall be of 22 AWG to 26 AWG bare solid copper conductors insulated with high density. PVC sheath. The insulated conductors are twisted into pairs.
- The 4-pair UTP cable shall be run using a star topology format from the cross connect at the floor distributor (FD) administration subsystem on each floor to every individual telecommunication outlet.
- The 4-pair UTP cable must be able to meet EIA/TIA 568, TSB 36 and Category 5, Cat 5E requirements. It must be proven to ensure connectivity for any application up to 155 Mbps from the floor distributor (FD) wiring closet to the telecommunications outlet at the work area.
- All horizontal UTP cable must meet requirement specified for current and emerging standard such as ANSI X3T9.5. TPPMD. 100 MB Ethernet, ATM 155 Mbps and Gigabit Ethernet in future application's.



- Each run of cable from the cross connect at the floor distributor (FD) and the telecommunication outlet shall be continuous without any joints or splices except for the open office design, when a consolidation point (CP), is proposed.
- The length of each individual run of fixed horizontal cable from the administration subsystem (FD) on each floor to the telecommunication outlet shall not exceed 90 meters for error-free transmission at 100 Mbps or 155 Mbps.
- The 4-pair UTP cable shall be Under-Writer's Laboratories (UL) listed. The 4-pair UTP cable shall be Underwriter's Laboratories (UL) listed.

□ **The 4-pair UTP cable shall meet or exceed the following standards: - (C5eT)**

- (a) EIA / TIA 568 Commercial Building Telecommunications Cabling Standard
- (b) IEEE 802.3, 10/100 BASE T ; IEEE 802.5, 4/16/100Mbps ; 155/622Mbps ATM, Gigabit Networking (WGNA); Broadband & Baseband Video;
- (c) ICEA S80-S76, 9/88
- (d) Conductor DC Resistance (Max): 28.6 Ohms/1Kft. @ 20°C
- (e) DC Resistance unbalanced (Max) : 5%
- (f) Insulation Resistance (Min): 500 Megohms/1Kft. @ 20°C
- (g) Mutual Capacitance (Typical): 15pF /ft;
- (h) Characteristics impedance : 100+/- 3% ohms @ 100 MHz
- (i) Worst Cast Cable Skew : 25 nsec/100 Meters
- (j) max.attenuation (Typical) < 19.5dB@ 100MHz ; < 27.8dB@ 200MHz ;
- (k) PowerSUM NEXT (Typical) > 49.5dB@ 200Mhz; > 43.6dB@ 200Mhz;
- (l) Return Loss (Typical) > 42.1db@ 100Mhz; > 39.6db@ 200 MHz;
- (m) Power Sum ELFEXT (Typical) > 38.7db@ 100Mhz; > 31.5db@ 200 MHz;

The same 4-pair UTP cable shall support applications for high speed data, voice, image and single channel & broadband video application.

B.3 Administration System

The administration system shall consist of rack mounted patch panels for termination of copper cables or rack mount fibre termination unit for termination of optical fibre cable.

Patch cords shall be provided for cross-connections to facilitate Moves, Adds and Changes (MAC's). They shall be able to support up to Category 5, Cat 5E applications and shall be POWERSUM NEXT compliant. The cross connect module shall either be

- (a) Power SUM NEXT compliant RJ45 modular lead frame jack panel.
- (b) 10 pair disconnection module (LSA or HIGHBAND) for incoming voice or 8 pair HIGHBAND module for all data services.

3.1 Termination Module-

The termination module shall be able to accommodate over 200 repeated insertions without incurring permanent deformation and it shall pass the reliability test of no more than one contact failures in 1000 connections.

The termination module shall be of the disconnection type to minimize wiring termination and allow test cords to isolate the cabling system for testing purposes.

The wiring module shall be able to accommodate 22-26AWG cable conductors. The termination module should be accessible from the front without any contact element exposed.



The termination module shall be 8 pair module with IDC contact element to ensure 63 dB NEXT at 100 MHz in patched system. In hard wire jumper environment, the NEXT shall be 53 dB at 100 MHz

The IDC contact element shall be spring special brass with 0.5-micron silver plating. The contact range shall be 5 micron silver-plated to ensure maximum reliability.

3.2 Modular Jack Panel -

- The RJ45 modular jack panel shall be POWERSUM NEXT compliant. The worst pair NEXT loss for the RJ45 values must not less than 44 dB.
- The RJ45 modular jack panel consisting of IDC field at the rear of the panel and is made continuous to the 8-pin modular jack. The front of the panel through cross-over contact concept without the need for printed wiring boards or other additional components. – Lead frame Technology.
- The panel shall be available in 16, 24, 32 jack's configuration in one rack unit and shall fit into a 19" rack. Wiring management should only occupy the same as the panel.
- Modular jacks in the jack panel should be identical and interchangeable with those modular jacks in the telecommunication outlet for easy maintenance purpose. Functional grouping can be achieved by different colours of modular jacks in the same panel and can be changed and altered at any time.
- The contact plating of the modular jacks shall have a minimum thickness of 50 microns-of hard gold over a minimum thickness of 100 microns of nickel.
- The modular jack panel will have insertion life of 1250 cycle's minimum.
- Modular jacks shall be able to be mounted in the same plane as the face plate
 - i.e. the face plate can accept the modular jack for termination.
- The Jack panel can be used for both Shielded and Unshielded solutions, a metal mounting bar at the rear for the cable to be secured after installation, and provide a termination point for connection of shield.

3.3 Rack Mount Fibre Termination Unit -

The 19" rack mount fibre termination unit shall provide cross-connect, interconnect or splicing capabilities.

The 19" rack mount fibre termination unit shall consist of a frame mountable housing for terminating and/or splicing fibre optic cables and allow for organization of the fibre optic interconnects. The assembly shall have rear slots for cable entry, with grommets fibre retainers for holding buffered fibre in place and fibre storage guide for maintaining bend radius.

The 19" rack mounting unit should be either 12 or 24 ports for one rack unit (1RU) and come with a removable lid for access and can be either a fixed position unit or have a slide-able tray to improve access.

The adaptor plates are suitable for both ST, SC and SC duplex couplings, and the adaptor plates should be installed to angled through adaptors to the left or to the right of the panel,



this improves the patch cord management and provides safety from possible damage to the eye from active fibres.

3.4 Patch Cords

Tenderer shall supply patch cords for cross-connection and inter-connection of termination modules, patch panels and fibre termination unit.

- Tenderer shall supply patch cord (factory assembled plug-ended) for patch panel and terminal modules.
- The patch cord shall be available in a 4 pair version with lengths of 1.2 through 12.8 meters.
- The type of patch cord shall depend on the termination module used, i.e. 8-pair termination module, patch panel or a rack mount fibre termination unit.
- The patch cord shall have built in exclusion features to prevent accidental polarity reversals and split pairs. It shall have a latching mechanism to prevent accidental dislodging of the plug from the termination module or modular jack panel (eg. RJ45).
- The patch-cord shall provide air-tight connection for cross-connection and shall comply with Cat. 5E requirement and Power SUM NEXT requirement.
- Patch Cords for HIGHBAND disconnection modules are used for the Moves, Address and Changes and only hard wire jumper are need for the permanent wiring of the modules. Thereby providing better cable management.

B.6 Channel Performance

Tested channels are based on the recommendation by ISO/IEC 11801 Class D+ configuration and meet the following criteria:

- Attenuation $\leq 24\text{dB @ } 100\text{MHz}$
- NEXT $\geq 30.1\text{dB @ } 100\text{MHz}$; PSNEXT $\geq 27.1\text{dB @ } 100\text{MHz}$
- Channel ELFEXT $\geq 17.4\text{dB @ } 100\text{MHz}$; Channel PSELFEXT $\geq 14.4\text{dB @ } 100\text{MHz}$ \square ACR $\geq 6.1\text{dB @ } 100\text{MHz}$

C. TECHNICAL SUPPORT STAFF AND EXPERIENCE

Tenderer shall provide a list of their technical support staff, together with their working experience in the relevant field.

Tenderer shall state if their staff are trained by the manufacturer, by on-site training or other means.

Tenderer shall state the nearest location of their principal's support centre. This centre shall have permanently stationed support staff who are capable of providing technical support effectively and efficiently.

D. APPLICATION ASSURANCE AND WARRANTY

Tenderer shall provide a 20 years' industrial standards compliance warranty, 5 years Zero Bit Error warranty, backed by the manufacturer. 20/5 years' warranty described in this document from the date of successful implementation, testing and commissioning of the cabling system.



The tenderer shall provide on-site warranty for one year for the Structured Cabling System from the certified practical completion date of the whole contract.

The 20-year product warranty shall cover product manufacturing defects for all passive Structured Cabling System components.

The 20-year application assurance shall cover the failure of the offered cabling system to operate the applications which the system was designed to support and additional future applications.

The application assurance program should also cover: -

- (a) those identified in the current (at the time of installation) and future versions of the Cabling Performance Specifications; and
- (b) any applications introduced in the future by recognized standards or user forums that is the EIA/TIA 568-A or (ISO/IEC 11801) component and link / channel specifications for cabling.

In the events of system failure, the tenderer / manufacturer shall repair or replace the defective products at its own cost for the cost of Labour to repair or replace any such defective product until the cabling system is set up to support the required applications.

Progressive audit check of the workmanship quantity of the cabling system by the manufacturer is required. The site should be certified by a certified engineer from the manufacturer.

For the Class D+ Channel performance, the warranty ACR value provided by the manufacturer should be at least 10dB @ 100MHz.

E ACCEPTANCE TEST

The structured cabling system should be tested by the tenderer to conform to the requirements specified in the ISO 11801 Class D+ specifications and to be complaint to manufacturer ACR pair-pair warranty value.

100% of the UTP cables and fibre optic cables must be individually tested by the tenderer after installation of the cables.

A certain percentage of the outlets will be chosen at random for the final acceptance test.

Results of all acceptance tests performed are to be fully documented and submitted to end-user.

A 100% of total installation and provide a printout indicating Certifiers name, position, date, length, resistivity, impedance, attenuation, NEXT, ACR, PSNEXT, propagation delay, delay skew, ELFEXT, PSELFEXT, FEXT, PSACR, return loss, twisting lay and crosstalk at frequencies listed in the maker's specifications.

For Active testing for the Zero Bits error warranty, it should be carried out by the Manufacture, and 10% of the total nodes should be tested and verified to assure zero bit errors caused but the Structured Cabling Channel.

F. CUSTOMER ACCEPTANCE

At the conclusion of the installation a preliminary walkthrough with the installation contractor will be performed to check for installation quality, accurate performance of the work, and to verify engineering diagrams. Any modifications to the documentation or the installation that may be required shall be accomplished within a 2-week period. "Customer Acceptance" shall consist of a final walkthrough with the installation contractor. The walk through shall be scheduled within 3 weeks of the completion of the installation in order to turn the project and



documentation over to the end user. Please note that "Customer Acceptance" does not release the installation contractor from repairing any cabling errors or improperly labelled circuits, caused by the installation contractors that may be discovered at a later date.

G. EQUIPMENT AND MATERIALS

All equipment and materials supplied shall be new, the best of quality and designed to ensure satisfactory operation under varying atmosphere, climatic, humid tropical conditions without distortion and deterioration in any part affecting efficiency and reliability of the systems.

All equipment shall also be designed to provide the necessary safety to human life and property during operation and maintenance and particular attention shall be given to electrical safety precautions.

The Contractor shall check the finishing paint work and touch up all damaged parts after the installation of equipment.

The Contractor shall provide manufacturer's literature including manufacturer's data on maintenance and operation of all equipment installed. Relevant catalogues of all materials, instruments, equipment, components, etc. supplied shall be included in this Tender.

All equipment and materials shall be permanently and legibly marked to indicate clearly the name of the manufacturer or the registered trade name or registered trade mark.

