

ANNEXURE C1 - COSTING TEMPLATE**RFB013/21/22: SUPPLY AND INSTALLATION OF A COMPLETE SOLAR SYSTEM WITH PANELS AT SANDRINGHAM CAMPUS NHLS MODDERFONTEIN****BILL OF QUANTITIES : GRID-TIED, CARPORT SOLAR PV INSTALLATION COMMON ITEMS**

ITEM	DESCRIPTION	UNIT	QTY	RATE		TOTAL
				Material	Labour	
1	<u>METERING AND CONTROL</u>					
1	METER MUNICIPAL CONNECTION					
1.1	Bi-directional 6.6kV Bulk Meter, 3 phase, Demand and kWh					
	Schneider type EM3555 or similar, for monitoring import and export to POS, including 6.6kV VT and 400/200:1 CTs and ethernet communications					
1.1.1	i) Supply, deliver and installation	No	2			
1.1.2	ii) Commissioning	No	2			
2	CONTROLLERS					
2.1	Power plant controller to manage active/ reactive power, one per bulk intake point, export monitoring and control.	Item	2			
3	PERFORMANCE MONITORING SYSTEM					
3.1	Performance monitoring system for early detection of faults including communication to maintenance team.	Item	1			

4	MISCELLANEOUS					
4,1	All other items not included above to complete the installation					
	i) Supply, deliver and installation	No	1			
5	TESTING AND COMMISSIONING					
5.1	Testing and commissioning of installation and issue of Certificates					
	of Compliance	Sum	1			
6	WARRANTY AND MAINTENANCE					
6.1	Full warranty and maintenance of complete system for 5 years after Practical Completion including inspections, cleaning, on site replacement of faulty inverters, solar PV modules, etc. including cost of materials, labour, monthly reporting and overheads.	Months	60			
	SUB-TOTAL BoQ No. 1-4 COMMON ITEMS (Carried forward to Summary)					

PROJECT NAME : SUPPLY AND INSTALLATION OF A COMPLETE SOLAR SYSTEM WITH PANELS AT SANDRINGHAM CAMPUS NHLs MODDERFONTEIN

BILL OF QUANTITIES : GRID-TIED, CARPORT SOLAR PV INSTALLATION IT & HR SECTION 1

ITEM	DESCRIPTION	Unit	Qty	RATE		TOTAL
				Material	Labour	
	PRELIMINARY AND GENERAL					
	Refer to Conditions and Special Conditions of Contract. P&G Items shall be detailed in the Schedule below and the total amount shall be carried forward to the Summary to Bill of Quantities for each Section.					
1.	PRELIMINARY AND GENERAL ITEMS					
1.1	Site Establishment : (Fixed-charge and Value Related Items)					
1.1.1	Office	sum	1			
1.1.2	Office equipment	sum	1			
1.1.3	Store	sum	1			
1.1.4	Workshop	sum	1			
1.1.5	Other (Specify)	sum				
1.2	Administrative : (Time related items)					
1.2.1	Staff on Site	sum	1			
1.2.2	Supervisory Staff	sum	1			
1.2.3	Transport	sum	1			
1.2.4	Running cost eg. Telephone/ data, electricity, cleaning, services, printing & photocopy machines, stationery, etc.	sum	1			
1.2.5	Other (Specify)					
	Security (tenderer to allow for months as per his program)	month				
	Registration of personnel at ____ @ R150 / person	sum	N/A			

1.3	Items related to tender amount					
1.3.1	Insurance	sum	1			
1.3.2	Cost of Guarantee	sum	1			
1.3.3	Cost of Sureties	sum	1			
1.3.4	Financing of Retention	sum	1			
1.3.5	Financing of Contract Amount					
	i) Prior to Commencement of Construction	sum	1			
	ii) From Commencement of Construction	sum	1			
1.4	OHS Act Requirements					
	All conditions pertaining to the OHS Act,					
	including but not limited to the items listed below:					
1.4.1	Provision of a SAFETY plan	Item	1			
1.4.2	Provision of a medical aid kit on site	Item	1			
1.4.3	Appointment of an ACCREDITED safety person on site	sum	1			
1.4.4	Supply and provision of safety clothing to all workers on site	Sum	1			
1.4.5	"Adherence to and Compliance with" the OSH Act	Sum	1			
TOTAL PRELIMINARY & GENERAL (carried to IT & HR Section Summary)						

PROJECT NAME :SUPPLY AND INSTALLATION OF A COMPLETE SOLAR SYSTEM WITH PANELS AT SANDRINGHAM CAMPUS NHLs MODDERFONTEIN

BILL OF QUANTITIES : GRID-TIED, CARPORT SOLAR PV INSTALLATION IT & HR SECTION 1

ITEM	DESCRIPTION	UNIT	QTY	RATE		TOTAL
				Material	Labour	
2	<u>CABLE TRENCHES, CABLE SLEEVES & MARKERS</u>					
2.1	CABLE TRENCH EXCAVATION AND RESURFACING					
	Excavate in machine removable materials (hand or machine excavation) for trenches to widths and depths as indicated below, backfill and compact in 200mm layers to 90% MOD AASTHO, including reinstating road surface, dispose of surplus material for sleeves/ cables.					
2.1.1	1000mm deep x 600mm wide	m	238			
2.1.2	600mm deep x 600 mm wide	m	10			
2.1.3	600mm deep x 450mm wide	m	10			
2.1.4	Extra over for items 2.1.1 to 2.1.3 for excavation (provisional) in hard rock material (as defined in SANS 1200).					
2.1.5	Hand excavation for cross cuts, to expose services, excavation on top of or next to existing services	m ³	7			
2.1.6	Bedding and covering sand for cables	m ³	77			
2.1.7	Supply & Installation of Danger Tape	m	258			
2.2	CABLE SLEEVES					
	Cable sleeves with couplings and draw wire as specified					
2.2.1	160mm dia flexible BLACK sleeves, including draw wire couplings and bends (Kableflex, DN160)					
	i) Supply and delivery	m	12			
	ii) Installation	m	12			

