

Replacement of Robinson Drydock Floating Caisson at Cape Town
ANNEXURE B

ITEM NO.	PAYMENT REF.	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
		<p>BILL OF QUANTITIES</p> <p>NOTES</p> <p>In accordance with the NEC3 contract, this is an Option B: Remeasurement priced contract with bill of quantities.</p> <p>The Employer provides the bill of quantities which is priced by the Contractor.</p> <p>The contract price is the sum of prices for all items in the bill which may include lump sums for certain items.</p> <p>When the work is done, if it is found by remeasurement that the estimated quantity is not correct, it is corrected and payment is made to the Contractor to reflect the actual work carried out.</p> <p>The monetary amounts that the Contractor fills in, in this document, shall be deemed to be algebraically accurate and fully inclusive of the following:</p> <p>Inductions, permitting, all SHERQ requirements as per the Employer's requirements, risk assessments by relevant authorities as determined by the Employer and Statutory Bodies, inspections and audits, planning, all Plant and Materials and Equipment required to undertake the complete scope of the works, access requirements for Plant and Materials and Equipment, certification of Equipment and vessels, fuels and lunbricants and any other consumables, demolition and disposal of existing materials and equipment, all diving work below water and on the water surface, underwater installation by diving, procurement, offloading, material and equipment handling, storage, fabrication, equipment and infrastructure refurbishment, testing, modification,s, welding, bolting, production, corrosion protection, rigging, trial fitting, marking, packing, transportation, mechanical and civi land strutural and electrical and control installations, electrical and control sytem hook-ups and wiring, punch listing, cold and hot commissioning, trial operation, handover and project management and any other requirements not specifically mentioned but required as per industry and engineering and construction legislation and requirements.</p>				

ITEM NO.	PAYMENT REF.	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
1	SANS 1200 A	<p><u>SECTION 1</u> <u>PRELIMINARY AND GENERAL</u></p> <p><u>BILL NO.1 : PRELIMINARIES</u></p> <p><u>PREAMBLES</u></p> <p><u>Fixed preliminary items</u> Fixed preliminary items will be valued and paid on a proven cost basis up to the total value</p> <p><u>Time related preliminary items</u> Time related preliminary items will be paid on the proportion of: Value of the price of work done to date per the Project Manager's assessment (excluding activities directly related to materials, escalation and compensation events) over the contract value excluding preliminaries costs</p> <p><u>FIXED-CHARGE ITEMS</u></p> <p>1.1 Contractual Requirements Sum 1</p> <p>1.2 Establishment of Facilities on the Site Sum 1</p> <p>1.3 All work to ensure compliance with the provisions of the OHS Act 85 of 1993 and Regulations R1010 as published in the Government Gazette on 19 July 2003. This item shall include all costs to provide a safety plan including the monitoring and auditing thereof and reporting thereon to the Engineer on a regular basis as well as any other costs associated herewith and not measured elsewhere (e.g. inductions etc) and complying with the Employer's site safety requirements. Sum 1</p> <p><u>Facilities for Engineer</u></p> <p>1.4 Furnished offices Sum 1</p> <p>1.5 Telephone Sum 1</p> <p>1.6 Nameboards Sum 1</p> <p><u>Facilities for Contractor</u></p> <p>1.7 Offices and Storage sheds Sum 1</p> <p>1.8 Workshops Sum 1</p> <p>1.9 Laboratories Sum 1</p> <p>1.10 Living accommodation Sum 1</p> <p>1.11 Ablution and latrine facilities Sum 1</p> <p>1.12 Tools and equipment Sum 1</p> <p>1.13 Water supplies, electric power and communications connections Sum 1</p> <p>1.14 Dealing with water Sum 1</p> <p>1.15 Access Sum 1</p> <p>1.16 Plant Sum 1</p> <p>1.17 Removal of Site Establishment Sum 1</p> <p>1.18 Other fixed charge obligations Sum 1</p>				
		Carried to Collection				R