H. LABELING

Each equipment, panels and outgoing cables from the patch panels shall be labelled. Proper labelling and numbering shall also be provided on the outlets.

All cable labels are to be of clear wrap around self-adhesive type & each cable is to be labelled at each end 100mm from termination point. Labelling to be machine typed.

Outlets are to be labelled in a prominent position, firmly affixed.

I. CABLING PRACTICE

The Contractor shall plan the cabling system and routing to ensure system integrity and performance, and that it does not present problems of maintenance, access nor conflict with the operation and maintenance of other systems.

The Contractor shall in his Tender submission, give full details of the type of cables used including the type of termination, colour scheme, identification method, method of installation and shielding (if required), limitations (if any) and any other relevant telecommunication.

Unless otherwise stated, the Contractor shall submit for approval one month prior to commencement of installations, drawings, showing the proposed wiring cable tray/catenary or conduit layout for the entire systems with all necessary dimensions and support details clearly indicated.

All cable trays, catenaries and ductwork required to complete the installation will be the responsibility of the Tenderer, to supply and install. Contractor to liaise with End-User, and/or Manufacturer when strip out of

existing floors commences, to evaluate if any existing cable tray or ducts can be re-used.

All necessary penetrations and access between floors is the responsibility of the Tenderer, to provide same, and to ensure all penetrations and access holes are fully sealed to local Fire Authority rules.



Support all cabling within the false ceiling space or under raised flooring by steel cable tray, trunking and/or duct, catenary wires, fixed by approved hangers and methods.

Group cables neatly together in bundles not exceeding 24 cables per bundle. Do not try to arrange cables in bundles in straight lines leave in a random lay, to help eliminate crosstalk between cables and bundles.

Maintain at all times a minimum of 150mm spacing from parallel runs of electrical cabling and 300mm from fluorescent lights. Where telecommunications cable cross, electrical cables this shall be at right angles with approved local regulations for separation/segregation adhered to, with a minimum of 6mm of durable insulation material 300mm long with at least 25mm of overlap.

Provide adequate support for all cabling that is vertically installed, ensuring that the weight of the cables is sufficiently supported.

Provide and use screwed moulded plastic bushes to protect cable, with the use of locknuts inside the trunking or tray work to ensure bush remains securely in place.

Before cable is installed and after installation ensure that trunking and tray is thoroughly clean of any extraneous material, such as cable scraps, dust, dirt and construction debris.

Co-ordinate all trunking and tray work fully with other services on site as necessary.

All cable trays and catenaries wires shall be earthed to a protective earth from the electrical distribution board on the floor where such cable tray is installed.

Cables shall be secured with plastic or Velcro cable ties on cable trays and /or catenaries.

Where cabling is installed in partitions and similar enclosures, install cables in free spaces free from protrusion of screws and similar fasteners. Remove all sharp edges and allow slack in cable runs.

Where cables are installed in partitions or false walls through studs, ensure bushing is secured in these fittings to protect cables.

Cables shall be installed using a bending radius not less than eight (8) times the overall diameter of the cable. Cables shall be installed ensuring that the hauling tension does not exceed 11.3Kg.

Restrict any single pull to no more than two (2) 90-degree bends, in conduit and ducts.

J DOCUMENTATION:

The contractor shall provide complete documentation covering the installation and maintenance of the building cabling system. Including "as built" drawings showing all main cable runs, cable trays and catenaries, outlets, consolidation points. Complete with outlet numbering.

J.1 QUANTITY:

The Tenderer shall provide three complete sets of documentation. As built drawings shall be provided within 14 days of completion of the project, to the project manager and/or the client showing all main cable runs, locations, identifications and destinations.

J.2 PRINTING AND BINDING OF DOCUMENTATION:

The Tenderer shall provide all documentation in suitably labelled, A4 sized binders. All binding shall be of a high quality to provide for a long and durable service.



J.3 DOCUMENT AND DRAWING SIZES:

All documentation shall be typed on either single or double-sided A4 pages. Drawings shall where practicable, be on A4 size. However, A3 may be used for larger drawings.

J.4 CONTENTS:

The Installation/Systems manual shall cover the following areas:

- (1) A detailed overview of the building cabling system
- (2) Full description of the specific installation
- (3) Full schematics showing the overall layout of the installation
- (4) Floor layout drawings showing the location and designation of each outlet, location of cable trays and ducts and location of all connection frames



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SPECIFICATION

VOLUME 6

**CCTV & ACCESS CONTROL
SYSTEM**

PROPOSED

**DEPARTMENT OF HEALTH: IDEAL
CLINICS PROROTYPE ELECTRICAL
SPECIFICATION**



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CCTV & ACCESS CONTROL INSTALLATION

DETAILED SPECIFICATION



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DEPARTMENT OF HEALTH: IDEAL CLINICS PROTOYPE

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SECTION A

STANDARD SPECIFICATION: GENERAL REQUIREMENT



**DEPARTMENT OF HEALTH: IDEAL CLINICS PROTOTYPE
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DEPARTMENT OF HEALTH: IDEAL CLINICS PROTOTYPE

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STANDARD SPECIFICATION - GENERAL REQUIREMENTS:

- A1. VERIFICATION OF DRAWINGS: All drawings and layouts shall be regarded as diagrammatic and all positions and dimensions shown on drawings shall be verified on site. The Sub-Contractor shall check with the Principal Contractor before putting work in hand on any section of the work that he is in possession of the latest drawings, and should any discrepancy be found between the Sub-Contractor's drawings as issued by the Electrical Engineer and those in possession of the Principal Contractor, the matter shall be referred to the Electrical Engineer for clarification. No extra will be allowed for alterations or making good resulting from lack of verification.
- A2. VARIATIONS:
- .1 Submissions and Checking: The Sub-Contractor shall submit full details of all variations, complete with prices and rates, for all completed work by not later than 21 days after completion of such work. Concurrently with details for extras the Sub-Contractor shall submit fully detailed and priced relevant omissions wherever such omissions are applicable.
- .2 Cost Details: If requested by the Electrical Engineer to do so, the Sub-Contractor shall submit for perusal or examination by the Electrical Engineer all relevant documents including invoices, costing schedules, measurements and calculations to substantiate and support any claims for variations which are not covered by exact scheduled rates and for the supply of materials or equipment or provision of any work not already included in the net tendered installation prices. Similar cost details shall be made available on request to the Electrical Engineer in assessment of omissions from the Contract.
- Although the Tender is submitted as a Fixed Price Contract the anticipation is that Variations, Omissions and Changes shall occur due to Client and Tenant requirements. For this reason, the Scheduled Rates shall be used to determine the Final Contract Price and as such the Tenderer shall include in his rates for possible quantity Variations.
- A3. PROVISIONAL SUMS:
- .1 Discount: Where any Provisional Sums are specified they will represent the net cost plus VAT only.
- .2 Profit: Any profit, mark-up, Sub-Contractor's discount, etc., required by the Tenderer, shall be entered as a separate percentage in the space provided therefore in the Form of Tender.
- .3 Expenditure: The Electrical Engineer will select all material and equipment forming part of the Provisional Sums and will instruct the Subcontractor to purchase from any particular supplier or suppliers and will also specify the net price at which the material or equipment is to be purchased. The Sub-Contractor shall pay for all such material and equipment. The Electrical Engineer reserves the right to vary the quantity and



type of material or equipment to be supplied and such variations will be based on the net cost of the material and equipment subject to the percentage profit submitted by the successful tenderer in his tender.

A4. CONTINGENCIES:

Where a sum for contingencies is included in the Schedule of Tender Prices, expenditure out of this sum shall only be made with the authority of the Electrical Engineer. The contingency sum shall be deducted from the final amount, wherein all variations shall be fully detailed.

A5. PRELIMINARY WORK: .1

General: In the event of any work having been done or materials or equipment installed by others prior to the appointment of the successful Tenderer to the Sub-Contract, the Sub-Contractor shall take over all such preliminary work which shall then be deemed to be part of the Sub-Contract Works.

.2

Payment: Tenderers shall in all cases include in their tender price for the entire Sub-Contract Works as specified. The value of such preliminary work as may have been carried out will be deducted from the Sub-Contract Sum at scheduled rates. Payment for such work shall be made by the successful tenderer on instructions by the Electrical Engineer and the difference between such payment and the value of the work in accordance with the successful Tenderer's Scheduled Rates will be treated as a variation to the Sub-Contract Sum.

.3

Claims for Defective Work: The preliminary work will be deemed to have been correctly executed in terms of the Sub-Contract documents unless the successful tenderer notifies the Electrical Engineer in writing within 30 (thirty) days from commencement of the Sub-Contract, giving full details of any defects. No claim for extras arising out of any defective work will be considered unless these are received within the stipulated period of 30 days.

A6. TEMPORARY BUILDER'S SUPPLY:

Where the Principal Contractor requests the Sub-Contractor to provide a temporary power supply, or any other work for building operations, all such work shall fall outside the scope of this Subcontract, and the Sub-Contractor shall arrange for payment direct from the Principal Contractor.

Handling, Installation and Responsibility: The Sub-Contractor shall include in his net installation price for assuming full responsibility receiving, checking, handling, storing, protecting against damage, cleaning, assembling, installing, connecting, handing over in working condition and providing guarantees for any material and equipment supplied under this Clause. All such material and equipment shall become integrated into the Contract Works and the Specification and all conditions of the Contract shall apply thereto.

Payment: Payment to the Sub-Contractor in respect of any materials and equipment supplied under this clause will be made in accordance with actual quantities installed on site.



A7. STORAGE
PROTECTION:

The storage and safekeeping of all materials and equipment delivered to site shall be the responsibility of the Sub-Contractor until handover. He shall take adequate precautions to protect such materials and equipment from damage, theft and weather. The complete contract works shall be handed over in a clean and tidy state.

A8. VAT:

Where applicable, VAT shall be allowed for and included in the net tender price, but excluding schedules of quantities and schedules of rates.



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DEPARTMENT OF HEALTH: IDEAL CLINICS PROTOYPE

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SECTION B

STANDARD SPECIFICATION: GENERAL REQUIREMENT



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DEPARTMENT OF HEALTH: IDEAL CLINICS PROTOTYPE

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GENERAL REQUIREMENTS:

- B1. GENERAL: This section of the Specification covers the standards of materials, equipment and workmanship and general methods and procedure to be employed in the execution of the Sub-Contract Works, and forms part of the Sub-Contract documents.
- B2. COMPLIANCE STANDARDS:
- .1 Regulations: The installation of equipment and commissioning thereof shall be done in compliance with the latest amendments of the following acts and regulations:
- (1) The Occupational Health and Safety Act, Act No 85 of 1993.
 - (2) The Minerals Act, Act No 50 of 1991, which includes the Mines and Works Regulations.
 - (3) The local Municipal by-laws and regulations as well as the regulations of the local Supply Authority.
 - (4) The local Fire Regulations.
 - (5) The National Building Regulations and Building Standards Act including the Code of Practice for the Application of the Regulations, SANS 10400.
 - (6) The regulations of South Africa
 - (7) ISO/IEC 11801 : 1995
 - (8) SANS 1019 (Standard Voltages, Currents and Insulation)
 - (9) SANS 10142 (Wiring of Premises)
 - (10) SANS 1574 (Flexible Cable – Electrical)
- B3. ALTERNATIVE .1 Materials and equipment shall comply in respect of quality, manufacture, tests and performance with the aforementioned standards or alternatively to the current specification of at least one (1) of the following standards institutes:
- B4. WIRING .1 Standards: Unless otherwise specified in the Detail Specification all
(ELECTRICAL) wiring shall be carried out with PVC insulated single core copper conductors bearing the SABS mark, delivered on site with seals intact.
- .2 Wiring in Conduit: All wiring in conduit shall be done by means of looping in. Joints shall only be made in accessible boxes. The number of wires per conduit shall be in accordance with the SANS 10142 Code of Practice for the Wiring of Premises. Unless specifically permitted, no more than one circuit shall be run in one conduit.
- .3 Wiring Supports: Vertical runs of wiring exceeding 1,5m shall be provided with suitable clamping supports at 1,5m intervals to take up the weight of conductors and to relieve any strain on terminals.