2.2.2	110mm dia flexible BLACK sleeves, incl. draw wire (Kableflex, DN110)					
	i) Supply and delivery	m	516			
	ii) Installation	m	516			
2.3	DRILLING FOR AND INSTALLATION OF CABLE SLEEVES					
	Drilling below road surface complete with sleeve installed, all excavations for pit holes included, site visit by contractor compulsory to determine and clarify extent of work					
2.3.1	160mm dia, Nextube type (Kableflex, DN160)	m	10			
2.3.2	110mm dia, Nextube type (Kableflex, DN110)	m	10			
2.4	CABLE MARKERS					
2.4.1	Cable Markers	ea	5			
	TOTAL CABLE TRENCHES (carried to IT & HR Section Summary)					

PROJECT NAME :SUPPLY AND INSTALLATION OF A COMPLETE SOLAR SYSTEM WITH PANELS AT SANDRINGHAM CAMPUS NHLs MODDERFONTEIN

BILL OF QUANTITIES : GRID-TIED, CARPORT SOLAR PV INSTALLATION IT & HR SECTION 1

ITEM	DESCRIPTION	UNIT	QTY	RATE		TOTAL
				Material	Labour	
	PV PANELS, INVERTERS & CABLING					
3.1	PV PANELS					
3.1.1	Solar PV Panels					
	450W solar PV modules, minimum 12 year warranty					
	i) Supply, deliver and installation	No	372			
	ii) Commissioning	No	372			
3.2	INVERTER AND OPTIMISERS					
3.2.1	<u>OPTIMISERS</u>					
	950W Optimiser					
	i) Supply, deliver and installation	No	186			
	ii) Commissioning	No	186			
3.2.2	<u>INVERTER/S</u>					
	Three phase inverter (400V)					
	33,3kVAac Inverter or similar size, equipped with surge arrestors					
	i) Supply, deliver and installation	No	4			
	ii) Commissioning	No	4			
3.3	COMBINER/S					

3.3.1	Combiner Boxes as Required					
	Including surge arrestors					
	i) Supply, deliver and installation	Sum	1			
	ii) Commissioning	Sum	1			
3.4	DC CABLING					
3.4.1	DC cabling as per the design layout					
	i) Supply, deliver and installation	Sum	1			
	ii) Terminate	Sum	1			
3.5	AC CABLING					
3.5.1	AC cabling as per the design layout					
	i) Supply, deliver and installation	Sum	1			
	ii) Terminate	Sum	1			
3.6	COMMUNICATIONS CABLES					
3.6.1	Communications cabling and network equipment					
	i) Supply, deliver and installation	Sum	1			
	ii) Terminate	Sum	1			
	TOTAL PV PANELS, INVERTERS AND CABLES (carried to IT & HR Section					

PROJECT NAME : SUPPLY AND INSTALLATION OF A COMPLETE SOLAR SYSTEM WITH PANELS AT SANDRINGHAM CAMPUS NHLS MODDERFONTEIN

BILL OF QUANTITIES : GRID-TIED, CARPORT SOLAR PV INSTALLATION IT & HR SECTION 1

ITEM	DESCRIPTION	UNIT	QTY	RATE		TOTAL
				Material	Labour	
4	MOUNTING STRUCTURE FOR PV PANELS					
4.1	Carport mounting structure for mounting PV panels including foundations, rails, brackets, etc. and removal of existing structures. Structures to comply with SANS 10400-B and SANS 10160 for Johannesburg Wind Conditions 1:50 Year Design Wind Gust of 36m/s					
	i) Supply, deliver and installation	Sum	1			
	ii) Commissioning	Sum	1			
4.2	Lightning protection LPL 1 and earthing, including air- terminals, down-conductors and earth spikes, Dehn or similar approved	Sum	1			
4.3	Structural Engineer's Involvement					
	a) Inception	Item	1			
	b) Stage 1	Item	1			
	c) Stage 2	Item	1			
	d) Handing Over to Client / Contractor	Item	1			
	TOTAL MOUNTING STRUCTURES (carried to IT & HR Section Summary)					

PROJECT NAME : SUPPLY AND INSTALLATION OF A COMPLETE SOLAR SYSTEM WITH PANELS AT SANDRINGHAM CAMPUS NHLS MODDERFONTEIN

BILL OF QUANTITIES : GRID-TIED, CARPORT SOLAR PV INSTALLATION IT & HR SECTION 1

ITEM	DESCRIPTION	UNIT	QTY	RATE		TOTAL
				Material	Labour	
	AC PROTECTION AND METERING					
5.1	AC CIRCUIT BREAKERS					
	Circuit breakers installed in DBs or Minisubs. Fault current rating of breaker to suit transformer, 30kA at 1000kVA, 15kA at 500kVA.					
5.1.1	i) Supply, deliver and installation	Sum	1			
5.2	METERING EXISTING LOAD					
5.2.1	Honeywell Elster A1140	Item	1			
5.2.2	CTs 800:1 set of 3, class 0,5	Item	1			
5.2.3	Modem Kocos ME16.3 with GDSP sim card	Item	1			
5.2.4	Ethernet Connection	Item	1			
5.3	CONTROLLER					
5.3.1	Controller to manage alternative power source, i.e. existing diesel generator, including cabling, connections, interfacing, programming, etc.	Item	1			
5.4	MISCELLANEOUS					