SECTION NO. 1
PRELIMINARIES
SECTION SUMMARY

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ITEM No.	PAYMENT REF.	DESCRIPTION	UNIT	QTY	RATE	Amount
1		<u>SECTION 2</u>				
		<u>CAISSON STRUCTURE AND STEELWORK</u>				
		<u>BILL NO. 1 - CAISSON VENTILATION SYSTEM COMPLETE</u>				
		Ducts Material: Stainless Steel, Grade 316L to ASTM A240				
		Note: All equipment comprising the system is to be fabricated in accordance with the relevant fabrication drawings supplied 'free issue' to the Contractor by TNPA				
		Note: All equipment comprising the system shall be in accordance with the specifications and requirements as described in the Part C3 - Technical Specification and Scope of Work section of the Contract				
		1.1 300x150x3 - 316L Stainless Steel SA Duct	m	25		
		1.2 300x150x3 - 316L Stainless Steel RA Duct	m	25		
		1.3 300x150x3 - 316L Stainless Steel Special Piece	No.	2		
		1.4 50x50x3 316 L Stainless Steel Angle Iron Support	No.	50		
		1.5 500x200 Aluminium Supply Air Grill with OBD	No.	4		
		1.6 500x200 Aluminium Extract Air Grill with OBD	No.	4		
		1.7 830x430x270x3 316L Stainless Steel Vent Enclosure	No.	2		
		1.8 316L Stainless Steel Junction box	No.	2		
		1.9 316L Stainless Steel Air vents SA/EA	No.	4		
		1.10 680x300x215x3 316L Stainless Steel Junction Box Neck	No.	2		
		1.11 316l Stainless Steel inlineTube fan-Luft fans/ equally approved	No.	2		
		1.12 316l Stainless steel Sonex Silencer	No.	2		
		1.13 316L Stainless steel flanges	No.	8		
		1.14 316l Stainless Steel Transformation Pieces	No.	8		
		1.15 Rubber Mounts	No.	8		
		1.16 316l Stainless Steel inline fan & Silencer Special Supports	No.	12		
2		Craneage and Abnormal Load Transport	Sum	1		
3		Diving, Commissioning, Testing and Handover	Sum	1		
Carried to Collection						R

ITEM No.	PAYMENT REF.	DESCRIPTION	UNIT	QTY	RATE	Amount
2		<u>BILL NO. 2 - STEELWORK</u> Material: Mild Carbon Steel, Grade S355JR+AR to EN 10025-2 Note: All steelwork is to be fabricated in accordance with the relevant fabrication drawings supplied 'free issue' to the Contractor by TNPA Note: All steelwork shall be in accordance with the specifications and requirements as described in the Part C3 - Technical Specification and Scope of Work section of the Contract				
	2.1	Compartment formed between decks A-B complete including all internal steelwork, bulkheads, stringers, stiffeners, webs, deck plates, hull sheets, fixing and securing elements INCLUSIVE of B-deck deckplate	kg	317000		
	2.2	Compartment formed between deck B-C including all internal steelwork, bulkheads, stringers, stiffeners, webs, deck plates, hull sheets, fixing and securing elements BUT excluding B-deck deckplate	kg	145000		
	2.3	All caisson steel accesses, stairways complete including kickflats, landings, gratings and hand rails, trunks including internal and external stiffeners, entry and exit lockable hatches including all associated components, trunk support frames and brackets, bollards and fairleads, fixing and securing elements	kg	1600		
	2.4	Sealing face retaining steel formed structures and backing platework to fix and support sealing face assemblies, including all fixing and securing elements	kg	17500		
	2.5	Control Cabin complete including steelwork and cladding, all marine grade and sealable doors, windows, interior and exterior fittings, electrical installations and shopfittings as per the relevant drawings	Sum	1		
3		<u>STEELWORK FOR CAISSON ACCESSES</u> Material: Stainless Steel, Grade 316L to ASTM A240 Note: All steelwork is to be fabricated in accordance with the relevant fabrication drawings supplied 'free issue' to the Contractor by TNPA Note: All steelwork shall be in accordance with the specifications and requirements as described in the Part C3 - Technical Specification and Scope of Work section of the Contract				
	3.1	All stainless steel access stairways and landings including all handrails and stanchions, access ladders including all mounting brackets, fixing and securing elements	kg	3680		
		Carried to Collection				R