- .4 Open Wiring: Except where otherwise specified in the Detail Specification, no open wiring will be permitted.
- .5 Colour: Colour insulated wiring shall be used for all multi-phase circuits to correspond strictly to the phase colours i.e. red, white (or yellow), blue for phases and black for neutral. Single phase circuits however may be wired with red and black.
- B5. EARTHING AND BONDING:
- .1 General: The installation and other services shall be effectively earthed and bonded in accordance with the SANS 10142 Code of Practice for the Wiring of Premises and to the requirements of the Supply Authority.
- .2 Earth Continuity Conductors: Unless otherwise specified the Electrical Sub-Contractor shall provide copper earth continuity conductors with all mains and circuits in accordance with SANS 10142 Code of Practice for the Wiring of Premises.
- .3 (i) Earthing of Electronic Equipment: Interconnections and proper earthing between electronic components must be done on a radial wiring system.
- .5 Installation Procedure:
When the equipment is installed, the Sub-Contractor must accurately determine that all earth connections are done as specified. It is recommended that the Sub-Contractor utilize suitable measuring equipment and auxiliary equipment such that the earth connections can be individually monitored during installation of the earth connections to obviate any earth loops which might occur.
- B6. SWITCHED SOCKETS:
- .1 Rating: Unless otherwise specified in the Detail Specification or indicated on drawings, switched sockets shall consist of a 16A single pole 250V grade switch and a 16A, 250V, 3-pin (line, neutral and earth) shuttered socket, all to SANS Specification. The switch and socket may be integrated or mounted together on a common cradle or plate and shall be metal clad.
Unless otherwise specified, switched socket circuits shall be wired with 4mm² conductors and 2,5mm² earth wire.
- .2 Flush Switched Sockets: Where conduit is built in or concealed, switched sockets shall be fitted in standard flush pressed steel rustproofed boxes 100 x 100 x 50mm nominal dimensions, and provided with over-lapping cover plates as specified elsewhere.
- .3 Surface Mounted Switched Sockets: Where conduit or cable is surface run, or where specified, switched sockets of the surface mounted metal clad type shall be used.
- B7. ROUTINE INSPECTIONS
- .1 The equipment and components of the installation will be inspected by the Engineer on a routine basis during the



AND TESTS:

manufacture of the equipment and during installation on site. For this purpose, the Engineer must be allowed access at all reasonable times to the workshops of all manufacturers of equipment and components for the installation.

- .2 Such inspections shall not exempt the Sub-Contractor from his responsibility in respect of the control of quality of equipment and workmanship.
- .3 All equipment, instruments and test equipment, including all interconnections for executing such tests, must be supplied by the Subcontractor.
- .4 Should the results of such tests prove that the equipment does not comply with the requirements of this specification, the Sub-Contractor shall, without delay, at his own cost, undertake modifications and adjustments as required, to ensure that the installation and equipment is modified to comply with the requirement of this specification. These modifications and adjustments shall be carried out with the full knowledge and approval of the Engineers.

B8. ELECTRONIC COMPONENTS AND CIRCUITS:

- (1) The general arrangement, composition and build-up of electronic circuits and components shall be in a clear logical fashion, with a view to ease of maintaining these components.
- (2) Components shall be of the high quality industrial type to ensure maximum precision and close tolerances as required for the installation.
- (3) As far as possible electronic circuits shall be built up in logical banks of printed circuit frames, which can easily be withdrawn for maintenance or replacement purposes.
- (4) The logical build-up of printed circuit frames shall be such as to allow for sequential fault tracing by means of the instruments referred to in the acceptance test plan and procedure for tracing faults, after having plugged in the printed circuit and inserted the test probe into the plug-in base. Terminals of the plug-in base engaging on a printed board shall be gold electroplated.
- (5) Printed circuits shall be mounted with the long or short edges vertical to allow for free movement of air over components for cooling purposes. Care shall be taken that the emission of heat by components on printed circuit boards does not cause the ambient temperature to rise above the acceptable level allowed for by the manufacturers of the components.
- (6) All electronic equipment shall be adequately and suitably protected against damage, faulty operation or interference by any external factors such as static electricity induced voltages, magnetic fields and forces or radio emissions, lightning strikes, etc.
- (7) Equipment that is sensitive to interference and surges in electrical power, variations in voltages and frequencies which normally occur in the electrical reticulation network and municipal supplies and which cannot be prevented, shall be furnished and supplied with the necessary stabilizers, over and under voltage protection equipment, suppressors, etc.



- (8) All electronic equipment inputs from data or signal lines must be provided with in-line protection. The protection equipment and manufacture shall be of an approved standard generally utilized and offered to comply with the standards as specified in this specification.
- (9) The design and manufacture of components intended for mounting on boards with printed wiring and printed circuits shall be in accordance with Publication 321 of the International Electro-Technical Commission, as amended, which is affiliated to ISO.

9.1 Printed Circuits:

- (1) The design and manufacture of printed circuits shall be done according to the most modern techniques and developments.
- (2) Circuitry shall be accurately positioned and accurate registration of circuitry common to both side of the boards such as terminals and edge contacts, shall be maintained. Definition of all circuitry, coding and solder masking shall be of a high standard, without rough edges and saw tooth. Component leads through the boards shall be short and neatly trimmed.

B9. SPARE PARTS:

- (1) At completion of the installation, the Sub-Contractor shall supply to the Engineer a recommendation containing a list of components, which should be acquired as spares for maintenance purposes.

B10. CABLE SCHEDULES:

- (1) Cable schedules must be supplied which must amongst other things include the

following:

- The number of cables mutually connected between all terminating points.
- Cable sizes
- Number of conductors in each cable.
- Number of reserve cables and/or conductors in each cable.
- Cable types.
- Technical references of the cables.



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DEPARTMENT OF HEALTH: IDEAL CLINICS PROTOTYPE

CCTV & ACCESS CONTROL INSTALLATION

VOLUME 6

SECTION C

STANDARD SPECIFICATION: GENERAL REQUIREMENT



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DETAIL SPECIFICATION:

I N D E X

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DETAIL SPECIFICATION:

C1. GENERAL

INFORMATION:

The Client is committed to utilize advanced information and communications techniques in order to keep up with the latest practices for development. All material and equipment used shall conform to these standards specified herein after and the appropriate workmanship shall enhance the objective of an efficient CCTV and Access Control Systems.

This part of the specification covers the detail technical requirements for the specific CCTV and Access Control Installations for this project.

The equipment offered by Tenderers and the general installation requirements and standards shall be in accordance with the General Specification for Electronic and Data Installations. Where there are discrepancies between the General Specification and the Detail Specification, the contractor is to inform the Engineer and a ruling will be made.

The rooms and other locations in which the equipment of the system must be installed are indicated on the drawings, which are available for inspection at the Electrical Engineer's offices.

C2. SITE INFORMATION AND CONDITIONS: .1

Location and Conditions:

The site is located in South Africa.

The following site conditions will be applicable and equipment shall be suitably rated to develop their assigned performance and duty at these conditions:

- (a) Height above sea level : 2000m
- (b) Minimum ambient temperature : 5°C
- (c) Maximum ambient temperature : 45°C
- (d) Maximum ambient humidity at maximum temperature : 80%
- (e) Lightning strikes per square km per year : 5

C3. SITE AND WORKING HOURS:

The site will be accessible to the Sub-Contractor during normal working hours and with prior arrangements over weekends.



- C4. SECURITY: Tenderers must take note of the sensitive nature of the development and that strict security measures will be enforced. For this purpose, all personnel shall wear easily identifiable working clothes.
- C5. PROGRAMME: The successful Tenderer shall be required to comply with the Main Contractors programme and submit, for approval by the Main Contractor, a detailed programme which if accepted shall be binding in terms of the Conditions of Contract and clauses relating to penalties for late completion.
- C6. SCOPE OF WORKS: The Sub-Contractor shall supply, deliver, install, test and commission the complete CCTV and Access Control Installations, as specified in this document and indicated below. Should the Client want to install and commission modules of equipment on his own, such modules will be identified in the Schedule of Quantities or depicted on drawings.
- C7. SUPPLY VOLTAGE: An electrical supply for the CCTV and Access Control equipment shall be available in all buildings and at the main Administration block (Phase). The supply will be at 400V/230V (nominal) with a frequency of 50Hz and fed from a Standby Generator Power supplied and installed by others. All equipment shall be rated to function normally at 400V/231 Volt AC \pm 10%.
- The CCTV and Access Control Sub-Contractor shall coordinate with the Electrical Sub-Contractor to ensure that all electronic circuits on the CCTV and Access Control Systems that need to be earthed shall be earthed on this earth bar, and nowhere else, to eliminate earth loops.
- The Electrical Sub-Contractor shall provide a 16Amp 3-pin switched socket outlet at each CCTV and Access Control point for the supply to power packs. The Access Control System Sub-Contractor shall provide a 3m length of 2,5mm² 3 core Cabtyre with a 13Amp 3-pin plug top to his access control power packs.
- C8. GUARANTEE: The whole of the CCTV and Access Control Systems shall carry a 1 (one) year system guarantee.



C9. ACCESS CONTROL SYSTEM OPERATION DESCRIPTION:

This tender calls for a fully integrated solution with the following core modules:

.1 General The Security and Access flow Philosophy for the Project is to be of the highest quality “**Totally Secure**” environment whilst maintaining ease of Access.

C10. ACCESS CONTROL DETAILS:

.1 General: Details of the access control equipment on/at doors in the Complex are as scheduled below:

Note: All Access Control of electronic strikes that form part of any emergency exit shall be disconnected from the system control by a signal from the Fire Detection System to allow easy exit from the Building in the event of a fire. In addition, Green manual break glass units shall be installed over these doors to over-ride the system, should the system fail in the event of a fire

.2 Micro Switches:

Micro-switches shall be installed to monitor the Gate positions. The switches shall provide audible alarms within the control room for events that occur out of synchronism.

.3 Software:

The software required shall be a graphical user interface PC based. Standard features of the Software shall include Data Logging, Alarms for inconsistent use, that is access flow out of synchronization, Anti-pass back facility etc.

The software shall also be fully integratable with other services, for example Lift, Fire, and CCTV.

All software supplied under this contract shall be correctly licensed to the user. The original license shall be issued to the user and copies included in the operating and maintenance manuals. Full details of software support and maintenance costs shall be submitted at tender stage.

Surge arrestors shall be provided on the lines not completely internal to the building.

C11. CABLE INSTALLATION:

.1 General



Pick-Up Device:	752(H) x 582(V) pixels, Interline transfer CCD
Scanning Area:	4.9(H) x 3.7(V)mm (Equivalent to scanning area of 1/3" pick-up tube)
Horizontal:	15.625KHz Vertical: 50.00Hz
Synchronization:	Line-Lock (-120° to 120° vertical phase adjust) or internal crystal
Video Output :	1.0 V □p-p□ PAL composite 75 Ohms/BNC connector
Horizontal:	470 TVL
Signal-to-Noise ration:	50 db (AGC OFF, weight ON)
Dynamic Range:	40Db
Minimum Illumination:	8.1 x (0.74-foot candle) (Equivalent to 3 1 x 0.28-foot candle)
Gain Control:	OFF/AUTO with adjustable limit (SET UP MENU)
White Balance:	Selectable ATW or AWC (SET UP MENU)
Aperture:	Set variable (SET UP MENU)
Electronic Light Control:	Equivalent to continuous variable shutter spread between 1/50 second and 1/10 000 second Back Light Compensation: Selectable pre-set On or Off (SET UP MENU)
Ambient operating Temperature:	-10°C + 50°C (14°F - 122°F)
Ambient operating Humidity:	Less than 90%
Power Source and Power consumption:	220 - 240V AC 50Hz. 46,0W
Dimension (without lens):	70mm(W) x 78.3mm(H) x 194.5mm (D)
Weights (without lens):	0,700



C14.2. CAMERA DRIVE UNIT: .1

General: The camera drive units are to be selected in conjunction with the high resolution cameras in order to achieve the best possible result.

