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**NATIONAL WATER CONSERVATION AND PIPELINE CORPORATION**  
**CONTRACT NO. NWC/RT/010/2017-2018**  
**BILL OF QUANTITIES**  
**GRAND SUMMARY**

BILL NO.	DESCRIPTION	AMOUNT Kshs.
<b>BILL A: DAM COMPONENT</b>		
1	PRELIMINARY AND GENERAL ITEMS	
2	RIVER DIVERSION	
3	DAM EMBANKMENT	
4	INTAKE TOWER	
5	SPILLWAY	
6	SPILLWAY BRIDGE	
7	INSTRUMENTATION	
8	ELECTRICAL WORKS	
9	ROAD WORKS	
10	RAW WATER MAIN	
11	SCHEDULE OF DAY WORKS	
<b>BILL B: WATER SUPPLY COMPONENT</b>		
2.0	RAW WATER MAIN	
3.1	SITE WORKS	
3.2	WATER TREATMENT UNITS	
4.0	GRAVITY MAIN TO ISIOLO	
5.0	TRANSMISSION LINE TO KIPSING	
6.0	GRAVITY TO ISIOLO WEST/MLANGO	
7.0	RISING MAIN TO OLDONYIRO	
8.0	RISING MAIN TO MUSUL	
9.0	GRAVITY MAIN TO WAMBA	
10.0	500M3 TANK OLDONYIRO TOWN	
11.0	400M3 ELEVATED STEEL TANK MLANGO TOWN CENTER	
12.0	200M3 ELEVATED STEEL TANK LONGOPITO TOWN CENTER	
13.0	1000M3 TANK AT MUSUL	
14.0	KIPSING 15000m3 RESORVIOR TANKS, BUILDING AND SITE WORKS	
15.0	2000M3 TANK AT WAMBA	
16.0	ELECTRO-MECHANICAL WORKS	
17.0	MINI HYDROPOWER	
	<b>GRAND TOTAL</b>	

<b>ISIOLO DAM WATER PROJECT</b> <b>BILL A: DAM COMPONENT</b> <b>BILL No. 1: PRELIMINARIES AND GENERAL</b> <b>ITEMS</b>					
ITEM	DESCRIPTION	UNIT	QTY	RATE (Ksh.)	AMOUNT (Ksh.)
<b>SPECIFIED REQUIREMENTS</b>					
1.01	Provide and erect sign boards at the site as indicated by the Engineer's Representative and in accordance with the Conditions of Contract and as shown on Drawing before construction	No.	5.00		
1.02	Provide and erect sign boards at the site as indicated by the Engineer's Representative and in accordance with the Conditions of Contract and as shown on Drawing after construction	No	2.00		
<b>Project Materials Laboratory (Items procured shall revert to employer at the end of the Contract)</b>					
NOTE: The following items for laboratory for the Engineer shall be deemed to include all costs involved in providing and maintaining such buildings, including furniture, fittings and access thereto and for the provision of security, heating, lighting, power, water, sewage and refuse disposal, as required for the duration of the Contract.					
1.03	Provide and maintain a permanent building to be used as a testing laboratory, floor area 60 square metres as per the specifications, ownership to revert to the Employer at the end of the Contract.	item	sum		
1.04	Provide laboratory equipment and associated equipment /services as listed in Appendix A	item	sum		
1.05	Provision of 6No. Laboratory technicians	months	288.00		
1.06	Allow a provisional sum of Kshs 4,000,000 for testing of materials in independent laboratories as per specifications or as directed by the Engineer	Is	Is	4,000,000.00	4,000,000.00
1.07	Include percentage of item 1.07 for Contractor's overheads and profits	%			
<b>ACCOMODATION</b>					
<b>Accommodation for the Resident Engineer's Staff (Items procured shall revert to employer at the end of the Contract)</b>					
NOTE: The following items for housing, offices for the Engineer shall be deemed to include all costs involved in providing and maintaining such buildings, including furniture, fittings and access thereto and for the provision of security, heating, lighting, power, portable water,waste water and refuse disposal, as required for the duration of the Contract.					
Construct, furnish and maintain accommodation for Engineer's staff as detailed in drawings and specifications. Ownership to Revert to the employer and to be constructed					
1.09	(i)Type A (Three bed roomed house)	unit	1.00		
1.10	(ii)Type F (One unit consists of 2 houses and each 2 bedroomed )	unit	4.00		
Accommodation for Engineer's junior staff					
1.11	(iii)Type G (One unit consists of 2 houses and each 1 bedroomed)	Unit	10.00		
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<b>ISIOLO DAM WATER PROJECT</b> <b>BILL A: DAM COMPONENT</b> <b>BILL No. 1: PRELIMINARIES AND GENERAL</b> <b>ITEMS</b>					
ITEM	DESCRIPTION	UNIT	QTY	RATE (Ksh.)	AMOUNT (Ksh.)