SECTION 2 SUMMARY
Bill No.1 & 2
CAISSON STRUCTURE AND STEELWORK

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ITEM No.	PAYMENT REF.	DESCRIPTION	UNIT	QTY	RATE	Amount
3		<u>SECTION 3</u> <u>BILGE SYSTEM</u> <u>BILL NO. 1 - BILGE PUMP</u> Note: The Bilge System is to be fabricated in accordance with the relevant fabrication drawings supplied 'free issue' to the Contractor by TNPA Note: All bilge system components shall be in accordance with the specifications and requirements as described in the Part C3 - Technical Specification and Scope of Work section of the Contract PIPING, PIPE FITTING AND FLANGES Material for piping, pipe fittings, flanges and bolt assemblies: Stainless Steel, Grade 316L to ASTM A240				
3.1						
	3,1,1	Piping - 300NB, Sch 40S	m	38		
	3,1,2	Piping - 250NB, Sch40S	m	88		
	3,1,3	Piping - 150NB, Sch40S	m	36		
	3,1,4	150NB, Slip-On Raise Face Flange, PN10, Table 16/3	No.	20		
	3,1,5	250NB, Slip-On Raise Face Flange, PN10, Table 16/3	No.	48		
	3,1,6	300NB, Slip-On Raise Face Flange, PN10, Table 16/3	No.	12		
	3,1,7	150NB, 45 Degree, long radius bend	No.	10		
	3,1,8	250NB, 45 Degree, long radius bend	No.	12		
	3,1,9	300NB, 45 Degree, long radius bend	No.	6		
	3,1,10	150NB, 90 Degree, long radius bend	No.	10		
	3,1,11	250NB, 90 Degree, long radius bend	No.	12		
	3,1,12	300NB, 90 Degree, long radius bend	No.	8		
	3,1,13	250x150NB Eccentric Reducer, Schedule 40S	No.	5		
	3,1,14	200x150NB Eccentric Reducer, Schedule 40S	No.	6		
3.2		VALVES Type: a) Globe valve, non-rising spindle b) Wafer, Non-return, swing disk type Globe Valve - Material of Construction: Body and Stem: Zinc-free naval bronze Trim: 316 Stainless Steel, rubber lined Non-return Valve - Material of Construction: Body and Trim: 316 Stainless Steel, resilient seal Rating: PN10 Method of Actuation - Globe Valves: Multi-turn electric actuator, with basic control unit for OPEN, STOP and CLOSE input functionality and minimum six outputs				
		Carried to Collection				R

ITEM No.	PAYMENT REF.	DESCRIPTION	UNIT	QTY	RATE	Amount
	3,2,1	500NB Globe Valve - BARTHEL PT No. 01-360 FLANGES ACC TO DIN, PN10, SPECIAL BRASS METALIC SEALING RG5, NAVAL BRONZE, C/W ONTRAC ON/OFF 220VAC ELECTRIC MULTITURN ACTUATOR WITH MANUAL OVER RIDE, FITTED AND TESTED C/W MODBUS/PROFIBUS COMPATIBLE CARD	No.	2		
	3,2,2	250NB Globe Valve - BARTHEL PT No. 01-360 FLANGES ACC TO DIN, PN10, SPECIAL BRASS METALIC SEALING RG5, NAVAL BRONZE, C/W ONTRAC MODULATING 220VAC ELECTRIC MULTITURN ACTUATOR WITH MANUAL OVER RIDE, FITTED AND TESTED C/W MODBUS/PROFIBUS COMPATIBLE CARD	No.	4		
	3,2,3	250NB Globe Valve - BARTHEL PT No. 01-360 FLANGES ACC TO DIN, PN10, SPECIAL BRASS METALIC SEALING RG5, NAVAL BRONZE, C/W ONTRAC ON/OFF 220VAC ELECTRIC MULTITURN ACTUATOR WITH MANUAL OVER RIDE, FITTED AND TESTED C/W MODBUS/PROFIBUS COMPATIBLE CARD	No.	34		
	3,2,4	250NB Non-Return Valve	No.	2		
		BILGE PUMP				
		Type:				
3,3,1	3,3,1	Bilge Pump	No.	2		
		MUD BOXES				
		Type:				
		a) Quick release, removable basket				
		Material of Construction:				
3.4	3.4	Mud Box: Zinc-free naval bronze				
		Basket: 316L Stainless Steel				
		Basket Appertures: 8mm x 8mm				
		Rating: PN10				
3,4,1	3,4,1	250NB Mud boxes	No.	4		
4	4	ZINC ANODES				
4.1	4.1	Supply and Installation of zinc anodes conforming to TNPA specification	kg	5 000		
Carried to Collection						R