.2 Specification:

Video Output 1,0V [p-p] 75 OHMs/BNC Connector
Power Supply 12V – 24V AC/DC

Power Consumption 5 Watt

Ambient Temperature 0°C to 50°C

Humidity Less than 90%

C13. DVR MACHINE:

Video format: MPEG-4 (PAL/NTSC)

Resolution: 704 x 576 PAL or 704 x 480 NTSC

Video input 8 or 16 composite video
0.5 -2 Vpp, 75 ohm

Video output 8 or 16 composite video
1 Vpp, 75 ohm

Audio input 4 or 8 Line in, 30 kohm

Audio output 1 Line, 100 kohm

Audio sampling rate 8 kHz

Power requirements AC 240 VAC 50 Hz

Power consumption 80W to 120W

Dimensions 430mm (W) x 98mm (H) x 435mm (D)
(Approximately)

Network Speed: Up to 120 IPS @ 352x288 PAL,
352x240 NTSC

Internal HDD 320 GB Internal
DVD Writer DVD+R/DVD+RW 3

Storage: USB Ports
System LCD Monitor

C14. HIGH RESOLUTIONS COLOUR MONITOR:

Power Requirements 220 VAC 50Hz

Resolution No Less than 500 Lines
at the centre

Audio Built in speaker for
audio monitoring

Controls Front Panel control selection



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Screen Size	17 inch unless specified
VGA input	Loop through BNC 1v P-P+3db-6db, Automatic 75 Ohms termination, synchronize negative
Frequency	30-80Hz
Power consumption	80W to 120W
Dimensions (Approximately)	430mm (W) x 98mm (H) x 435mm (D)
Network Speed:	Up to 120 IPS @ 352x288 PAL, 352x240 NTSC
Storage:	Internal HDD 320 GB Internal DVD Writer DVD+R/DVD+RW 3 USB Ports



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SCHEDULE OF OUTLETS:

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SECTION D

SCHEDULE OF TECHNICAL INFORMATION:

STANDARD SPECIFICATION: GENERAL REQUIREMENT



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SCHEDULE OF TECHNICAL INFORMATION - GENERAL REQUIREMENTS:

I N D E X

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E1

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E3



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SCHEDULE OF TECHNICAL INFORMATION - GENERAL REQUIREMENTS:

E1. ACCESS CONTROL:

Tenderers shall complete the following schedule in full and shall further support his tender with technical literature associated with the pieces of equipment offered.

Failure to complete the following schedule could lead to the disqualification of the tender.

ITEM No.	DESCRIPTION	EQUIPMENT OFFERED
1	Type of Card Reader/Proximity Tag reader controller	Door Access Controller / Improx
2	Are card reader controllers capable of full and complete standalone operation?	Yes
3	Is battery backup provided as specified?	Yes
4	Type of Surge Protection Offered?	
5	Type of Batteries?	
6	Capacity of battery?	
7	Type of access card?	
8	Type of door monitor?	

E1

E2. TECHNICAL INFORMATION SCHEDULE – CCTV:

ITEM No.	DESCRIPTION	EQUIPMENT OFFERED
1	Colour cameras (Fixed)	Minidome LTC1422
2	Colour cameras (PTZ)	Envirodome VG4211ECS 2M
3	Camera lenses (Fixed/PTZ)	(3mm / 18mm)
4	Camera mounting brackets	Wall: VGA4-A-PA1 Pole: VGA4-A-9541
5	Co axial cable	RG 59 and UTP Cat 5
6	DVR	MR Series DVR 16L-032A 1L with Internal DVD Writer
7	Multiplexers	Built-in
8	Colour video monitor	17" LCD (VGA)



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BILL OF QUANTITIES



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BILL OF QUANTITIES:

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NOTES TOTENDERES:

1. TENDER DOCUMENTS:

The Tender Documents comprise the Specification, Tender Form, Schedule of Tender Prices, Provisional Bill of Quantities, Schedule of Technical Information for the Access Control and CCTV Installation.

2. EXTENT OF PROJECT:

The extent of the project involves the construction of the Ideal Clinics Prototype. The phase comprises of different buildings, i.e. Ticket Sales, Staff Accommodations, Admin, Guard House, Ablutions. Some CCTV cameras will be required in general areas around the site.

3. EXTENT OF THIS SUB-CONTRACT

The scope comprises the Supply, Installation, Testing, Commissioning and 12 months' free maintenance during the Guarantee Period of the Access Control and CCTV Installation in accordance with the specification.

The Access Control & CCTV Installation Contractor shall provide all materials, equipment, Labour and services necessary for the complete and efficient operation of the Access Control and CCTV Installation in accordance with the intent of the specification.

4. THE SITE:

The site of Ideal Clinics Prototype is in South Africa.

5. PROGRAMME (GENERALLY)

Building Operations for Phase 1 (not part of this contract) are well advanced. The CCTV and Access Control contract are to tie into the main builder's programme. Tenderers are to include in the submission a Programme for the executions of the Works.

6. DRAWINGS:

Drawings for the CCTV & Access Control Installation have been produced and tenderers are invited to inspect all drawings at the offices of the Engineer as appropriate.

7. SITE VISIT:

The Tenderer must acquaint himself with any limitations or restriction which may be imposed by the Principal Contractor, Local or other Authorities in regard to access to site or transport of materials from the site and allow for any additional resultant costs involved.



8. CONFLICTING NOTES, TERMS, DESCRIPTIONS ETC:

Where requirements of notes, terms or descriptions in the Tender Documents conflict in any way, then the Engineer must be contacted immediately for a ruling. The Engineer will be sole Judge as to the final meaning of any note, term or description in these Tender Documents.

9. METHOD STATEMENT:

Tenderers are required to submit with their tenders a method statement which indicates clearly the proposed method and sequence of the work, together with safety procedures, where required, and the protection of existing adjacent services that are to remain operational.

10. TENDERS:

Tenderers are also requested to submit all relevant Technical Brochures and descriptive leaflets of the offered equipment as well as details of working existing installations previously completed using similar equipment.

11. ALTERNATIVE OFFERS:

All Tenderers shall submit prices strictly in accordance with the Technical Specification as detailed herein.

12. VALUE ADDED TAX:

All prices in the Bills of quantities are to exclude VAT, and VAT is to be added to the totals at 15%.

13. IMPLEMENTATION OF THE OCCUPATIONAL HEALTH SAFETY ACT No. 85 OF 1993:

The Employer and the Main Contractor hereby agree, in terms of Provisions of Section 37 (2) of the Occupational & Safety Act, Act No. 85 of 1993 as amended, hereinafter referred to as "The Act", that the contractor as an employer in its own right and in its capacity as contractor for the execution of the contract works, shall have certain obligations and that the following arrangements shall apply between them to ensure compliance by the contractor with the Provisions of the Act, namely:

- i. The contractor undertakes to acquaint his employees with all relevant provisions of the Act, and the regulations promulgated in terms of the Act, and
- ii. The contractor undertakes that all relevant duties, obligations and prohibitions imposed in terms of the Act and regulations will be fully complied with, an
- iii. The contractor hereby accepts sole liability for such compliance with the relevant duties, obligations and prohibitions imposed by the Act and regulations and expressly absolve the Employer and the Employer's consultants from being obliged to comply with any of the aforesaid duties, obligations and prohibitions of the work included in the contract.
- iv. The contractor shall be obliged to report forthwith to the Engineer any investigation, complaint or criminal charge which may arise as a consequence of the provisions of the Act and regulations pursuant to work performed on behalf of the Employer and



shall, on written demand, provide full details in writing of such investigation, complaint or criminal charge, and

- v. Should the contractor be issued with any instructions to execute the contract works, which in his opinion be considered dangerous to his employees he shall immediately notify the Engineer in writing of his concern prior to proceeding with the works.



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SPECIFICATION

VOLUME 7 PABX INSTALLATION

PROPOSED DEPARTMENT OF HEALTH: IDEAL CLINICS PROROTYPE ELECTRICAL SPECIFICATION



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VOLUME 7

PABX INSTALLATION

DETAIL SPECIFICATION – PART
1PX



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VOLUME 7 - PABX INSTALLATION

PART 1PX - DETAIL SPECIFICATION

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VOLUME 7 - PABX INSTALLATION

PART 1PX - DETAIL SPECIFICATION

1.1 INITIAL AND ULTIMATE REQUIREMENTS

The new PABX unit shall be equipped for the initial requirements, and be capable of expansion to the final requirements as indicated on the drawings.

The actual number of extension outlet points, standard telephones and feature telephones to be supplied shall be as indicated in the Bill of Quantities.

The PABX's MDF/IDF must be housed in a suitable cabinet, which must be supplied as part of this contract.

PABX to be as Type Siemens or other approved. The contractor to note that approval is required prior to the Tender closing.

The system is not required to operate as part of a network of PABX units. Tenderers shall state whether the unit is capable of networking and if yes, furnish the information required in Clause 3.4 of the General Specification.

1.2. NETWORKING

1.3 ISDN LINKS :

The PABX will be linked to the public exchange via ISDN Primary Access Rate Interface channels.

The PABX must also be equipped with spare analogue exchange lines. In the event of failure of the ISDN primary basic rate interface channels, it must be possible for an attendant to access the spare analogue exchange lines from the operator's console

4. BARRING:

.1 The system shall allow barring to outgoing calls to permit any extension to be:

- (a) totally unbarred
- (b) barred to international calls
- (c) barred to all trunk calls
- (d) barred to all calls
- (e) barred to certain regions
- (f) barred to all trunk calls except certain dial codes.

.2 The system shall allow modification of barring facilities.

.3 It shall be possible to program extensions to access any number within the abbreviated dial code table, even if the extension is barred to all outgoing calls.

.4 It shall be possible to bar any extension to all incoming calls.



- 5. TELEPHONE MANAGEMENT SYSTEM:
 - The Contractor shall allow for the equipment necessary to permit operation of the telephone management system when it is located up to fifty meters from the PABX. The equipment shall include a Personal Computer (if required), a laser jet printer as well as software.

 - 6. CABLING SYSTEM AND SITE RETICULATION:
 - .1 The cabling for additional outlets shall be allowed for on a "per point" basis up to a maximum length of 80m cable from the distribution point to the outlet point. The cost of an outlet shall include the telephone socket.
 - .2 The positions of the outlet points must be verified with the user.

 - 7. TELEPHONE INSTRUMENTS
 - .1 The analogue telephone instruments supplied shall be standard, i.e. they shall be equipped with the features available on a "Venues" type telephone.
 - .2 A number of digital feature telephones shall be supplied. These shall be capable of "hands free" operation, adjustable volume, be capable of storing a number of speed dial codes and form part of an executive/secretary system. The feature telephones shall be powered from the PABX, and shall not require a separate source of electrical power.
 - .3 The quantity of telephone instruments supplied shall be as indicated in the Bills of Quantity.

 - 8. ACCOMMODATION;
 - .1 The new PABX, including the MDF/IDF cabinet, batteries and uninterruptible power supply (UPS) shall be accommodated in the Buildings
 - 1. DATA BASE AND The Contractor shall liaise with the Superintendent or any responsible personnel of the Ideal Clinics Prototype, South Africa to enable him to draw up the system data base, which will contain all information relevant to an extension.
 - .2 The Contractor shall program the database into the system.
 - .3 It shall be possible to alter the database from the operator's console.
 - .4 The Contractor shall train a nominated member of the staff to modify the database.
- PROGRAMMING:
-
10. OPERATOR'S CONSOLE:
 - The console must be provided with a standard telephone handset, as well as a headset incorporating a microphone and earpiece to allow hands-free operation. One of the consoles must also be suitable as supplied for operating by a blind or partially sighted person.
-
11. DOCUMENTATION:
 - .1 The Contractor shall provide two copies of the Operator's Handbook and two copies of a "User's Handbook" which describes the PABX system and the facilities available.
 - .2 The Operator's Handbook and the "User's Handbook" may be consolidated into one volume.