	All other items not included above to complete the installation					
5.4.1	i) Supply, deliver and installation	No	1			
5.5	TESTING AND COMMISSIONING					
5.5.1	Testing and commissioning of installation and issue of Certificates of Compliance	Sum	1			
TOTAL AC PROTECTION AND METERING (carried to IT & HR Section						

PROJECT NAME : NHLS MODDERFONTEIN

BILL OF QUANTITIES : GRID-TIED, CARPORT SOLAR PV INSTALLATION IT & HR SECTION 1

ITEM	DESCRIPTION	UNIT	QTY	RATE		TOTAL
				Material	Labour	
6	UNINTERRUPTIBLE POWER SUPPLY					
	UPS FOR HR AND IT SECTION					
6.1	INVERTER					
6.1	Inverter 500kVA, 400V three phase					
6.2	BATTERY FOR UPS					
6.2.1	2 MWh Battery including container, battery management and charging, IP connection	Item	1			
6.3	LOAD MANAGEMENT					
6.3.1	Load management, battery charging and discharge to benefit from off-peak tariffs	Item	1			
6.4	CABLES AND CONNECTION	Item	1			
6.4.1	240mm ² x 4 core cables run 3 in parallel 800A	m	1			
6.4.2						
5.4	MISCELLANEOUS					
	All other items not included above to complete the					

	installation					
5.4.1	i) Supply, deliver and installation	No	1			
5.5	TESTING AND COMMISSIONING					
5.5.1	Testing and commissioning of installation and issue of Certificates of Compliance	Sum	1			
TOTAL AC PROTECTION AND METERING (carried to IT & HR Section						

PROJECT NAME : SUPPLY AND INSTALLATION OF A COMPLETE SOLAR SYSTEM WITH PANELS AT SANDRINGHAM CAMPUS NHLS MODDERFONTEIN NHLS MODDERFONTEIN

GRID-TIED, CARPORT SOLAR PV INSTALLATION IT & HR SECTION 1

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PROJECT NAME : SUPPLY AND INSTALLATION OF A COMPLETE SOLAR SYSTEM WITH PANELS AT SANDRINGHAM CAMPUS NHLs MODDERFONTEIN

BILL OF QUANTITIES : GRID-TIED, CARPORT SOLAR PV INSTALLATION SERUM SECTION 2

ITEM	DESCRIPTION	Unit	Qty	RATE		TOTAL
				Material	Labour	
	PRELIMINARY AND GENERAL					
	Refer to Conditions and Special Conditions of Contract. P&G Items shall be detailed in the Schedule below and the total amount shall be carried forward to the Summary to Bill of Quantities for each Section.					
1.	PRELIMINARY AND GENERAL ITEMS					
1.1	Site Establishment : (Fixed-charge and Value Related Items)					
1.1.1	Office	sum	1			
1.1.2	Office equipment	sum	1			
1.1.3	Store	sum	1			
1.1.4	Workshop	sum	1			
1.1.5	Other (Specify)	sum				
1.2	Administrative : (Time related items)					
1.2.1	Staff on Site	sum	1			
1.2.2	Supervisory Staff	sum	1			
1.2.3	Transport	sum	1			
1.2.4	Running cost eg. Telephone/ data, electricity, cleaning, services, printing & photocopy machines, stationery, etc.	sum	1			
1.2.5	Other (Specify)					
	Security (tenderer to allow for months as per his program)	month				
	Registration of personnel at ____ @ R150 / person	sum	N/A			

1.3	Items related to tender amount					
1.3.1	Insurance	sum	1			
1.3.2	Cost of Guarantee	sum	1			
1.3.3	Cost of Sureties	sum	1			
1.3.4	Financing of Retention	sum	1			
1.3.5	Financing of Contract Amount					
	i) Prior to Commencement of Construction	sum	1			
	ii) From Commencement of Construction	sum	1			
1.4	OHS Act Requirements					
	All conditions pertaining to the OHS Act,					
	including but not limited to the items listed below:					
1.4.1	Provision of a SAFETY plan	Item	1			
1.4.2	Provision of a medical aid kit on site	Item	1			
1.4.3	Appointment of an ACCREDITED safety person on site	sum	1			
1.4.4	Supply and provision of safety clothing to all workers on site	Sum	1			
1.4.5	"Adherence to and Compliance with" the OSH Act	Sum	1			
TOTAL PRELIMINARY & GENERAL (carried to SERUM Section Summary)						

PROJECT NAME : SUPPLY AND INSTALLATION OF A COMPLETE SOLAR SYSTEM WITH PANELS AT SANDRINGHAM CAMPUS NHLS MODDERFONTEIN

BILL OF QUANTITIES : GRID-TIED, CARPORT SOLAR PV INSTALLATION SERUM SECTION 2

ITEM	DESCRIPTION	UNIT	QTY	RATE		TOTAL
				Material	Labour	
2	<u>CABLE TRENCHES, CABLE SLEEVES & MARKERS</u>					
2.1	CABLE TRENCH EXCAVATION AND RESURFACING					
	Excavate in machine removable materials (hand or machine excavation) for trenches to widths and depths as indicated below, backfill and compact in 200mm layers to 90% MOD AASTHO, including reinstating road surface, dispose of surplus material for sleeves/ cables.					
2.1.1	1000mm deep x 600mm wide	m	161			
2.1.2	600mm deep x 600 mm wide	m	10			
2.1.3	600mm deep x 450mm wide	m	10			
2.1.4	Extra over for items 2.1.1 to 2.1.3 for excavation (provisional) in hard rock material (as defined in SANS 1200).					
2.1.5	Hand excavation for cross cuts, to expose services, excavation on top of or next to existing services	m ³	7			
2.1.6	Bedding and covering sand for cables	m ³	54			
2.1.7	Supply & Installation of Danger Tape	m	181			
2.2	CABLE SLEEVES					
	Cable sleeves with couplings and draw wire as specified					
2.2.1	160mm dia flexible BLACK sleeves, including draw wire couplings and bends (Kableflex, DN160)					
	i) Supply and delivery	m	12			
	ii) Installation	m	12			