ITEM No.	PAYMENT REF.	DESCRIPTION	UNIT	QTY	RATE	Amount
5		<p><u>BILL NO. 2 : CAISSON GREENHEART TIMBER SEALING FACES</u></p> <p>Material: Greenheart Timber, Insertion rubber sealing strips and bitumen epoxy with hessian layers to seal gap between wood and steel retaining structure</p> <p>Note: All wood sections and steelwork is to be fabricated in accordance with the relevant fabrication drawings supplied 'free issue' to the Contractor by TNPA</p> <p>Note: All wood installations shall be in accordance with the specifications and requirements as described in the Part C3 - Technical Specification and Scope of Work section of the Contract</p> <p>Material for vents, piping, pipe fittings, flanges and bolt assemblies: Stainless Steel, Grade 316L to ASTM A240</p> <p>Note: All vents and associated piping is to be fabricated in accordance with the relevant fabrication drawings supplied 'free issue' to the Contractor by TNPA</p> <p>Note: All vents and associated piping shall be in accordance with the specifications and requirements as described in the Part C3 - Technical Specification and Scope of Work section of the Contract</p> <p>Greenheart timber; supplied to final required shape and drilled and machined with all fitment ancillaries as required to ensure high quality, leak free seal arrangement including rubber gaskets and fixing and securing elements</p>	m ³	63		
6		<p>ALL VENTS AND VENT PIPING, PIPE FITTING AND FLANGES</p> <p>Supply and Installation of all caisson Wintel type unidirectional vents, vent piping, breather piping, sounding piping and any other piping not specifically mentioned including all pipe fittings, primary and secondary supports, flanges and fixing and securing elements. Note, piping included under this line does not fall part of the Bilge System piping</p>	kg	5 000		
7		<p>CORROSION PROTECTION OF ALL GR 355JR+AR MILD STEEL COMPRISING THE CAISSON AND ANCILLARIES</p> <p>To all Gr 355JR+AR mild steel surfaces, a 5year supplier guaranteed, AIA and Engineer approved marine grade, primer, intermediate and final coat corrosion protection system and grit/water blasting and high pressure washing and cleaning conforming to TNPA approved specifications and the specification included in the Part C3 Technical Specification</p>	m ²	9 000		
		Carried to Collection				R

SECTION 3 SUMMARY
Bill No.1 & 2
BILGE SYSTEM

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ITEM No.	PAYMENT REF.	DESCRIPTION	UNIT	QTY	RATE	Amount
8		<u>BILL SECTION 4</u>				
		<u>ELECTRICAL INSTALLATIONS</u>				
		<u>BILL NO. 1 - EXCAVATIONS</u>				
		For LV streetlight cables, feeding cables from Caisson and pole floodlight to respective distribtuion boards, MCC and kiosk as per the drawing.				
		Trenching shall be calculated using the formula below: (0.7m deep * 0.5m wide * length)				
	8.1	Cut and Excavate in concrete and hard soil, backfilling and compaction to 97% MOD AASHTO	m3	77		
	8.2	Re-instate excavated tar and/or concrete to match existing. Rates to allow for all required materials and labour.	m3	77		
	8.3	Handling of material	sum	1		
	8.4	Earthing : Supply, deliver and install complete manufacturer standard system consisting of 8 x 1.2m earth spikes, installed under foundation and connected to foundation bolts via 95mm2 copper conductor with stainless steel clamps	No.	8		
	8.5	Earthing and Bonding of all electrically connected Equipment and cable racking and supports including earthing of the main Caisson structure as per Spec & regulations.	sum	1		
9		LOW VOLTAGE INSTALLATION				
		DISCONNECTION/ REMOVAL OF REDUNDANT ELECTRICAL EQUIPMENT				
	9.1	The following equipment shall be isolated, disconnected, removed and handed over to the Employer:				
	9.1.1	Decommissioning of existing isolators to the caisson, cabling to caisson and streetlights, cables inside the caisson and existing electrical installations in the caisson.	sum	1		
	9.1.2	Reclaim existing streetlight / floodlight poles including mounted fittings. Streetlight fitting to be delivered to TNPA.	sum	1		
	9.2	LV SWITCHGEAR				
		MCCs, DBs and LV Switchgear				
		Manufacture, deliver to site, install, commission, test kiosks, distribution boards motor control centre and tuning of 400 volt AC motor starters as per specification and single line diagram, to be housed in new MCC Enclosure. Rates to include for stainless steel Gr316L and powder coated, busbars and drilling, busbar connections internal wiring etc for all electrical panels. Refer to attached single line diagram. Colour shall be Electric Orange with red plate for MCC, DBs and Kiosk colour to be confirmed on site				
		Carried to Collection				R