12. PIN-CODES:

The system shall allow pin-codes to be assigned to telephone users to allow telephones to be locked by these codes, and to have facilities accessed via the pin codes.

13. SPEED DIAL CODES:

Notwithstanding anything to the contrary elsewhere in the specification, the PABX unit shall cater for 1000 speed dial codes.



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PABX INSTALLATION
VOLUME 7
DETAIL SPECIFICATION – PART
2PX



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DEPARTMENT OF HEALTH: DEAL CLINICS PROTOTYPE
VOLUME 7 - PABX INSTALLATION
PART 2 PX - GENERAL SPECIFICATION

1. GENERAL: This tender calls for the complete supply, delivery, installation, commissioning and maintenance of an ISDN compatible, digital electronic Private Automatic Branch Exchange, and Telephone Management System for the institution indicated on the front cover of this document.
 - .2 The successful tenderer is to submit all necessary applications to Network Provider to satisfy their requirements and make all necessary arrangements with the provider for the satisfactory conclusion of the contract.
 - .3 Preference will be given to systems which afford flexibility, economy and efficiency of expansion.
2. REQUIREMENTS: .1 **Tender Requirements:**
 - (a) Tenderers are to provide a “**Statement of Compliance**” to each and every paragraph of this Specification.

A Certificate of Compliance must also be submitted with the Tenderer’s offer.
 - (b) Apart from any references to consult PABX Specifications, sheets and manuals elsewhere in the document, it is also required that all questions **must** be answered **with a brief description** of the facility. Answers are to be neatly documented in paragraph order and attached to this tender document at the time of closing of tenders. Failure to submit this statement of compliance will automatically disqualify a tender.

Where Tenderers make reference (in the compliance list) to information elsewhere in the document, it is requested that section and page/paragraph reference be given to help find the part referred to.

Tenderers are requested to bind the brochures and technical manuals related to their PABX and related equipment separately from the tender form, compliance list and other contractual information.
- .2 **Approval and Quality Assurance**
 - (a) The system, inclusive of the PABX ISDN interface plus all constituents must have type approval by Network Provider at the date of tendering. A copy of the appropriate letter of approval must be included with the tender.
 - (b) All installation practices shall be in accordance with the relevant Network Provider requirements for the installation of PABX’s and Associated Wiring and Terminating of cables and stations, as applicable.



3. NEW PABX:

.1 General

- (a) The new PABX system shall comprise the PABX, operator's consoles, telephone management system, telephone cabling, telephone instruments and UPS or charger/battery system as specified elsewhere.
- (b) The numbers of extensions to be installed initially will be as indicated in Detailed Specification Part 1PX of this document.
- (c) Existing extensions shall be incorporated onto the new PABX and new extension numbers provided for them, as necessary.
- (d) The existing facsimile lines, as well as new facsimile lines shall be incorporated onto the PABX and extension sockets and numbers provided for them.
- (e) All equipment shall be Year 2000 (Y2K) compliant.
- (f) Tenderers shall note that the available power source for the PABX equipment is 230V (nominal) \pm 10%, 50Hz single phase, plus earth.
- (g) **Systems which cannot meet the ultimate requirement will not be considered.**

.2 Facilities

- (a) The PABX shall be equipped to enable the following:
- (b) Tenderers are to state whether a mix of telephones of different signalling methods can be connected to the system and in what quantities for each type is to be stated.
- (c) The PABX must be able to automatically re-configure itself when Printed Circuit Boards are removed or installed.
- (d) State operating temperature ranges. This must be no less than 5° C to 30° C. In general, no air-conditioning is available in the PABX room.
- (e) State maximum power consumption of fully equipped system in Watts.

.3 ISDN and Future Enhancements

- (a) The system must support the latest ISDN interfaces and technology standards. The PABX unit must be equipped with all necessary hardware and software, so as to be a fully ISDN compatible digital exchange.
- (b) The PABX switching unit shall be connected to the Public Exchange using ISDN S_{2M} primary access rate interface channels. The successful Tenderer is to submit all



necessary applications to Network Provider for the provision of this facility.

- (c) Exchange lines are to be terminated at PCM30 OR primary Access Rate interface equipment as required within the PABX i.e. the system must accommodate digital incoming lines and there shall be no stage at which these lines must be analogue.
- (e) By slotting in appropriate interface cards, the PABX unit must be compatible with R2MFC (digital DID) exchange lines and/or standard analogue exchange lines.

.4 Networking

- (a) Which of the following network signalling protocols does the system support?

.5 Protection from Transients

- (a) Transient voltage suppression and protection must be provided for all electronic equipment in the exchange.

The system must be protected from:

- Lightning or induced surges
 - Inductive switching or electromagnetic interference
 - Electrostatic discharge
- (b) Each analogue exchange line circuit and extension circuit shall be separately protected on the MDF/IDF. The type, method and point of application of this protection shall be described by the tenderer.

.6 Site

- (a) Tenderers shall ensure that they are familiar with all the buildings and locations of the proposed new equipment and operator's consoles, so as to determine the required new cable routes and make allowances for this when tendering.

.7 Performance Guarantee

- (a) The supplier acknowledges that the purpose for which the PABX is required is known, and guarantees that the equipment will perform to the standards as laid down by the manufacturer, Network Provider and the country. Should it become necessary to modify or supply additional equipment in order to achieve compliance with the specification, this shall be done at no extra cost to the Country



.8 Facility Listing

4. SYSTEM REQUIREMENTS:
- (a) Tenderers shall submit, for adjudication purposes, a comprehensive listing of all facilities available on their PABX system.
 - .1 The system shall be the latest generation equipment.
 - .2 The exchange must be of modular design permitting expansion of the exchange by simply adding printed circuit boards when necessary, within the limits specified in 4.1 (a) of this section.
 - .3 In the event of a power failure and failure of the equipment Power Supply, the system must be provided with a RAM battery back-up capable of supporting the RAM memory for at least 2 months.
 - .4 Tenderers must state what options are available for reloading the system from the back-up device and typically what times to reload are envisaged.
 - .5 Tenderers are to state the number of switching paths the switch provides.
 - .6 Although it should be possible to gain access to the data base at any time for retrieval or examination purposes, the system must not allow unauthorized personnel to access this data base for the purposes of introducing changes or modifications there-to. In other words, the data base must be password controlled.
 - .7 The system shall have the facility to provide both incoming and outgoing call records, and shall provide such records where the main exchange equipment provides this facility.
 - .8 Details of the call logging information provided by the CPU are to be provided.
5. SYSTEM FACILITIES:
- .1 Can the user Data Base be retrieved and/or extended onto an external device?
 - .2 The system must provide "Line Lock-Out" to automatically block the extension when a handset is "Off Hook" for more than a specific time without dialling.
 - .3 The system must provide for discriminating ringing or external calls, internal calls, auto ring back calls and emergency calls.
 - .4 The system must provide full secrecy.
 - .5 The system must provide "SPECIAL" tones in the case of call diversion.
 - .6 Call transfer facility must be provided.



6. EXTENSION The system shall provide the under mentioned extension facilities: FACILITIES:

- Direct Inward Dialing, DID
- Automatic Ring Back (all extensions).
- Add-On Conference (all extensions).
- Call Transfer or Internal and External Calls.
- Enquiry Call (Internal and external calls with shuttle).
- Shuttle Call.
- Call Pick-Up Groups.

State the maximum number of groups possible.

State the maximum number of extensions per group.

.9 Executive/Secretary Combinations

State the maximum number of combinations possible.

.10 Flexible Extension Numbering

It shall be possible to alter individual extension numbers within the range allowed by the system numbering plan.

.11 Priority Allocation

Of exchange lines or tie-lines to privileged extensions.

.12 Follow Me

- (a) From own extension
- (b) From destination extension

.13 Paging

Access to a paging system may be required. Tenderers are to state what options are available.

.14 Hot Line

- (a) To operator

.15 Group Hunting

- (a) Sequential

.16 Abbreviated Dialling

State number of codes available.

- (a) Common Pool (System must provide for at least 80). (b)



Individual Extension Pool (5 per extension)

- .17 Call-Back on Trunks**
- .18 Camp-On Bay**
- .19 Camp-On Ringing**
- .20 Charge Code Account – 4 Digit Codes**
- .21 Divert All Calls**
- .22 Divert on Busy**
- .23 Divert No Reply**
- .24 Divert Not Disturb – (Divert to Operator)**
- .25 Last Number Redial**
- .26 Meet Me Paging**
- .27 Night Service Facilities**

When Night Service is engaged the following should be possible:

- (a) Night bells throughout the building may be operated. Any extension used may take the call by dialling a short code.
- (b) All incoming calls may be forwarded to another extension for instance, the Security Guard extension or Reception in Emergency Area.

7. CONSOLE FACILITIES:

.1 General

The Operator's Console must be of the most modern VDU design incorporating "User Friendly" techniques.

.2 Call Status

The console should provide displays for:

- (a) Trunk Lines
- (b) Time
- (c) Date
- (d) Current Calls

It should also be possible to use the console for Programming the system and providing Management Information such as:

- (a) Directories
- (b) Accounts/Bills



.3 Console Connections

- (a) Give the size of the cable used to connect the console with the PABX equipment.
- (b) Give the maximum distance the console can be installed from the PABX equipment without using Special Line equipment.

.4 Busy Lamp Field

- (a) A busy Lamp Field must be provided showing whether an extension is busy or idle and must be self-configuring for the hardware fit of the system. (This can be incorporated in the VDU display).

.5 Help Pages

Help Pages should be provided to assist the operator with the operation of the console and should show:

- (a) All extension facilities
- (b) All dial-up codes
- (c) Function of all console keys

.6 Alphabetic Directory

The Directory must show all Extension Users listed alphabetically with their extension numbers. The operator should be able to print the screen to give an Internal Directory.

.7 Call Progress Display

The Call Progress Display should indicate:

- (a) Status of incoming call
- (b) Parked calls
- (c) Call diverted to console
- (d) Status of extension

.8 Automatic Recall

The operator shall be automatically recalled after a time delay, if a call she has extended does not mature. It should be noted that, in the case of a multi-console configuration, the recall must only return to the console from which it was originally extended.

.9 Calls Waiting

The operator shall be able to indicate a call waiting by means of a warning signal or by being able to cut into the conversation.

.10 Camp on Busy/Ring When Free



The operator must be able to automatically camp a call on a busy extension line and the extension automatically, rings when it becomes free, without further intervention.

.11 Call Hold

- (a) The operator must be able to put any call into a hold or waiting condition at his/her discretion.
- (b) Such calls must be automatically retrieved in strict order (F.I.F.O)
- (c) State the limit to the number of calls in waiting at any given time?

.12 Call Splitting

During the setting up or extending of any call, the operator must be able to shuttle between the two parties involved so as to exclude the other, if required.

.13 Abbreviated Dialling

It must be possible for the operators to have access to a pool or pools of frequently dialled numbers. Each of these numbers (maximum 16 digits) should be condensed into a "Short Code" of not more than 4 digits.

State the number of codes which can be provided in:

- (a) Common Pool
- (b) Individual Pool

.14 Trunk Group Busy Indication

The operator must automatically receive an indication on the outgoing route or console when all lines in any group become busy.

.15 Call Handling

The exchange must be designed to allow the switchboard operator to effect fast and efficient handling of calls. A maximum of supervision must be exercised by the Exchange over all calls, freeing the operator from routine duties as far as possible. Any special facilities in this regard must be stated and explained, permitting the operator's attention to be focused on quality service.