2.2.2	110mm dia flexible BLACK sleeves, incl. draw wire (Kableflex, DN110)					
	i) Supply and delivery	m	362			
	ii) Installation	m	362			
2.3	DRILLING FOR AND INSTALLATION OF CABLE SLEEVES					
	Drilling below road surface complete with sleeve installed, all excavations for pit holes included, site visit by contractor compulsory to determine and clarify extent of work					
2.3.1	160mm dia, Nextube type (Kableflex, DN160)	m	10			
2.3.2	110mm dia, Nextube type (Kableflex, DN110)	m	10			
2.4	CABLE MARKERS					
2.4.1	Cable Markers	ea	5			
	TOTAL CABLE TRENCHES (carried to SERUM Section Summary)					

PROJECT NAME : SUPPLY AND INSTALLATION OF A COMPLETE SOLAR SYSTEM WITH PANELS AT SANDRINGHAM CAMPUS NHLs MODDERFONTEIN

BILL OF QUANTITIES : GRID-TIED, CARPORT SOLAR PV INSTALLATION SERUM SECTION 2

ITEM	DESCRIPTION	UNIT	QTY	RATE		TOTAL
				Material	Labour	
	PV PANELS, INVERTERS & CABLING					
3.1	PV PANELS					
3.1.1	Solar PV Panels					
	450W solar PV modules, minimum 12 year warranty					
	i) Supply, deliver and installation	No	676			
	ii) Commissioning	No	676			
3.2	INVERTER AND OPTIMISERS					
3.2.1	<u>OPTIMISERS</u>					
	950W Optimiser					
	i) Supply, deliver and installation	No	338			
	ii) Commissioning	No	338			
3.2.2	<u>INVERTER/S</u>					
	Three phase inverter (400V)					
	33,3kVAac Inverter or similar size, equipped with surge arrestors					
	i) Supply, deliver and installation	No	9			
	ii) Commissioning	No	9			
3.3	COMBINER/S					

3.3.1	Combiner Boxes as Required					
	Including surge arrestors					
	i) Supply, deliver and installation	Sum	1			
	ii) Commissioning	Sum	1			
3.4	DC CABLING					
3.4.1	DC cabling as per the design layout					
	i) Supply, deliver and installation	Sum	1			
	ii) Terminate	Sum	1			
3.5	AC CABLING					
3.5.1	AC cabling as per the design layout					
	i) Supply, deliver and installation	Sum	1			
	ii) Terminate	Sum	1			
3.6	COMMUNICATIONS CABLES					
3.6.1	Communications cabling and network equipment					
	i) Supply, deliver and installation	Sum	1			
	ii) Terminate	Sum	1			
TOTAL PV PANELS, INVERTERS AND CABLES (carried to SERUM Section						

PROJECT NAME : SUPPLY AND INSTALLATION OF A COMPLETE SOLAR SYSTEM WITH PANELS AT SANDRINGHAM CAMPUS NHLS MODDERFONTEIN

BILL OF QUANTITIES : GRID-TIED, CARPORT SOLAR PV INSTALLATION SERUM SECTION 2

ITEM	DESCRIPTION	UNIT	QTY	RATE		TOTAL
				Material	Labour	
4	MOUNTING STRUCTURE FOR PV PANELS					
4.1	Carport mounting structure for mounting PV panels including foundations, rails, brackets, etc. and removal of existing structures. Structures to comply with SANS 10400-B and SANS 10160 for Johannesburg Wind Conditions 1:50 Year Design Wind Gust of 36m/s					
	i) Supply, deliver and installation	Sum	1			
	ii) Commissioning	Sum	1			
4.2	Lightning protection LPL 1 and earthing, including air- terminals, down-conductors and earth spikes, Dehn or similar approved	Sum	1			
4.3	Structural Engineer's Involvement					
	a) Inception	Item	1			
	b) Stage 1	Item	1			
	c) Stage 2	Item	1			
	d) Handing Over to Client / Contractor	Item	1			
	TOTAL MOUNTING STRUCTURES (carried to SERUM Section Summary)					

PROJECT NAME : SUPPLY AND INSTALLATION OF A COMPLETE SOLAR SYSTEM WITH PANELS AT SANDRINGHAM CAMPUS NHLS MODDERFONTEIN

BILL OF QUANTITIES : GRID-TIED, CARPORT SOLAR PV INSTALLATION SERUM SECTION 2

ITEM	DESCRIPTION	UNIT	QTY	RATE		TOTAL
				Material	Labour	
	AC PROTECTION					
5.1	AC CIRCUIT BREAKERS					
	Circuit breakers installed in DBs or Minisubs. Fault current rating of breaker to suit transformer, 30kA at 1000kVA, 15kA at 500kVA.					
5.1.1	i) Supply, deliver and installation	Sum	1			
5.2	METERING EXISTING LOAD					
5.2.1	Honeywell Elster A1140	Item	2			
5.2.2	CTs 1 500:1 set of 3, class 0,5	Item	2			
5.2.3	Modem Kocos ME16.3 with GDSP sim card	Item	1			
5.2.4	Ethernet Connection	Item	1			
5.3	CONTROLLER					
5.3.1	Controller to manage alternative power source, i.e. existing diesel generator, including cabling, connections, interfacing, programming, etc.	Item	1			
5.4	MISCELLANEOUS					