ITEM No.	PAYMENT REF.	DESCRIPTION	UNIT	QTY	RATE	Amount
	9.2.1	MCC 1	No.	1		
	9.2.2	DB - 1	No.	1		
	9.2.3	DB - A	No.	1		
	9.2.4	Kiosk 1	No.	1		
	9.2.5	Kiosk 2-Caisson	No.	1		
	9.2.6	Kiosk 3-Caisson	No.	1		
	9.3	CABLES				
		Supply, deliver to site cables and conductors as specified. Install, rack, strap and testing of cables as per specification including clamps, ties and cable numbering system. Contractor to confirm & measure required cable prior to place an order				
	9.3.1	1.5 mm² 3c 600/1000V LKSM-HF flex copper Cable	m	100		
	9.3.2	2.5 mm² 3c 600/1000V LKSM-HF flex copper Cable	m	250		
	9.3.3	2.5 mm² 4c 600/1000V LKSM-HF flex copper Cable	m	160		
	9.3.4	2.5 mm² 5c 600/1000V LKSM-HF flex copper Cable	m	2 900		
	9.3.5	4,0 mm² 3c 600/1000V LKSM-HF flex copper Cable	m	200		
	9.3.6	10 mm² 4c 600/1000V LKSM-HF flex copper Cable	m	160		
	9.3.7	16 mm² 5c 600/1000V LKSM-HF flex copper Cable	m	200		
	9.3.8	95mm² 4c 600/1000V LKSM-HF flex copper Cable	m	50		
	9.3.9	120 mm² 4c 600/1000V HO7RN-F flex rubber copper Cable	m	210		
	9.3.10	10 mm² 1c 600/1000V LKSM-HF flex insulated earth copper conductor	m	100		
	9.3.11	95 mm² 1c 600/1000V LKSM-HF flex insulated earth copper conductor	m	210		
	9.3.12	10mm² 2c 600/1000V PVC/SWA/PVC ECC Cu Cable	m	100		
	9.3.13	16mm² 4c 600/1000V PVC/SWA/PVC ECC Cu Cable	m	200		
	9.3.14	150mm² 4c 600/1000V XLPE PVC/SWA/PVC ECC Cu Cable	m	60		
	9.3.15	2,5mm² 2c 600/1000V PVC/SWA/PVC ECC Cu Cable	m	100		
	9.3.16	95 mm² 1c 600/1000V HO7RN-F flex rubber copper insulated earth copper conductor	m	360		
		Carried to Collection				R

ITEM No.	PAYMENT REF.	DESCRIPTION	UNIT	QTY	RATE	Amount
	9.4	CABLE TERMINATIONS Termination of cables shall include supply installation and testing of the IP66 glands with corrosion guard , making-off the cable, lugs, and fitting the gland to the board gland plate, switchgear or equipment and final connection of cable tails into board or terminals. Include for Reducing Glands and shrouds where applicable. NB: IP66 Glands are to be used				
	9.4.1	1.5 mm² 3c 600/1000V LKSM-HF flex copper Cable	No.	16		
	9.4.2	2.5 mm² 3c 600/1000V LKSM-HF flex copper Cable	No.	70		
	9.4.3	2.5 mm² 4c 600/1000V LKSM-HF flex copper Cable	No.	6		
	9.4.4	2.5 mm² 5c 600/1000V LKSM-HF flex copper Cable	No.	100		
	9.4.5	4,0 mm² 3c 600/1000V LKSM-HF flex copper Cable	No.	8		
	9.4.6	10 mm² 4c 600/1000V LKSM-HF flex copper Cable	No.	8		
	9.4.7	16 mm² 4c 600/1000V LKSM-HF flex copper Cable	No.	4		
	9.4.8	95 mm² 4c 600/1000V LKSM-HF flex copper Cable	No.	1		
	9.4.9	120 mm² 4c 600/1000V LKSM-HF flex copper Cable	No.	2		
	9.4.10	2,5mm² 2c 600/1000V PVC/SWA/PVC ECC Cu Cable	No.	16		
	9.4.11	16 mm² 4c 600/1000V PVC/SWA/PVC ECC Cu Cable	No.	4		
	9.4.12	150 mm² 4c 600/1000V XLPE PVC/SWA/PVC ECC Cu Cable	No.	8		
		CABLE TRAY, LADDER, TRUNKING, CONDUIT AND ACCESSORIES				
	9.5	Supply, deliver to site unpainted stainless steel Gr316L heavy duty cable tray, heavy duty cable ladder, inclusive of all items required to install in accordance with manufacturers specification. Supply, deliver and Install stainless steel Gr316L heavy duty all items such as brackets, rawl bolts, splices, bonding straps etc. required to install in accordance with manufacturers specification. NB: all additional HDG steel supports to be included in the rates.				
	9.5.1	300mm wide ladder - Cable ladder	m	310		
	9.5.2	Cable ladder bends (32), tee ways (10), 4-way(26) and accessories	sum	1		
	9.5.3	Supply and install HDG angle iron including mounting clamps for cable droppers as specified. 40mm x 40mm x 5mm.	sum	1		
	9.5.4	300mm wide tray - Cable tray	m	100		
	9.5.5	Cable tray bends (16), tee ways (6), 4-way(12) and accessories	sum	1		
	9.5.6	Supply and install HDG angle iron bends including mounting clamps for cable droppers as specified. 40mm x 40mm x 5mm.	sum	1		
		Carried to Collection				R