.16 Queue Indication

When more than a specified number of incoming external calls are queued, an indication of traffic build-up shall be provided.



.17 Priority On Call Back

In addition to priority cut-in it shall be possible for the same selected extensions to cut-in on an existing call to or from any other extension on call back. The same warning tone, etc. shall apply.

.18 Night Service

It shall be possible to switch the consoles into "night service" mode. Programming of the system to bar all or selected extensions to outgoing calls or trunk calls must be possible.

8. TELEPHONE INSTRUMENTS:

.1 Standard Analogue Telephone Instrument

The standard analogue DTMF telephone instrument in this installation shall be as the "Venus" type. Instruments which offer at least the features of the "Venus" are also acceptable.

.2 Digital, Executive/Feature Telephone Instruments

Feature telephones must amongst others, incorporate the following features:

- (a) 12-digit keypad with standard features
- (b) be system powered
- (c) use a two wire cable
- (d) full "hand free operation", i.e on hook dialling, listening in loudspeaker and communal microphone with key activation and LED
- (e) microphone mute key
- (f) audible ring tone and volume selection adjustment
- (g) 10 one touch speed dial repertory keys
- (h) LCD display showing messages, extension of incoming calls, date, time, etc.
- (i) Function keys to access system features
- (j) Full single or multiple executive/secretary operation
- (k) Ability to connect add-on module of twenty or more repertory dialled keys

.3 Cabling

All new telephones, including feature telephones, executive telephones, etc., must be connected by means of two wire cable, and attendant consoles by means of (maximum) four wire cable. All of these shall be system powered and not require any local power supplies.

9. POWER SUPPLY:

- .1 The power supply shall be accommodated in the PABX Room.
- .2 The power supply, for the system shall comprise of sealed valve regulated gas recombination lead acid stationary plant batteries with suitable charger. Standard motor vehicle batteries are **not** acceptable. The charger shall



obtain its power from a standard single 50Hz electricity supply as specified in Clause 3.1 (f).

- .3 In the event of failure of the mains supply or the charger the battery must be capable of powering the system for at least 8 hours at 100% of maximum load.
- .4 The charger must operate automatically and be capable of fully charging a completely discharged battery within 8 hours whilst simultaneously supplying the system at maximum load.
- .5 The battery charger must be fully protected against all possible battery faults. Such protection must include output current limit at a value not exceeding the maximum specified by the battery manufacturer.
- .6 The charger must have a boost charge facility to recharge a depleted battery at a higher than normal rate for a pre-set period. Initiation of the boost charge should be automatic or manual, at the operator's option.
- .7 A suitable isolator must be provided to disconnect the battery power supply in the event of a fault causing excessive battery current and to allow the battery to be isolated.
- .8 Full specification and particulars of the batteries on offer must be included with the tender.
- .9 The Tenderer shall state in his tender the minimum guaranteed life of the battery, when operated in accordance with the supplier's instructions.
- .10 The Tenderer shall obtain written approval from the battery supplier that the battery charger used shall cause no detrimental effects on the life of the battery system.
- .11 The Contractor shall be responsible for any electrical reticulation necessary from the battery/charger to the system.
- .12 The battery bank must be supplied with a wooden stand. The Contractor shall note that batteries are to be installed so as to comply with the Occupations Health and Safety Act.

10. CABLING SYSTEM .1 If it is required to install new cables, or to extend the cable installation, cables must AND SITE RETIC- be installed in wire ways. If suitable wire ways are not available, the Contractor shall LATION install trunking or conduit as instructed.

- .2 All outdoor reticulation cabling linking buildings etc., shall be replaced unless otherwise stated.
- .3 All overhead cables must be self-supporting.
- .4 The PABX shall be able to withstand lightning induced voltage surges on the extension and exchange line between lines and also line to earth for each leg and



surges via the power supply.

- .5 All new cables shall be installed so as to contain **at least** 30% spare
- .6 Where necessary, the Contractor shall be responsible for trenching across asphalted and other hard surfaces and shall also be responsible for making good to any such surfaces which require trenching across them. Cables which are to run under any hardened surfaces shall be run in PVC sleeves. When filling trenches, run across these surfaces, the backfill shall be compacted so as to avoid sagging and then resurfaced to match existing.
- .7 Telephone numbers must be built if sleeves longer than 25m are required. These will be spaced at 25m intervals and cables exposed in these manholes. If the manholes are to be placed in an area where they will be subjected to vehicle traffic or any other heavy traffic they shall have cast iron covers which must be capable of withstanding such traffic without damage.
- .8 Any distribution boxes and draw boxes required shall be supplied as part of the cabling.
- .9 The Contractor shall supply "as built" drawings of cable reticulation.
- .10 The Contractor shall be responsible for determining all cable routes. It is **strongly recommended** that Tenderers visit the site to ascertain the extent of the site. Any claims by the Contractor which arise from unfamiliarity of the site will **not** be entertained.
- .11 The Contractor must note that all cable routes must be approved by the Secretary of Works before commencement of any trenching or installation.

11. TELEPHONE
MANAGEMENT
SYSTEM:

- .1 The system shall include a Personal Computer (PC) or integral processing facility to be connected to a laser jet printer, supplied as part of the system. The system must be easy to use and not require specially trained computer staff for the operation. All functions must be menu driven or alternately the system must provide the "Help" screens.
- .2 The software must cater for remote maintenance via a modem.
- .3 The system must perform all recording of call details and processing
- .4 The system must allocate storage for extensions and trunk lines fully automatically, i.e., if new extensions are being added to the PABX, calls must be recorded against such extensions without the need to allocate storage beforehand.
- .5 It must be possible to set certain system parameters to suit individual requirements. This must include the cost per meter unit and exception parameters for exceptional long or expensive calls. This system must allow for individual settings of minimum time and values for different call types,



i.e., it must be possible to have a different time limit on local calls and trunk calls.

- .6 The complete system must be immune to power failures, spikes and dropouts, that is, it must operate off a standalone Uninterruptible Power Supply (UPS) supplied as part of the TMS.
- .7 In the event of a power failure and failure of the UPS, the RAM memory must be backed-up for at least two months.
- .8 The system's memory must have sufficient capacity to store a minimum of one month's call records.
- .9 The system must be able to perform its own call costing based on the time of day, the area code dialled and the call duration from its own internally generated meter pulse.
- .10 The system must cater for local call costing.
- .11 A cost code table must be maintained on the system which defines the cost details for trunk as well as for local calls. The cost details are to include values for three different time zones (day and night tariffs) with a minimum of three decimal digits as well as the area names.
- .12 It must be possible for the operator easily amend the cost code table. Special password protection is required for this function.
- .13 The time zones (day and night tariffs) must be defined within the system. It must be possible for the operator to amend the time zone definitions. Special password protection is required for this function.
- .14 It must be possible to update the cost code table by means of an updated table supplied on removable media.
- .15 The system must produce meaningful reports. The system must store all reporting data for one complete accounting period (minimum one month). It must be possible to extract any report either at the end of the accounting period or at any other time, as required. All reports showing department codes or extension numbers must also show the department name and the extension use name next to the department or extension code. Reports showing only department codes or extension numbers are not acceptable.
- .16 An extension report is required showing number of calls, total call duration, total call cost, average duration and average cost for each. This report must be sorted in department order.
- .17 The system must be able to print an exception report showing all calls which have exceeded the present exception parameters. The exception report should show full call details sorted by extensions within a department. Surnames and initials of extension users should be included in the Report.



- .18 The system administration shall be menu driven for the various functions to be performed from time to time such as:
 - (a) Manual and automatic processing routines
 - (b) File status display
 - (c) Daily statistics reports
 - (d) Month end clear functions

Alternatively, "Help" screens shall be provided.

- .19 The call logging program should record all call details as they occur and save them RAM disk. If left in the logging mode, the system must automatically perform processing during the night.

NOTE: SUPPLIERS ARE TO ENSURE THAT CALLS MADE DURING THE PROCESSING PERIOD ARE BUFFERED IN THE PABX AND ARE NOT LOST.

- .20 It should be possible to print the following:
 - (a) Call Logging File
 - (b) Extension Summary Report
 - (c) Exception Summary Report
 - (d) Costing Module Table

12. ACCOMMODATION :

.1 PABX Accommodation

Tenderers shall assume that the PABX equipment accommodation is not in an air-conditioned environment.

.2

Should the equipment being offered by the supplier require any special environment conditions or apparatus to ensure its reliable operation such as:

- (a) Air-conditioning
- (b) Forced ventilation

PROVISION FOR THESE REQUIREMENTS MUST BE ALLOWED FOR IN THE TENDERER'S OFFER

- .3 State mass of apparatus, fully equipped in kilograms.
- .4 State dimensions of cabinets in millimetres (width x height x depth).
- .5 Is the main distribution frame (MDF) an integral part of the system or is a separate MDF provided, and if so, state dimensions.
- .6
 - (a) Are the PABX cabinets floor mounted?
 - (b) Is rear access required?
- .7 Does the system have cooling/ventilation fans? If so, state number per cabinet.

13. MAINTENANCE:

- .1 The maintenance period for this contract shall be 12 months and shall commence on the date of first delivery of the system.



- .2 The Tenderer is to submit with his Tender, a priced maintenance agreement, for maintenance of the PABX after the initial 12-month period has expired. The Secretary for Works will enter into this agreement at his discretion.
- .3 Each Tenderer must give full particulars of the maintenance, spare parts and service facilities which are available in the Republic of South Africa. In addition, the names and addresses of the companies, agencies, etc., shall be furnished.

The tenderer shall list the centers where maintenance facilities can be readily provided and shall state if repairs under guarantee or maintenance agreement can be undertaken at these centers. Local Companies or subsidiaries thereof, other than the main supplier, who only offer replacement of malfunctioned printed circuit boards, etc., **cannot be considered to be maintenance centers under this clause.**

- (a) The system must allow for "Hot Maintenance" so that PCB's can be inserted and removed without having to cut off the power to the system or PCB's.
- (b) When replacing faulty cards, the new cards when inserted must automatically initialize themselves.
- (c) The system must provide for remote maintenance.
- (d) The system must perform an automatic start after a power failure.

COST

- (a) What are the annual maintenance charges (including provision of spare parts) for the system in question and how are they calculated?
- (b) Tenderers are to enclose a sample Maintenance Contract.
- (c) What escalation on an annual basis will be applied to the Contract and on what basis will it be determined?
- (d) Does the charge include all traveling within a specified radius of a Service Depot? Please
- (e) What is the traveling charge per kilometre outside your stipulated radius?
- (f) How many maintenance technicians are available for this equipment at each site in South Africa?
- (g) Will all the necessary spare parts/cards etc. be kept at local depots to ensure that the down-time of the system is minimal.



- (h) What will be your minimum/maximum reaction time for service?
- (i) Are charges to the system such as night service, facility class, etc. and software support included in your Maintenance Contract?
- (j) If the answer to the above question is NO give charges or hourly rates.
- (k) Can user facility allocation be made to the system without the assistance of the Supplier?
- (l) What would be the costs involved to alter the data base of the system? Please give hourly rates and traveling charges
- (m) Tenders are to state whether future software updates will be made available

.4 Tenderers shall undertake to maintain the PABX equipment for at least 10 years from the date of first delivery of the system.

14. SUPPORT AND: .1 All Tenderers must be accompanied by a supplier's commitment to provide an TRAINING: effective after-sales service. In fulfilment of this condition, it shall be incumbent on the successful tenderer to render technical expertise and advise when called upon to do so, hold or have access to a sufficiently wide range of spares to effect repairs of any nature on the system supplied and provide for any contingency which may arise from normal operation.