	All other items not included above to complete the installation					
5.4.1	i) Supply, deliver and installation	No	1			
5.5	TESTING AND COMMISSIONING					
5.5.1	Testing and commissioning of installation and issue of Certificates of Compliance	Sum	1			
TOTAL AC PROTECTION (carried to SERUM Section Summary)						

PROJECT NAME : SUPPLY AND INSTALLATION OF A COMPLETE SOLAR SYSTEM WITH PANELS AT SANDRINGHAM CAMPUS NHLS MODDERFONTEIN

GRID-TIED, CARPORT SOLAR PV INSTALLATION SERUM SECTION 2

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	SERUM SECTION 2		
	CONTINGENCY AMOUNT : 10 % OF ABOVE		
	SUB-TOTAL		
	ADD VAT : 15% ON SUB-TOTAL		
	TOTAL CARRIED FORWARD TO BOQ SUMMARY PAGE		

PROJECT NAME : SUPPLY AND INSTALLATION OF A COMPLETE SOLAR SYSTEM WITH PANELS AT SANDRINGHAM CAMPUS NHLS MODDERFONTEIN

BILL OF QUANTITIES : GRID-TIED, CARPORT SOLAR PV INSTALLATION

HIV SECTION 3

ITEM	DESCRIPTION	Unit	Qty	RATE		TOTAL
				Material	Labour	
	PRELIMINARY AND GENERAL					
	Refer to Conditions and Special Conditions of Contract. P&G Items shall be detailed in the Schedule below and the total amount shall be carried forward to the Summary to Bill of Quantities for each Section.					
1.	PRELIMINARY AND GENERAL ITEMS					
1.1	Site Establishment : (Fixed-charge and Value Related Items)					
1.1.1	Office	sum	1			
1.1.2	Office equipment	sum	1			
1.1.3	Store	sum	1			
1.1.4	Workshop	sum	1			
1.1.5	Other (Specify)	sum				
1.2	Administrative : (Time related items)					
1.2.1	Staff on Site	sum	1			
1.2.2	Supervisory Staff	sum	1			
1.2.3	Transport	sum	1			
1.2.4	Running cost eg. Telephone/ data, electricity, cleaning, services, printing & photocopy machines, stationery, etc.	sum	1			
1.2.5	Other (Specify)					
	Security (tenderer to allow for months as per his program)	month				
	Registration of personnel at____@ R150 /	sum	N/A			

	person					
1.3	Items related to tender amount					
1.3.1	Insurance	sum	1			
1.3.2	Cost of Guarantee	sum	1			
1.3.3	Cost of Sureties	sum	1			
1.3.4	Financing of Retention	sum	1			
1.3.5	Financing of Contract Amount					
	i) Prior to Commencement of Construction	sum	1			
	ii) From Commencement of Construction	sum	1			
1.4	OHS Act Requirements					
	All conditions pertaining to the OHS Act,					
	including but not limited to the items listed below:					
1.4.1	Provision of a SAFETY plan	Item	1			
1.4.2	Provision of a medical aid kit on site	Item	1			
1.4.3	Appointment of an ACCREDITED safety person on site	sum	1			
1.4.4	Supply and provision of safety clothing to all workers on site	Sum	1			
1.4.5	"Adherence to and Compliance with" the OSH Act	Sum	1			
TOTAL PRELIMINARY & GENERAL (carried to HIV Section Summary)						

PROJECT NAME: SUPPLY AND INSTALLATION OF A COMPLETE SOLAR SYSTEM WITH PANELS AT SANDRINGHAM CAMPUS NHLS MODDERFONTEIN

BILL OF QUANTITIES : GRID-TIED, CARPORT SOLAR PV INSTALLATION

HIV SECTION 3

ITEM	DESCRIPTION	UNIT	QTY	RATE		TOTAL
				Material	Labour	
2	<u>CABLE TRENCHES, CABLE SLEEVES & MARKERS</u>					
2.1	CABLE TRENCH EXCAVATION AND RESURFACING					
	Excavate in machine removable materials (hand or machine excavation) for trenches to widths and depths as indicated below, backfill and compact in 200mm layers to 90% MOD AASTHO, including reinstating road surface, dispose of surplus material for sleeves/ cables.					
2.1.1	1000mm deep x 600mm wide	m	161			
2.1.2	600mm deep x 600 mm wide	m	10			
2.1.3	600mm deep x 450mm wide	m	10			
2.1.4	Extra over for items 2.1.1 to 2.1.3 for excavation (provisional) in hard rock material (as defined in SANS 1200).					
2.1.5	Hand excavation for cross cuts, to expose services, excavation on top of or next to existing services	m ³	7			
2.1.6	Bedding and covering sand for cables	m ³	54			
2.1.7	Supply & Installation of Danger Tape	m	181			
2.2	CABLE SLEEVES					
	Cable sleeves with couplings and draw wire as specified					
2.2.1	160mm dia flexible BLACK sleeves, including draw wire couplings and bends (Kableflex, DN160)					
	i) Supply and delivery	m	12			
	ii) Installation	m	12			

2.2.2	110mm dia flexible BLACK sleeves, incl. draw wire (Kableflex, DN110)					
	i) Supply and delivery	m	362			
	ii) Installation	m	362			
2.3	DRILLING FOR AND INSTALLATION OF CABLE SLEEVES					
	Drilling below road surface complete with sleeve installed, all excavations for pit holes included, site visit by contractor compulsory to determine and clarify extent of work					
2.3.1	160mm dia, Nextube type (Kableflex, DN160)	m	10			
2.3.2	110mm dia, Nextube type (Kableflex, DN110)	m	10			
2.4	CABLE MARKERS					
2.4.1	Cable Markers	ea	5			
	TOTAL CABLE TRENCHES (carried to HIV Section Summary)					