1.13	Provide with drivers, service, insurance, fueling and maintain One (1) new 4WD station wagon SUV vehicles of 3000 cc minimum diesel engine capacity or equivalent approved by the Engineer inclusive of the first 5,000km per vehicle month. Vehicles to revert to the Contractor on completion of the Contract.	Veh. Mth	96.00		
1.14	Extra over item 1.13 for mileage over 5,000 km per vehicle month (Rate inclusive of driver, insurance, fuels, maintenance, lubricants and servicing).	Km	75,000.00		
1.15	Provide with drivers, service, insurance, fueling and maintain four (4) new fully loaded 4WD double cabin pick up vehicles of 2800 cc minimum diesel engine capacity or equivalent approved by the Engineer inclusive of the first 5000km per vehicle month. Vehicles to revert to the employer on completion of the Contract.	Veh. Mth	144.00		
1.16	Extra over item 1.15 for mileage over 5000 km per vehicle month (Rate inclusive of driver, insurance, fuels, maintenance, lubricants and servicing).	Km	200,000.00		
1.17	Provide with drivers, service, insurance and maintain <b>six (6)</b> new Turbo diesel propelled 4WD, 4 door 5-seater double cabin vehicle of minimum engine capacity at least 2300cc and at most 2800cc and approved by the Engineer. <b>Vehicle to revert to the Employer at the end of the Contract.</b>	Veh. Mth	72.00		
1.18	Extra over item 1.17 for mileage over 5000 km per vehicle month (Rate inclusive of driver, insurance, fuels, maintenance, lubricants and servicing).	Km	50,000.00		
1.19	Allow a Provisional sum for Implementation of Environmental and Social Management Plan	months	48.00		
<b>MISCELLANEOUS ACCOUNT</b>					
1.21	Allow a Prime Cost sum of Kshs 20,000,000 for the Engineer's miscellaneous account to be spent in whole or part as directed by the Resident Engineer	Prov. Sum	1.00		
1.22	E.O. item 1.21 for the Contractor's overheads, profits & expenses	%			
<b>Video and Photography</b>					
1.23	Allow a prime cost sum of Ksh. 2,000,000 for provision of progress photographs and video motion pictures throughout the duration of the Contract as will be directed by the Resident Engineer	PC Sum	1.00		
1.24	E.O. item 1.23 for the Contractor's overheads, profits & expenses	%	0.10		
<b>Offices</b>					
1.25	Provide an office for at a suitable Site to the approval of the Engineer. Office to include waterborne sanitation / internal plumbing and drainage, water supply, electrical supply, installation of telephone and other requisite facilities all as specified. This office will be used by the Supervision staff. Office to revert to the employer on completion of the project.	Month	48.00		
1.26	Contractor to allow for maintenance and attendance of the Engineer's offices and supply of consumables as per Specifications, for the Engineer's staff for the duration of the Contract.	Month	48.00		
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<b>ISIOLO DAM WATER PROJECT</b> <b>BILL A: DAM COMPONENT</b> <b>BILL No. 1: PRELIMINARIES AND GENERAL</b> <b>ITEMS</b>					
ITEM	DESCRIPTION	UNIT	QTY	RATE (Ksh.)	AMOUNT (Ksh.)