.2 The successful tenderer shall be required to train operators in the use of the system accepted, free of charge, and to the satisfaction of the Province. All features of the system, whether required by this specification or not, must be covered in the training programme. Tenderers shall indicate:

- (a) The duration of the instruction
- (b) The earliest date of commencement
- (c) The venue for instruction

.3 The successful tenderer shall provide each operator with a "short form" instruction leaflet/brochure detailing each feature and facility and clearly indicating the appropriate switchboard keys or push buttons, indications and sequence applicable. The information must be available to each operator prior to commencement of the period of instructions.

.4 It shall be accepted that staff will have received full training by the time the new exchange is commissioned and that it may be necessary for such staff to be trained at the cost of the supplier.



- .5 The successful tenderer shall also train selected members from each department in the operation of the system and demonstrate to them the full range of facilities available.
- .6 Written operating instructions are to be provided for switchboard operators as well as **all** extension users. Spare copies of written instructions for extension users are also to be provided.

A description of the supplier's approach to the management of the project must be furnished.

Tenderers must give an undertaking that should they be successful they will be required to study the organizational structure of the building in terms of departments, etc., and their needs in regard to telephone service. On the strength of this study, the successful tenderer will be expected to configure the customer data base to meet the needs of each user group.

15. FINALISATION OF .1 Prior to commencing work, the successful Tenderer shall discuss the project and TELEPHONE verify telephone instrument positions on site with the Engineer POSITIONS:



health

Department:
Health
REPUBLIC OF SOUTH AFRICA

PABX INSTALLATION
VOLUME 7
BILLS OF QUANTITIES

DEPARTMENT OF HEALTH
NYAVINI CLINIC
CONSTRUCTION OF NEW CLINIC
MECHANICAL WORKS

1. SCOPE OF WORKS

These works consist of the supply, delivery, installation and commissioning of:

- 1.1. Split Air Conditioning Equipment
- 1.2. Ventilation Equipment
- 1.3. Fire Protection Equipment
- 1.4. Hot Water Reticulation
- 1.5. Hot Water Supply
- 1.6. Hydroboils
- 1.7. Water Pumps

2. PARTICULAR SPECIFICATION

2.1. Supply, Delivery and Installation of New Equipment

The following new equipment is to be supplied, delivered, installed and commissioned on site:

2.2. Air Conditioning Equipment

2.2.1. General

All equipment is to comply with the latest amendments of:

- a) SANS 1125: Room Air conditioners.
- b) SANS 10147: Refrigerating Systems, including plant associated with air conditioning systems.
- c) SANS 1283: Manufacture of Ducting.
- d) SANS 10173: Installation, Testing and Balancing of Ducting.
- e) SANS 1424: Air conditioning and Ventilation Filters.
- f) SANS 1287: Flexible Ducting.
- g) SANS 60335-2-40/ICE60335-2-40: Electrical Safety of Air conditioning.

Walls are to be chased for the controllers, conduits and wall boxes installed and the walls patched and made good.

Units are to be complete with drip trays which shall be mounted under the coils and properly pitched for positive drainage. They shall project under the entire length and width of the coil. PVC (blue) or other approved type drain tubing of not less than 25mm nominal bore with glued

joints and supported at 1m intervals, shall be provided. Drip trays are to be easily accessible for cleaning and piped to drain.

Precautions shall be taken to prevent condensation on the outside of drip trays and piping.

The mean sound pressure levels generated by the units shall not exceed 40 dB(A) when measured at a distance of 2 metres from the units.

The interconnecting refrigerant piping and electric wiring shall be fitted in trunking and unobtrusively run between units and must be straight, vertical, horizontal or parallel to walls as applicable.

Refrigerant piping shall be seamless, dehydrated, deoxidised, sealed, copper tubing.

The suction (and supply when reverse cycle heating is used) line piping is to be insulated with Armaflex type insulation and any exposed insulation is to be painted with UV resistant, flexible type outdoor paint. Any joints or bends are to be sealed with polyurethane foam.

The equipment is to be supplied with a manufacturer's guarantee of 5 years on the motor/compressor.

2.2.2. Split Units

Inverter type midwall split units, with reverse cycle heating, are to be installed as shown on the drawings, each with its own hard-wired controller.

Split type units shall consist of a direct expansion fan coil unit and a separate externally located air cooled condensing unit.

Each indoor unit must be suitable for wall mounting or ceiling suspended, and shall be operated by a separate, flush mounted hard-wired controller installed in the room, adjacent to the light switch (unless otherwise indicated). Fan speed and temperature are to be adjustable and are to be controlled by this controller.

The condensing unit shall be wall mounted on sturdy, hot dipped galvanised brackets with galvanised rawl bolts in the position specified. Rubber waffle pads are to be used to eliminate vibration between mounting brackets and the unit.

2.2.3. Technical Specification

Room air conditioners shall be completely self-contained and equipped with suitable filters, recirculation fan with a minimum of two speeds, adjustable or automatic directional air discharge vanes, direct expansion cooling coil, compressor, air cooled condenser, interconnecting refrigerant tubing, reverse cycle heating unless otherwise specified, thermostat, control panel and electric wiring.

All moving parts shall be resiliently mounted in a sturdy sheet steel casing.

All steel surfaces shall be thoroughly rust proofed in the factory and final coated with epoxy scratch-proof finish unless otherwise specified.

Condenser coils shall be constructed from copper or aluminium tubing and aluminium or copper fins as specified.

Electric terminals and connections shall be protected with mastic coating.

All units must have a drip tray and drain outlet. Slinger-ring type fans are not acceptable.

Console and window type units must have fresh air inlet vents with selector lever.

Filter elements shall be of robust construction and shall be easily removable. Filter material shall be constructed of washable synthetic fibre.

The following interlocks shall be provided:

- a) The compressor shall only run when the recirculation and condenser fans are running.
- b) Heater elements, when specified, shall only be on when the recirculation fan is running.
- c) Heater elements must be fitted with an overheat cut-out thermostat.
- d) Cooling and heating shall not run simultaneously.

Refrigerant is to be of CFC free type

Reverse cycle heating shall be provided when calling for heating, i.e. heater elements not accepted.

Air conditioners shall be unconditionally guaranteed for a minimum period of twelve (12) months from date of installation.

Air conditioners shall comply with the Occupational Health and Safety Act of 1993, as amended.

2.2.3.1. Controls

The air conditioning in each room is to have a single, independent, hard wired controller, flush mounted, installed next to the light switch.

2.2.3.2. Split Units

Split type units shall consist of a direct expansion fan coil unit and a separate externally located air cooled condensing unit.

The fan coil unit must be suitable for wall and floor mounting or ceiling suspended as specified and shall be operated by hard wired controls.

- a) The condensing unit shall be wall mounted on sturdy, hot dipped galvanized brackets with galvanized rawl bolts in the position specified.
- b) The condensing unit shall be made weatherproof.
- c) The interconnecting refrigerant piping and electric wiring shall be fitted in trunking and unobtrusively run between units and must be straight, vertical, horizontal or parallel to walls as applicable.
- d) Refrigerant piping shall be seamless, dehydrated, deoxidized, sealed, copper tubing.
- e) Holes made through the building wall shall be neatly finished, sealed and made good, and a horizontal PVC sleeve installed protruding not more than 5mm beyond the wall.
- f) The suction (and supply when reverse cycle heating is used) line piping is to be insulated with Armaflex type insulation and any exposed insulation is to be painted with UV resistant, flexible type outdoor paint. Any joints or bends are to be sealed with polyurethane foam.

2.2.3.3. Installation of Air Conditioners

Where specified the air conditioning units supplied shall be installed in the following manner:

Provision shall be made to remove condensate from inside the building via copper or PVC tubing which must be saddled against the outside wall at intervals of no greater than 750mm (minimum internal diameter of 20mm).

Cassette units are to be installed flush with the ceiling.

2.3. Ventilation Equipment

2.3.1. Fan Filter Unit

Fan filter units, to supply filtered fresh air to each wing and ducted to all areas of the building via ceiling voids and bulkheads. Each unit shall consist of a washable pleated filter in a holding frame, and a speed-controlled fan in an enclosure as detailed below:

Filter Frame	Front withdrawal with neoprene seal and stainless-steel clips
Fan	Axial in-line
Casing	0,8mm galvanised mild steel, primed and painted
Soundproofing	Neoprene faced internal sonic liner
Maximum noise	NR35 (40dBA) measured in duct @ 2m
Ducting	Galvanised mild steel (not insulated)

Fresh air supply fans shall be mounted in the ceiling void.

The filters should be easily accessible, and a trap door should be installed beneath the filter for easy access.

The fan offered is to operate permanently or controlled by a switch as shown on drawings.

2.3.2. Attenuation

Should the fan supplied not be able to provide the required duty under the maximum noise, an attenuator is to be fitted to the supply air ducting to restrict the sound to the above-mentioned levels.

2.3.3. Extract Fans

In-line axial fans, as per the drawings.

Extract fans are to be complete with internal and external grilles and wall kits. The fans are to be fitted with a totally enclosed motor fitted with lubricated-for-life bearings and thermal cut-out overheat/overloading protection. Fan noise is not to exceed 40 dB (A) (measured at 2m). Fans are to operate permanently or controlled by a switch, as indicated on the drawings.

2.3.4. Supply/Extract Air Ducting

2.3.4.1. Sheetmetal Ducting

0.6mm galvanised steel sheetmetal ducting complete with MEZ flanges, in accordance with SANS 1283, installed in accordance with SANS 10173, is required.

2.3.4.2. Flexible Ducting

Flexible ducting may only be used at connections to disc valves. It is to be non-allergenic spiral wound and not to exceed 1.5 metre in length. Connections are to be clamped with purpose made stainless steel clamps.

2.3.5. Fresh Air Supply

Fresh air supply quantities for each room are indicated on the drawings.

2.3.6. Weather Louvres

Standard Trox type AWG weather resistant louvres, with natural anodised finish, or powder coated to the Architect's specified colour.

Louvres are to be complete with sub frames and secured on the wall, external to the relevant extract fan.

2.3.7. Door Grilles

350x350mm double-sided natural anodised aluminium door grilles, with frames drilled for countersunk fixing.

These are to be handed to the builder for installation by his Carpenter.

2.4. Fire Protection Equipment

2.4.1. Handheld Extinguishers

Handheld fire extinguishers are to be comply with SANS 1739 and SANS 1522.

These are to be mounted on a full-length hardwood backing board on the walls, as shown in the drawings:

a) DCP handheld extinguishers – are to comply with SANS 1522, SANS 1739 and SANS 10105.

2.4.2. New 30m Fire Hose Reel, complete with Hose and Nozzle, are to be fitted with an isolating valve and union, in that order (so that the Reel can be isolated and removed without having to isolate the mains) as SANS 543.

2.4.3. Signage

200x200mm SABS approved photoluminescent signage a clear Perspex sheet, with anodised aluminium supports, mounted on the wall, suspended from the ceiling, or mounted perpendicular to the wall, as agreed on site with the Engineer and Architect.

2.5. Hot Water Reticulation

2.5.1. Piping

All piping is to be Copper, Class II in accordance with SANS 460, with capillary soldered joints and fittings.

Note that:

- a) Only lead-free solder is to be used.
- b) The personnel installing the pipework are to be properly trained and experienced.
- c) The correct equipment is to be used, i.e., pipe cutters, hand held LPG torches etc.
- d) On completion, the entire system is to be:
 - i) Washed externally with fresh water to remove all traces of flux etc.
 - ii) Flushed to remove any impurities/foreign bodies.
 - iii) Pressure tested to 1000kPa for a minimum of 30 minutes, witnessed and certified by the Engineer.

Where pipes are chased into walls, it is imperative that all cleaning and pressure testing is completed and certified prior to covering.

Where pipes are chased into walls, they are to be wrapped with “Denso” tape.

On completion, bands of colour coding and directional arrows are to be fitted.

2.5.2. Isolation Valves

Lever ball valves, with brass or gunmetal bodies, stainless steel balls and nylon seats, are to be installed to isolate the various sections of the water reticulation, as indicated on the drawings.

Angled valves are required at every tap and toilet.