PROJECT NAME : SUPPLY AND INSTALLATION OF A COMPLETE SOLAR SYSTEM WITH PANELS AT SANDRINGHAM CAMPUS NHLS MODDERFONTEIN

BILL OF QUANTITIES : GRID-TIED, CARPORT SOLAR PV INSTALLATION

HIV SECTION 3

ITEM	DESCRIPTION	UNIT	QTY	RATE		TOTAL
				Material	Labour	
	PV PANELS, INVERTERS & CABLING					
3.1	PV PANELS					
3.1.1	Solar PV Panels					
	450W solar PV modules, minimum 12 year warranty					
	i) Supply, deliver and installation	No	1290			
	ii) Commissioning	No	1290			
3.2	INVERTER AND OPTIMISERS					
3.2.1	<u>OPTIMISERS</u>					
	950W Optimiser					
	i) Supply, deliver and installation	No	645			
	ii) Commissioning	No	645			
3.2.2	<u>INVERTER/S</u>					
	Three phase inverter (400V)					
	33,3kVAac Inverter or similar size, equipped with surge arrestors					
	i) Supply, deliver and installation	No	16			
	ii) Commissioning	No	16			

3.3	COMBINER/S					
3.3.1	Combiner Boxes as Required					
	Including surge arrestors					
	i) Supply, deliver and installation	Sum	1			
	ii) Commissioning	Sum	1			
3.4	DC CABLING					
3.4.1	DC cabling as per the design layout					
	i) Supply, deliver and installation	Sum	1			
	ii) Terminate	Sum	1			
3.5	AC CABLING					
3.5.1	AC cabling as per the design layout					
	i) Supply, deliver and installation	Sum	1			
	ii) Terminate	Sum	1			
3.6	COMMUNICATIONS CABLES					
3.6.1	Communications cabling and network equipment					
	i) Supply, deliver and installation	Sum	1			
	ii) Terminate	Sum	1			
	TOTAL PV PANELS, INVERTERS AND CABLES (carried to HIV Section					

PROJECT NAME : SUPPLY AND INSTALLATION OF A COMPLETE SOLAR SYSTEM WITH PANELS AT SANDRINGHAM CAMPUS NHLs MODDERFONTEIN

BILL OF QUANTITIES : GRID-TIED, CARPORT SOLAR PV INSTALLATION

HIV SECTION 3

ITEM	DESCRIPTION	UNIT	QTY	RATE		TOTAL
				Material	Labour	
4	MOUNTING STRUCTURE FOR PV PANELS					
4.1	Carport mounting structure for mounting PV panels including foundations, rails, brackets, etc. and removal of existing structures. Structures to comply with SANS 10400-B and SANS 10160 for Johannesburg Wind Conditions 1:50 Year Design Wind Gust of 36m/s					
	i) Supply, deliver and installation	Sum	1			
	ii) Commissioning	Sum	1			
4.2	Lightning protection LPL 1 and earthing, including air- terminals, down-conductors and earth spikes, Dehn or similar approved	Sum	1			
4.3	Structural Engineer's Involvement					
	a) Inception	Item	1			
	b) Stage 1	Item	1			
	c) Stage 2	Item	1			
	d) Handing Over to Client / Contractor	Item	1			
	TOTAL MOUNTING STRUCTURES (carried to HIV Section Summary)					

PROJECT NAME: SUPPLY AND INSTALLATION OF A COMPLETE SOLAR SYSTEM WITH PANELS AT SANDRINGHAM CAMPUS NHLS MODDERFONTEIN

BILL OF QUANTITIES : GRID-TIED, CARPORT SOLAR PV INSTALLATION

HIV SECTION 3

ITEM	DESCRIPTION	UNIT	QTY	RATE		TOTAL
				Material	Labour	
	AC PROTECTION					
5.1	AC CIRCUIT BREAKERS					
	Circuit breakers installed in DBs or Minisubs. Fault current rating of breaker to suit transformer, 30kA at 1000kVA, 15kA at 500kVA.					
5.1.1	i) Supply, deliver and installation	Sum	1			
5.2	METERING EXISTING LOAD					
5.2.1	Honeywell Elster A1140	Item	2			
5.2.2	CTs 1 500:1 set of 3, class 0,5	Item	2			
5.2.3	Modem Kocos ME16.3 with GDSP sim card	Item	1			
5.2.4	Ethernet Connection	Item	1			
5.3	CONTROLLER					
5.3.1	Controller to manage alternative power source, i.e. existing diesel generator, including cabling, connections, interfacing, programming, etc.	Item	1			

5.4	MISCELLANEOUS					
	All other items not included above to complete the installation					
5.4.1	i) Supply, deliver and installation	No	1			
5.5	TESTING AND COMMISSIONING					
5.5.1	Testing and commissioning of installation and issue of Certificates of Compliance	Sum	1			
TOTAL AC PROTECTION (carried to HIV Section Summary)						

PROJECT NAME: SUPPLY AND INSTALLATION OF A COMPLETE SOLAR SYSTEM WITH PANELS AT SANDRINGHAM CAMPUS NHLS MODDERFONTEIN NHLS MODDERFONTEIN

GRID-TIED, CARPORT SOLAR PV INSTALLATION HIV SECTION 3

[illegible]