ITEM No.	PAYMENT REF.	DESCRIPTION	UNIT	QTY	RATE	Amount
10		CABLE BOXES				
		Supply, deliver to site, store and install IP66 Cable Boxes for light fitting cables inclusive of terminals etc as specified. Rates to include Termination glands & terminations. complete with necessary required accessories for a complete installation				
	9.5.7	Cable Box 3-way box IP66	No.	18		
	9.5.8	Cable Box 4-way box IP66	No.	10		
		LUMINAIRES AND SMALL POWER / CONTROL DEVICES				
		Supply, deliver, accept and store the following luminaires, complete with lamps and control gear as per specification.				
	10.1	Type A6 - 46W LED, IP65 Surface mounted luminaire with marine grade die-cast aluminium body complete with 1 hour backup battery as per specification	No.	5		
	10.2	Type B - Bulkhead 20W LED, IP65 with black base and opal diffuse with 1 hour backup battery as per specification	No.	3		
	10.3	Type C - Floodlight LED 75W OPTIC 1700 complete mounting brackets with marine grade body and with 1 hour backup battery as per specification	No.	22		
	10.4	Type D - Decorative streetlight 75W LED luminaire Neutral white (4000K)	No.	4		
	10.5	Type F - Floodlight LED 55W, IP66 with marine grade, OPTIC 5422 complete with mounting brackets and with 1 hour backup battery as per specification	No.	4		
	10.6	Supply, deliver and installation of 10 meter hot deep galvanised poles. Rates to include mounting brackets for the floodlight and base plates for 3 poles	No.	4		
	10.7	Supply, deliver and installation of 400V, 250A, 5-pin IP67 rated Isolator with rotary switch, complete with all necessary accessories. Supply both female and male sections. Refer to the drawing for detailed specification	No.	2		
	10.8	Photo electric cell as per specification IP66 suitable for marine application	No.	4		
	10.9	Supply and installation of 15Amp, 1 lever, 1-way, white coloured, light circuit switch with red toggle complete with cover and all accessories	No.	10		
	10.10	Supply and installation of 15Amp, 1 lever, 2-way, white coloured, light circuit switch red toggle complete with cover and all accessories	No.	6		
	10.11	Supply and install 16A, 3pin, 230V Double Switched Socket Outlets, white coloured with red toggle and a weather-proof box IP65	No.	4		
	10.12	Supply, deliver and installation of 400V, 32A, 3-pole IP66 rated Isolator, white coloured, complete with all necessary accessories	No.	4		
		Carried to Collection				R

ITEM No.	PAYMENT REF.	DESCRIPTION	UNIT	QTY	RATE	Amount
11	10.13	Supply and installation of 63-Amp, 5 Pin, 400V Industrial IP66 / IP67 Welding Socket Outlet, powder coated to electric orange coloured, complete with all necessary accessories	No.	2		
	10.14	Field Control Station - Supply, deliver to site and install IP68 rated stop start station with all necessary controls for the motor pump linked with MCC. Refer to the detailed drawing for specification	No.	2		
	10.15	Galvanised Pedestals / Poles structure. Supply and install of HDG Pedestals as per detailed specification and drawing.	No.	3		
	10.16	Supply, deliver and installation of 2-tier PVC power skirting grey in colour, complete with all necessary accessories	m	21		
		SUNDRIES				
	11.1	LV reticulation - Preparation of 'As-Built' drawings and manuals as per this specification.	No.	1		
	11.2	Supply of hard bound spiral folders containing commissioning / COC certificates, test results & operating & maintenance manuals for the LV equipment, cabling, light fittings, etc.	No.	3		
	11.3	Labelling of light switches, sockets and isolators outlets as per drawing pop riveted to cover plate.	sum	1		
	11.4	Signs, Labels & Equipment Tags Supply and install all power, lighting, motors and earthing signs, labels and equipment tags as specified and in accordance with all Statutory requirements.	sum	1		
	11.5	EARTH BAR - A 500 mm x 20mm x4mm copper earth bar with 10 No. 6 mm diameter holes pre-drilled, surface fixed on insulators	No.	4		
12		SLEEVES				
		Supply and install the following underground flexible conduits in concrete slab, ground, chased through brick walls. All material to be SABS approved as suitable for cable installation. Must be black in colour. Must have 1,5mm draw wire.				
	12.1	110mm UPVC Flexible sleeves	m	200		
	12.2	75mm UPVC Flexible sleeves	m	50		
	12.3	Danger tape	m	200		
13	12.4	1,5mm draw wire	m	100		
		TEST AND COMMISSIONING				
		Test and commission the complete electrical installation including completion of quality checksheets, Cold and Hot Commissioning, Compliance Certificates & test results and submitting them to the Employer's Representative.				
	13.1	Test and commission the complete electrical installation including Cold and Hot Commissioning, Certificates of Compliance & test results to the Engineer.	Item	1		
		Carried to Collection				R