Ball-o-stop valves are required at every outlet, where angled valve is not appropriate.

2.5.3. Chasing into Walls

Where required, walls are to be chased 50mm deep by 30mm wide for the installation of water piping. All piping installed in the walls is to be wrapped with “Denso” tape. Walls are to be plastered and made good following the installation of the piping.

2.5.4. Pressure Testing

All piping reticulation shall be pressure tested after all the branches are connected and chased into the walls, before final connections are made. The pressure testing shall be conducted to ensure that there are no leaks in the reticulation.

All pipes are to be interlinked with no sections being isolated between the main incoming line and the final outlet. The piping is then to be pressurised to 10 bar (1000 kPa) using a mobile water compressor pump. A pressure gauge is to be fitted to the reticulation to monitor the pressure of the system. After a pressure of 10 bar is achieved, the pump is to be isolated from the system. The system is to maintain the pressure of 10 bar for a period of 30 minutes.

The entire pressure testing shall be witnessed and signed off by the Engineer.

Failure to do so indicates a leak in the system. In the instance where the pressure is not maintained, the reticulation shall be thoroughly inspected for the leak, the leak rectified, and the system retested to meet the 30 minutes requirement.

In the event of test failure, all rectification and subsequent tests shall be carried out at the contractor’s cost.

It is recommended that the testing be carried out before the walls are plastered over the piping which has been chased into the walls, as this will allow the leaks to be easily identified and rectified.

It is acceptable for the testing to be carried out in sections, however all sections must be tested, and these extra tests shall be at the contractor’s cost.

If outlets (taps) or a geyser has already been connected to the system, these shall be isolated prior to pressure testing.

2.6. Hot Water Supply

Supply and install 200ℓ close-coupled Direct solar hot water (as Kwikot Kwiksol or other approved) heaters in accordance with SANS 1307 and complies with:

- 2.6.1. 400kPa working pressure (tank and panels).
- 2.6.2. Inner cylinder fabricated from 2mm steel and lined with thermos-fused porcelain enamel.
- 2.6.3. Polyurethane insulation between inner and outer cylinders.
- 2.6.4. Galvanised steel, weatherproof, outer cylinders.
- 2.6.5. 2 x Aluminium sacrificial anodes.
- 2.6.6. IP54 rooftop electrical isolator.
- 2.6.7. Thermostat operated 2,0kW direct electric booster element. (Sensing water temperature from panels).
- 2.6.8. Each cylinder complete with:
 - Drain cock
 - Multi pressure control valve (400kPa)
 - 2 x vacuum breakers
 - Thermostatic mixing valve
 - 2 x air release valves
 - 15mm lever ball valve (to drain panels).
- 2.6.9. Roof mounting bracket and frame for 200ℓ solar water heater (as Kwikot SOL-BRCT-RM and Kwikot SOL-BRCT-200).
- 2.6.10. Roof fixings/penetrations are to be done under the direct supervision of the main contractor (who is to carry the roof guarantee).

The tank is to be complete with:

 - a) Cold water inlet, with non-return and isolating valves, at low level.
 - b) Hot water outlet, with isolating valve, at the highest point.
 - c) Supply and return connections to the heat pump.
 - d) 600kPa/95°C factory pre-set, lever-type combined temperature/pressure safety valve.
 - e) Vacuum breakers, expansion valves, pressure reducing valve, etc.

The cylinder is to be fitted with a manufacturer's plate giving working pressures, test pressure, date of manufacture, manufacturer's name and capacity etc.

2.7. Hydroboil

ZIP HydroBoil 5 litre instant boiling water unit with White Epoxy Powder Coated outer case, and a two-way tap, complete with twin-chamber technology. Unit to be installed in accordance with manufacturer's installation instruction manual and equipped with Zip GlobalPlus™ Water Filtration Kit.

2.8. Borehole Pump

Multi-stage borehole pump to 0.4m³/hr @ 165m dynamic head, at 134m below ground level. The pump to be made entirely of stainless steel. The pump motor to be a 1-phase motor with sand shield, liquid-lubricated bearings and pressure equalizing diaphragm. Pump is to be as per Grundfos SP1A-36 or other approved.

The pump is to be complete with all required connections to the control panel and piping to the elevated storage tank.

2.8.1. Borehole Pump Control Panel

The panel to have the following:

- i) Phase angle type relay to protect the borehole from running dry.
- ii) High and low level float switched installed in the elevated tank, including connections to the borehole pump.
- iii) IP55 enclosure.
- iv) Manual and auto running options.
- v) Operational indication lights, i.e., “High Level” lights for clarity of the operation of the pump and any faulty which may occur.

2.9. Transfer Pump

The existing transfer pump from the ground water JoJo tank the new elevated tank is to be replaced as part of these works. The pump is to meet the following specification:

40 lit/min @ 45m head, including all necessary connections and cabling.

The pump is to be complete with all required connections to the control panel and piping to the storage tanks.

2.9.1. Transfer Pump Control Panel

The panel to have the following:

- i) Connection to the two level float switches in the elevated tank, discussed above.
- ii) Low level float switch in the ground level JoJo tank to protect the transfer pump from running dry.
- iii) IP65 enclosure, mounted on elevated tank frame.

2.10. General

2.10.1. Air Conditioning: Qualifications of Tradesman

All air conditioning works are to be done by an authorised person who is registered with the South African Qualification and Certification Committee for Gas (SAQCC Gas), under the relevant category.

Valid proof of registration with SAQCC Gas shall be provided at the onset of the works.

2.10.2. Air Conditioning: Certificate of Conformity

In order to comply with the Pressure Equipment Regulations and Section 10 of the Occupational Health and Safety Act, a Certificate of Conformity (CoC) must be issued for the refrigeration works on the completion of the works.

Only an authorised person who is registered with the South African Qualification and Certification Committee for Gas (SAQCC Gas) may sign a CoC.

2.10.3. Plumbing: Qualifications of Tradesman

All hot water plumbing works are to be done by an authorised person who is registered with the Plumbing Industry Registration Board – PIRB, under the relevant category.

Valid proof of registration with the PIRB shall be provided at the onset of the works.

2.10.4. Plumbing: Certificate of Conformity

Upon completion of the works a plumbing certificate of compliance shall be issued to the relevant owner with five working days of the completion of the works.

A plumbing certificate of compliance will be issued for most plumbing work, including:

- a) Where the total value of work, including materials, labour and VAT, is more than R1500.00 (material costs must be included, regardless of whether the materials were supplied by another person)
- b) The installation, relocation or replacement of any Electric Water Heating System, regardless of the cost.
- c) For every separate installation on a site.
- d) The construction, installation or alteration of any above or below ground sanitary drain; regardless of the cost
- e) The installation, relocation or replacement of any Hot Water Solar Water Heating System.
- f) The installation, relocation or replacement of any Heat Pump Water Heating System.

Only a licensed plumber may issue the compliance certificate.

2.10.5. Electrical Connections

All equipment is to be provided with suitable electrical connections to a nearby isolator, provided by others.

2.10.6. Approval of Equipment

The contractor is to submit all technical information of the equipment to be installed for approval by the engineer prior to ordering/fabrication.

2.10.7. Shop Drawings

The contractor is to prepare the following detailed drawings for approval by the engineer prior to fabrication/ordering (as specified in Technical Specification clause **Error! Reference source not found.**):

- a) Electrical requirements
- b) Building works required
- c) Ducting layout
- d) Control system
- e) Refrigerant piping layout

These drawings are to include measuring on site and detailing equipment offered.

2.10.8. Operation and Maintenance Manuals

The contractor shall hand over, at the completion of the works, three (3) copies of the necessary operating and maintenance requirements for all plant and equipment supplied and installed by him. Each copy of the operating and maintenance manual shall be separately bound, in a plastic covered hard cover ring binder, indexed and shall be as specified in Technical Specification clause **Error! Reference source not found.** and contain the following data:

2.10.8.1. As Built Drawings

A complete set of full-size paper prints of the drawings of the entire installation reflecting as-built conditions (as specified in Technical Specification clause **Error! Reference source not found.**), shall be included in each copy of the manual. The set shall include:

- a) Electrical wiring diagrams indicating all cables sizes, current ratings, fuses, control units, both internal and external to the machine.
- b) Mechanical drawings and schematics showing all equipment, connections to the equipment and service runs installed by the contractor, and isolating valves, etc.
- c) Exploded views of all equipment showing each component part adequately identified and numbered.
- d) Electronic copies of the drawings (on CD) are to be handed over at first delivery.

2.10.8.2. Equipment Schedules

A complete schedule of all plant and equipment forming part of the works shall be included in the manual. The schedule shall include, but shall not be restricted to, the following data:

- a) equipment type and model
- b) equipment identity number/serial number
- c) working load/pressure
- d) date of manufacture, testing installation and commissioning
- e) country of manufacture
- f) manufactures name and contact address

2.10.8.3. Maintenance Requirements

The manufacturer's recommendation with regard to the routine servicing and maintenance of all equipment shall be included in the manual. This data shall include the recommended service interval and the estimated hours required for each type of service, for each item of equipment, together with a list of agents/contractors authorized to carry out service/maintenance.

2.10.8.4. Operating Instructions

A complete description of all-operating procedures and safety measures shall be included in the manual. A basic "Fault Finding Guide" shall also be included.

2.10.8.5. Staff Training Certificate

A certificate indicating the staff training details must be included in the manual. This should detail the training curriculum, the date, the trainer's name, ID number, company and position, the trainees' names, ID numbers and positions.

2.10.9. Testing and Commissioning

All equipment is to be tested and commissioned in accordance with the manufacturers' requirements. After each component has been tested/commissioned, the system is to be commissioned in the presence of the Client's representative, the results recorded for inclusion in the O&M Manuals.

2.10.10. Guarantee Period

All equipment is to be guaranteed for a period of 12 months after hand-over.

2.10.10.1. Maintenance During the Guarantee Period

The contractor is to allow for the maintenance of all equipment and installations included in this specification, for the full 12-month guarantee period. Notwithstanding the above, this is to include;

After 6 months, all equipment is to be serviced, all filters and oil replaced, and any repairs that may be required effected. A report, per service type, is to be submitted.

During the 12th month, all equipment is to be given a major service, which is to include the replacement of all consumables, belts, filters, oils and seals as well as any “touching-up” that may be required to hand the equipment over in “as-new” condition at Final Delivery.

Services are to comply with Technical Specification clause **Error! Reference source not found.**

2.10.11. **Spares on Site**

Running spares are to be left on site. These are to be replenished after use at the contractor’s next visit. First and Final Delivery will only be taken with a full complement of spares neatly stored in the applicable plantrooms. The contractor is to provide any brackets/shelves etc. that may be required to properly store these; i.e. spares left on the floor is not acceptable. In addition, labels detailing the type of spare/model/part No. etc. and number off are required.

2.10.12. **Logbooks**

Each system is to have a logbook, kept in the plantroom/maintenance manager’s office. These are to be A4 2-quire hardcover, feint and margin books per plantroom/equipment type. Where more than one type of equipment is in a plantroom, a book per service type shall be provided.

For groups of equipment (i.e.: fancoil air conditioning units, extraction fans, chilled water equipment, etc.) a single book, kept in the applicable office, will suffice.

These logbooks are to be completed by all staff at every visit/inspection/service or repair, and shall include:

- date
- running hours (if applicable)
- description of any work done/spares used
- any other relevant remarks
- the service man and company name (PRINTED)

2.10.13. **Plantroom Padlocks**

All mechanical plantrooms/equipment access doors etc. are to be provided with keyed alike 50mm brass padlocks (Viro HA1). A set of 5 keys, are to be handed over at First Delivery

2.10.14. **Site Dimensions**

Note that the dimensions shown on the drawings/listed in the bills of quantities are for tender purposes only, and that contractors are to verify all dimensions on site, and prepare fabrication drawings, for approval by the Engineer, prior to ordering/fabricating any equipment/components.