	HIV SECTION 3		
	CONTINGENCY AMOUNT : 10 % OF ABOVE		
	SUB-TOTAL		
	ADD VAT : 15% ON SUB-TOTAL		
	TOTAL CARRIED FORWARD TO BOQ SUMMARY PAGE		

PROJECT NAME : SUPPLY AND INSTALLATION OF A COMPLETE SOLAR SYSTEM WITH PANELS AT SANDRINGHAM CAMPUS NHLS MODDERFONTEIN

BILL OF QUANTITIES : GRID-TIED, CARPORT SOLAR PV INSTALLATION

NICD SECTOIN 4

ITEM	DESCRIPTION	Unit	Qty	RATE		TOTAL
				Material	Labour	
	PRELIMINARY AND GENERAL					
	Refer to Conditions and Special Conditions of Contract. P&G Items shall be detailed in the Schedule below and the total amount shall be carried forward to the Summary to Bill of Quantities for each Section.					
1.	PRELIMINARY AND GENERAL ITEMS					
1.1	Site Establishment : (Fixed-charge and Value Related Items)					
1.1.1	Office	sum	1			
1.1.2	Office equipment	sum	1			
1.1.3	Store	sum	1			
1.1.4	Workshop	sum	1			
1.1.5	Other (Specify)	sum				
1.2	Administrative : (Time related items)					
1.2.1	Staff on Site	sum	1			
1.2.2	Supervisory Staff	sum	1			
1.2.3	Transport	sum	1			
1.2.4	Running cost eg. Telephone/ data, electricity, cleaning, services, printing & photocopy machines, stationery, etc.	sum	1			
1.2.5	Other (Specify)					
	Security (tenderer to allow for months as per his program)	month				
	Registration of personnel at____@ R150 /	sum	N/A			

	person					
1.3	Items related to tender amount					
1.3.1	Insurance	sum	1			
1.3.2	Cost of Guarantee	sum	1			
1.3.3	Cost of Sureties	sum	1			
1.3.4	Financing of Retention	sum	1			
1.3.5	Financing of Contract Amount					
	i) Prior to Commencement of Construction	sum	1			
	ii) From Commencement of Construction	sum	1			
1.4	OHS Act Requirements					
	All conditions pertaining to the OHS Act,					
	including but not limited to the items listed below:					
1.4.1	Provision of a SAFETY plan	Item	1			
1.4.2	Provision of a medical aid kit on site	Item	1			
1.4.3	Appointment of an ACCREDITED safety person on site	sum	1			
1.4.4	Supply and provision of safety clothing to all workers on site	Sum	1			
1.4.5	"Adherence to and Compliance with" the OSH Act	Sum	1			
TOTAL PRELIMINARY & GENERAL (carried to NICD Section Summary)						

PROJECT NAME: SUPPLY AND INSTALLATION OF A COMPLETE SOLAR SYSTEM WITH PANELS AT SANDRINGHAM CAMPUS NHLS MODDERFONTEIN NHLS MODDERFONTEIN

BILL OF QUANTITIES : GRID-TIED, CARPORT SOLAR PV INSTALLATION

NICD SECTOIN 4

ITEM	DESCRIPTION	UNIT	QTY	RATE		TOTAL
				Material	Labour	
2	<u>CABLE TRENCHES, CABLE SLEEVES & MARKERS</u>					
2.1	CABLE TRENCH EXCAVATION AND RESURFACING					
	Excavate in machine removable materials (hand or machine excavation) for trenches to widths and depths as indicated below, backfill and compact in 200mm layers to 90% MOD AASTHO, including reinstating road surface, dispose of surplus material for sleeves/ cables.					
2.1.1	1000mm deep x 600mm wide	m	161			
2.1.2	600mm deep x 600 mm wide	m	10			
2.1.3	600mm deep x 450mm wide	m	10			
2.1.4	Extra over for items 2.1.1 to 2.1.3 for excavation (provisional) in hard rock material (as defined in SANS 1200).					
2.1.5	Hand excavation for cross cuts, to expose services, excavation on top of or next to existing services	m ³	7			
2.1.6	Bedding and covering sand for cables	m ³	54			
2.1.7	Supply & Installation of Danger Tape	m	181			
2.2	CABLE SLEEVES					
	Cable sleeves with couplings and draw wire as specified					
2.2.1	160mm dia flexible BLACK sleeves, including draw wire couplings and bends (Kableflex, DN160)					
	i) Supply and delivery	m	12			
	ii) Installation	m	12			

2.2.2	110mm dia flexible BLACK sleeves, incl. draw wire (Kableflex, DN110)					
	i) Supply and delivery	m	362			
	ii) Installation	m	362			
2.3	DRILLING FOR AND INSTALLATION OF CABLE SLEEVES					
	Drilling below road surface complete with sleeve installed, all excavations for pit holes included, site visit by contractor compulsory to determine and clarify extent of work					
2.3.1	160mm dia, Nextube type (Kableflex, DN160)	m	10			
2.3.2	110mm dia, Nextube type (Kableflex, DN110)	m	10			
2.4	CABLE MARKERS					
2.4.1	Cable Markers	ea	5			
	TOTAL CABLE TRENCHES (carried to NICD Section Summary)					