ITEM No.	PAYMENT REF.	DESCRIPTION	UNIT	QTY	RATE	Amount
14		GENERATOR SET				
		Manufacture, deliver to site, install, test and commission of a generator set 400 volts at 50Hz as per specification and single line diagram. The generator shall be enclosed or containerised on a stainless steel Gr316L. Rates to include for Gr316L steelwork and powder coated, busbars and drilling, busbar connections internal wiring, earthing for the generator set, etc. Refer to attached single line diagram.				
	14.1	160kVA, 400V containerised Diesel Generator 3 phase, 50Hz as specified.	No.	1		
	14.2	Investigate, design and construct / build a concrete plint for a generator set (Generator size in kVA specified on the document) of this document of complete with sleeves for feeding and exit cables. Position of the proposed generator as shown on the drawing. The concrete plint may be bigger by 300mm in length and width of the generator set and must be higher by a minimum of 100mm from the ground. Rates shall include all necessary duties prior to built the concrete and test result that are required.	sum	1		
	14.3	Stainless steel Metal claddd thermal insulation of exhaust pipe and silencer within the enclosure.	sum	1		
	14.4	Duvalco Water Trap/Fuel Filter cartridge	No.	1		
	14.5	New AMF panel - for Essentail and Non - Essential electrical board	No.	1		
	14.6	New Fuel Tank of 500l to supply generator with valves and instruments elivated stand	sum	1		
		Electrical reticulation				
	14.7	Interconnecting control & power cabling between genset and alternator and AMF panel	sum	1		
	14.8	Support & protection of exposed cabling between genset & AMF panel	sum	1		
	14.9	Electronic hooter & red flashing general alarm light mounted on the AMF panel.	No.	1		
	14.10	Remote alarm indicator panel complete the red indicator lamp and label - GENERATOR FAULT	sum	1		
	14.11	External emergency stop push button and cabling	sum	1		
	14.12	Earthing of the generator set and earthing system with minimum earthing spike / earthing points of 4; and reach 1ohm or less. Minimum conductor of 95mm to be used.	sum	1		
		Commissioning				
	14.13	Test & commission on site with load	sum	1		
	14.14	Resistance testing of earth system	sum	1		
	14.15	Balancing of the essential loads	sum	1		
	14.16	Electrical Certification of Compliance	sum	1		
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SECTION 4 SUMMARY
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ELECTRICAL INSTALLATIONS