<b>Telecommunications</b>					
1.27	Allow a Prime Cost ( P.C) sum of Ksh. 2,200,000 for the internet installation and charges for the Engineer's Representative Office, for the entire project period.	PC sum	1.00		
1.28	Include percentage of item 1.27 for Contractor's overheads and profits	%			
1.29	Allow a provisional sum of Kshs.2,000,000 for the payment of bills on mobile calls.	Prov. Sum	1.00		
1.30	Include percentage of item 1.29 for Contractor's overheads and profits	%			
<b>EQUIPMENTS</b>					
1.33	Provide and Maintain Furniture and equipment for Engineer's office as listed in the appendix B to this item	Lump Sum	1.00		
1.35	Provide and Maintain Engineer's Survey Equipment as listed in the appendix C this item	Lump Sum	1.00		
1.37	Allow a provision of Kshs 300 million for design and construction of 2 No. small concrete dams upstream of the main dam embankment on a location to be identified by the Engineer to act as silt traps to the main dam as directed by the Engineer.	PC Sum	1.00		
1.38	Include percentage of item 1.38 for Contractor's overheads and profits	%			
1.39	Provide and carry out site investigations listed in Appendix E as directed by the Engineer.	Lump Sum	1.00		
<b>Removal and alteration of services</b>					
1.41	Include percentage of item 1.21 for contractor's overheads and profits	%			
1.42	Attendance upon the Resident Engineer's Junior Staff				
1.43	Allow a provisional sum of Ksh. 10,000,000 for payment of salaries and overtime for the Resident Engineer's staff including the attached employer staff as directed by the Engineer	Prov. Sum	1	10,000,000.00	10,000,000.00
1.44	Include percentage of item 1.23 for contractor's overheads and profits	%			
1.45	Employer technical staff capacity building, Project Public Relations liaison and project monitoring tools softwares				
1.46	Allow a provisional sum of Ksh. 60,000,000 for Engineers and employer engineering technical staff only on capacity building (training) and project public relations liaison initiatives as directed by the Engineer	Prov. Sum	1	60,000,000.00	60,000,000.00
1.47	Allow a provisional sum of Kshs. 20,000,000 for costs associated with employers staff site visits and allowances for employers staff deployed to the project	Prov. Sum	1	20,000,000.00	20,000,000.00
1.48	Allow a provisional sum of KShs.10,000,000 to be spent under instructions from the Engineer for ICT facilities improvement and related services, all to be acquired as directed by the Engineer	Prov. Sum	1	10,000,000.00	10,000,000.00
1.49	Include percentage of items 1.25 & 1.26 and 1.27 for contractor's overheads and profits	%			
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<b>ISIOLO DAM WATER PROJECT</b> <b>BILL A: DAM COMPONENT</b> <b>BILL No. 1: PRELIMINARIES AND GENERAL</b> <b>ITEMS</b>					
ITEM	DESCRIPTION	UNIT	QTY	RATE (Ksh.)	AMOUNT (Ksh.)
1.5	Allow a provisional sum of Kshs. 10,000,000 for hiring of dam experts on specialised consultation as may be directed by the Engineer	Prov. Sum	1	10,000,000.00	10,000,000.00
1.51	Include percentage of items 1.29 for Contractor's overheads and profits	%			
1.52	Allow a provisional sum of Ksh. 10,000,000 for maintenance of public roads and traffic control including grading and watering of earth roads to reduce dust as per specifications and as directed by the Engineer	Prov. Sum	1	10,000,000.00	10,000,000.00
1.53	Include percentage of item 1.31 for contractor's overheads and profits	%			
	Engineer's Communication				
1.54	Provide a provisional sum of Kshs 10,000,000 for providing and maintaining mobiles telephones, VSAT internet connection, post office, courier, radio communication for the exclusive use of the Engineer	Prov. Sum	1	10,000,000.00	10,000,000.00
1.55	Include a percentage of item 1.35 for contractor's overheads and profits	%			
1.56	Allow a prime cost sum as a contribution to Kenya Power of Kshs 30 million for supply of electricity to the dam site. Includes for operation and maintainance	Prov. Sum	1	30,000,000.00	30,000,000.00
1.57	Include a percentage of item 1.37 for contractor's overheads and profits	%			
	Provision of Generation, Transmission and Electrical works				
1.58	Allow for a provisional sum of Ksh. 200,000,000 for undertaking a corporate social responsibility programme in the catchment areas of the dam	Prov. Sum	1	200,000,000.00	200,000,000.00
1.59	percentage addition to cover all overhead and profit on 1.51	%	0.05		
1.60	Allow for a provisional sum of 2,500,000 for Providing and maintaining a basic weather station to specifications	Prov. Sum	1	2,500,000.00	2,500,000.00
1.61	Percentage addition to cover all overhead and profit on 1.53	%			
1.62	Allow for provisional sum of Kshs. 2,500,000 for engineers accomodation for the first four months of the project	Prv. Sum	1	2,500,000.00	2,500,000.00
1.63	Allow for the construction of a project commemorative plaque at a conspicuous location to be shown by the Engineer at completion of the project.	Item	1		
	<b>OFFICE FOR THE RESIDENT ENGINEER (R.E.)</b>				
1.64	Provide all materials and construct prefabricated office for Resident Engineer to the approval of the Engineer. Office floor area 120 m <sup>2</sup> and to include waterborne sanitation / internal plumbing and drainage, water supply, electrical supply, installation of telephone and other requisite facilities all as specified. Prefabricated office building to revert to the Employer at the end of the Contract. This office will be used by the Resident Engineer's staff.	Item	L.S		
1.65	Maintenance of item 1.2.1 above in accordance with the condition of contract in the entire duration of the contract	month	24		
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<b>ISIOLO DAM WATER PROJECT</b> <b>BILL A: DAM COMPONENT</b> <b>BILL No. 1: PRELIMINARIES AND GENERAL</b> <b>ITEMS</b>					
ITEM	DESCRIPTION	UNIT	QTY	RATE (Ksh.)	AMOUNT (Ksh.)