PROJECT NAME :SUPPLY AND INSTALLATION OF A COMPLETE SOLAR SYSTEM WITH PANELS AT SANDRINGHAM CAMPUS NHLS MODDERFONTEIN

BILL OF QUANTITIES : GRID-TIED, CARPORT SOLAR PV INSTALLATION

NICD SECTOIN 4

ITEM	DESCRIPTION	UNIT	QTY	RATE		TOTAL
				Material	Labour	
	PV PANELS, INVERTERS & CABLING					
3.1	PV PANELS					
3.1.1	Solar PV Panels					
	450W solar PV modules, minimum 12 year warranty					
	i) Supply, deliver and installation	No	795			
	ii) Commissioning	No	795			
3.2	INVERTER AND OPTIMISERS					
3.2.1	<u>OPTIMISERS</u>					
	950W Optimiser					
	i) Supply, deliver and installation	No	398			
	ii) Commissioning	No	398			
3.2.2	<u>INVERTER/S</u>					
	Three phase inverter (400V)					
	33,3kVAac Inverter or similar size, equipped with surge arrestors					
	i) Supply, deliver and installation	No	9			
	ii) Commissioning	No	9			

3.3	COMBINER/S					
3.3.1	Combiner Boxes as Required					
	Including surge arrestors					
	i) Supply, deliver and installation	Sum	1			
	ii) Commissioning	Sum	1			
3.4	DC CABLING					
3.4.1	DC cabling as per the design layout					
	i) Supply, deliver and installation	Sum	1			
	ii) Terminate	Sum	1			
3.5	AC CABLING					
3.5.1	AC cabling as per the design layout					
	i) Supply, deliver and installation	Sum	1			
	ii) Terminate	Sum	1			
3.6	COMMUNICATIONS CABLES					
3.6.1	Communications cabling and network equipment					
	i) Supply, deliver and installation	Sum	1			
	ii) Terminate	Sum	1			
	TOTAL PV PANELS, INVERTERS AND CABLES (carried to NICD Section					

PROJECT NAME : SUPPLY AND INSTALLATION OF A COMPLETE SOLAR SYSTEM WITH PANELS AT SANDRINGHAM CAMPUS NHLs MODDERFONTEIN

BILL OF QUANTITIES : GRID-TIED, CARPORT SOLAR PV INSTALLATION

NICD SECTOIN 4

ITEM	DESCRIPTION	UNIT	QTY	RATE		TOTAL
				Material	Labour	
4	MOUNTING STRUCTURE FOR PV PANELS					
4.1	Carport mounting structure for mounting PV panels including foundations, rails, brackets, etc. and removal of existing structures. Structures to comply with SANS 10400-B and SANS 10160 for Johannesburg Wind Conditions 1:50 Year Design Wind Gust of 36m/s					
	i) Supply, deliver and installation	Sum	1			
	ii) Commissioning	Sum	1			
4.2	Lightning protection LPL 1 and earthing, including air- terminals, down-conductors and earth spikes, Dehn or similar approved	Sum	1			
4.3	Structural Engineer's Involvement					
	a) Inception	Item	1			
	b) Stage 1	Item	1			
	c) Stage 2	Item	1			
	d) Handing Over to Client / Contractor	Item	1			
	TOTAL MOUNTING STRUCTURES (carried to NICD Section Summary)					

PROJECT NAME : SUPPLY AND INSTALLATION OF A COMPLETE SOLAR SYSTEM WITH PANELS AT SANDRINGHAM CAMPUS NHLS MODDERFONTEIN

BILL OF QUANTITIES : GRID-TIED, CARPORT SOLAR PV INSTALLATION

NICD SECTOIN 4

ITEM	DESCRIPTION	UNIT	QTY	RATE		TOTAL
				Material	Labour	
	AC PROTECTION					
5.1	AC CIRCUIT BREAKERS					
	Circuit breakers installed in DBs or Minisubs. Fault current rating of breaker to suit transformer, 30kA at 1000kVA, 15kA at 500kVA.					
5.1.1	i) Supply, deliver and installation	Sum	1			
5.2	METERING EXISTING LOAD					
5.2.1	Honeywell Elster A1140	Item	2			
5.2.2	CTs 1 500:1 set of 3, class 0,5	Item	2			
5.2.3	Modem Kocos ME16.3 with GDSP sim card	Item	1			
5.2.4	Ethernet Connection	Item	1			
5.3	CONTROLLER					
5.3.1	Controller to manage alternative power source, i.e. existing diesel generator, including cabling, connections, interfacing, programming, etc.	Item	1			

5.4	MISCELLANEOUS					
	All other items not included above to complete the installation					
5.4.1	i) Supply, deliver and installation	No	1			
5.5	TESTING AND COMMISSIONING					
5.5.1	Testing and commissioning of installation and issue of Certificates of Compliance	Sum	1			
TOTAL AC PROTECTION (carried to NICD Section Summary)						

PROJECT NAME: SUPPLY AND INSTALLATION OF A COMPLETE SOLAR SYSTEM WITH PANELS AT SANDRINGHAM CAMPUS NHLS MODDERFONTEIN

GRID-TIED, CARPORT SOLAR PV INSTALLATION NICD SECTOIN 4

[illegible]

	NICD SECTOIN 4		
	CONTINGENCY AMOUNT : 10 % OF ABOVE		
	SUB-TOTAL		
	ADD VAT : 15% ON SUB-TOTAL		
	TOTAL CARRIED FORWARD TO BOQ SUMMARY PAGE		

PROJECT NAM: SUPPLY AND INSTALLATION OF A COMPLETE SOLAR SYSTEM WITH PANELS AT SANDRINGHAM CAMPUS NHLS MODDERFONTEIN

BILL OF QUANTITIES : GRID-TIED, CARPORT SOLAR PV INSTALLATION SUMMARY

[illegible]

	SUB-TOTAL A		
	CONTINGENCY AMOUNT : 10 % OF SUB-TOTAL A		
	SUB-TOTAL B		
	ADD VAT : 15% ON SUB-TOTAL B		
	TOTAL CARRIED FORWARD TO SUMMARY PAGE - MAIN TENDER DOCUMENT		