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ITEM No.	PAYMENT REF.	DESCRIPTION	UNIT	QTY	RATE	Amount
15		<u>SECTION 5</u>				
		<u>CONTROL SYSTEM INSTALLATIONS</u>				
		<u>BILL 1 - CONTROL SYSTEM INSTALLATIONS</u>				
		Caisson Water Tanks Level Transmitters				
	15.1	Supply six radar type flanged mounted level transmitters to be installed on the caisson water tanks tag numbers: LT-001, 002, 003, 004, 005, 006 (refer to Instrument specification No: 1002-007-CI-007).	No.	12		
	15.2	Install radar type flanged mounted level transmitters on the caisson water tanks tag numbers: LT-001, 002, 003, 004, 005, 006. Installation according to Instrumentation scope of work refer to document No: 1002-007-002 and Instrumentation installation standard document No: 1002-007-CI-004.	No.	12		
16		Caisson Heel and Trim Level Transmitters				
	16.1	Supply four hydrostatic type level transmitters to be installed on the caisson deck for heel and trim level monitoring, tag numbers: LT-065, 066, 067, 068 (refer to Instrument specification No: 1002-007-CI-007).	No.	8		
	16.2	Install four hydrostatic type level transmitters on good quality stainless steel brackets mounted on the caisson deck, tag numbers: LT-065, 066, 067, 068. Installation according to Instrumentation scope of work refer to document No: 1002-007-002 and Instrumentation installation standard document No: 1002-007-CI-004. Brackets to be custom/ designed by installation contractor, location and design to be approved by the site engineer.	No.	8		
17		Harbour and Dry Dock Water Level				
	17.1	Supply two hydrostatic type level transmitters with 100m signal cable to be installed on the harbour and the dry dock edge for water level monitoring, tag numbers: LT-007, 008 (refer to Instrument specification No: 1002-007-CI-007).	No.	2		
	17.2	Install two hydrostatic type level transmitters on the harbour and dry dock edge, transmitters cables (100m) supplied with each instrument to be field run in buried conduits and connected to the Dock control room PLC cabinet I/O card , tag numbers: LT-007, 008. Installation according to Instrumentation scope of work refer to document No: 1002-007-002 and Instrumentation installation standard document No: 1002-007-CI-004.	No.	2		
18		<u>Caisson Flooding Detection Level Switch</u>				
	18.1	Supply one vibrating type level switch with 1,5m extension tube to be installed at the caisson lower level to detect possible flooding. Switch tag number LS-042 (refer to Instrument specification No: 1002-007-CI-007).	No.	1		
	18.2	Install one level switch tag No: LS-042 at a suitable location in the caisson lowest area. Installation according to Instrumentation scope of work refer to document No: 1002-007-002 and Instrumentation installation standard document No: 1002-007-CI-004.	No.	1		
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ITEM No.	PAYMENT REF.	DESCRIPTION	UNIT	QTY	RATE	Amount
19		<u>Caisson Pumps Flow Switches</u>				
	19.1	Supply two calorimetric type flow switches to be installed in the pump discharge piping. Swiches tag number FS-063, FS 064 (refer to Instrument specification No: 1002-007-CI-007).	No.	2		
	19.2	Install two flow switches Tag No:FS-063, FS-064 in the caisson pumps discharge piping. The G 1/2" pipe fitting is to be installed by the piping contractor. Installation according to Instrumentation scope of work refer to document No: 1002-007-002 and Instrumentation installation standard document No: 1002-007-CI-004.	No.	2		
20		<u>Pumps Discharge Pressure Gauges</u>				
	20.1	Supply two pressure gauges to be installed in the pump discharge piping. Gauges tag number PI-048,PI- 049 (refer to Instrument specification No: 1002-007-CI-007).	No.	2		
	20.2	Install two pressure gauges Tag No:PI-048, PI-049 in the caisson pumps discharge piping. The 1/2" pipe fitting and isolation valve is to be installed by the piping contractor. Installation according to Instrumentation scope of work refer to document No: 1002-007-002 and Instrumentation installation standard document No: 1002-007-CI-004.	No.	2		
21		<u>Instrument Signal and control cables</u>				
	21.1	Supply Instrument signal 0.5 mm2 single pair, twisted and shielded with drain wire, armoured marine quality cable for 24VDC 4-20 mA signal.	m	300		
	21.2	Install instrument cable 0.5 mm2 single pair, twisted and shielded with drain wire, armoured marine quality cable for 24VDC 4-20 mA signal. Cable to be installed in conduits as per Loop drawings and Instrumentation scope of work refer to document No: 1002-007-002 and Instrumentation installation standard document No: 1002-007-CI-004.	m	300		
	21.3	Supply instrument control cable 1 mm2, 4 conductors , armoured marine quality cable for 24VDC/ 220 VAC digital signal.	m	350		
	21.4	Install instrument control cable 1 mm2, 4 conductors , armoured marine quality cable for 24VDC/ 220 VAC digital signal. Cable to be installed in conduits as per Loop drawings and Instrumentation scope of work refer to document No: 1002-007-002 and Instrumentation installation standard document No: 1002-007-CI-004.	m	350		
	21.5	Supply industrial ethernet cable Cat.5 / 100 Mbit with FRNC outer sheath material, cable to be certified for marine application and CG, DNV approved.	m	100		
	21.6	Install and connect Ethernet cable for 40 control valves, from PLC Modbus communication module. Cable to be installed in conduits as per scope of work , refer to document No: 1002-007-002 and Instrumentation installation standard document No: 1002-007-CI-004.	m	100		
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ITEM No.	PAYMENT REF.	DESCRIPTION	UNIT	QTY	RATE	Amount
22	22.1	<p><u>PLC and Operator stations</u></p> <p>Supply PLC equipment for the caisson as one PLC I/O cabinet 2200X800X350mm complete with 12 slot backplane a high power Ac power supply, a CPU Modbus ethernet type and a Modbus communication module to accomodate 40 electrically driven control valves, 1X 24 VDC Digital 32 inputs and 1X 32 Digital outputs card rated at 24 VDC, 3 X Analog input cards 12 bits 8 points with isolated inputs, one Color touch panel (HMI), one universal power supply 24 V 10 A one Ethernet radio communication module and radio equipment c/w antenas and switch. Supply PLC equipment for the dock control room as above with only one analogue input card rated 24 VDC to accomodate the dock and harbour level measurements this station shall be supplied with operator station PC and monitor for overall monitoring of the caisson operation. Both PLC stations to be supplied with suitable UPS for a minimum of 30 minutes back up power. Tha PLC supplier shall include the Scada and control software , software engineering, PLC engineering, Scada engineering, drawing and documentation as well as caisson HMI engineering, testing ,and commissioning.Manufacturing if the PLC cabinets shall be according to the specifiation: 1002-007-CI-003. Software design according to The Functional description document No: 1002-007CI-001.</p>	Sum	1		
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SECTION 5 SUMMARY

Bill No.1

CONTROL SYSTEM INSTALLATIONS

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