	<b>VEHICLES FOR RESIDENT ENGINEER'S USE REVERT OWNERSHIP TO THE EMPLOYER</b>				
	Contractor's Vehicles for the Resident Engineer's Use				
	Employer's Vehicles				
1.66	Allow a provisional sum of Kshs.18,000,000.for purchase of <b>Two (2)</b> type 1 new 4WD station wagon vehicles of 4164 cc minimum diesel engine capacity, or equivalent on behalf of the employer as per specifications and as approved by the Engineer.	Prov Sum	1	18,000,000.00	
1.67	Allow a provisional sum of Kshs 20,000,000 for purchase of <b>Three (3)</b> type 2 new 4WD double cab vehicles of 4164cc minimum diesel engine capacity or equivalent on behalf of the employer as per specifications and as approved by the Engineer.	Prov Sum	1	20,000,000.00	
1.68	4nr motor bikes 175 c.c for inspectors ownership revert to employer	P.C sum			
1.69	Maintenance, running and repairs of vehicles and motor bikes for the Engineer in 1.2.13-1.2.14 as specified	month	48		
1.7	Employ and provide for the sole use of the S.R.E. 3 no. approved drivers with 10years experience for the above vehicles.Include all overtime, allowances, accommodation costsetc. as necessary for the drivers to perform their duties in accordance with the Specifications.	month	144		
1.71	Employ and provide for the sole use of the S.R.E. the following personnel for the entire contract period; 3No.chainmen, 1No. office secretary and 1No.clerk/messenger.	month	120		
1.72	Allow for Kshs. 10,000,000 for permanent diversion of existing services as per the specifications as directed by the engineer and approved by employer.	P.C sum	pc	10,000,000.00	10,000,000.00
1.73	Allow for a sum of 10,000,000 for Provision for alternative water supply arrangement for Oldonyiro town during the construction period	P.C sum	pc	10,000,000.00	10,000,000.00
1.74	All profits and overheads on Item 1.4.1 as inserted for PrimeCost Item in Appendix to Tender	%			
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<b>ISIOLO DAM WATER PROJECT</b> <b>BILL A: DAM COMPONENT</b> <b>BILL No. 1: PRELIMINARIES AND GENERAL</b> <b>ITEMS</b>					
ITEM	DESCRIPTION	UNIT	QTY	RATE (Ksh.)	AMOUNT (Ksh.)
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	BILL NO 1 COLLECTION				
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<b>ISIOLO DAM WATER PROJECT</b> <b>BILL No. 2: RIVER DIVERSION SYSTEM</b>					
ITEM	DESCRIPTION	UNIT	QTY	RATE (Ksh)	AMOUNT (Ksh)
<b>2</b>	<b>Excavation and Foundation Treatment</b>				
2.0.1	Excavate for through the full length of the river diversion culvert in soft material	m <sup>3</sup>	10,000		
2.0.2	Excavate for river training in soft material	m <sup>3</sup>	16,500		
2.0.3	Extra over item 7.01 and 7.02 for excavation in hard material	m <sup>3</sup>	15,900		
2.0.4	Provide, Supply and place dental concrete to rock cavities in foundations	m <sup>3</sup>	4,800		
2.0.5	Provide, Supply and Place concrete type C20/25 to the fault zones	m <sup>3</sup>	1,500		
2.0.6	Supply and Place slush grout to seal rock fissures in foundations	m <sup>3</sup>	1,000		
2.0.7	Clean, trim and prepare foundation for Diversion culvert structure	m <sup>2</sup>	1,800		
<b>2.1</b>	<b>CLASS F: CONCRETE WORKS</b>				
	<b>Vibrated, Reinforced Concrete Class 30/20</b>				
	Rate to include for the curing as per the specifications and as directed by the Engineer.				
2.1.1	Provide all materials, mix, place and compact concrete class 30/20	m <sup>3</sup>	5,400		
2.1.2	Provide all materials, mix, place and compact concrete class 25/20	m <sup>3</sup>	1,440		
2.1.3	Blinding Concrete class 15/20	m <sup>3</sup>	120		
<b>2.2</b>	<b>Reinforcement</b>				
2.2.1	High Tensile Steel Reinforcement bars-dia less or equal to 16mm	Tonne	600		
2.2.2	As item above but diameter greater than 16mm	Tonne	300		
2.2.3	Fabric Reinforcement A252	m <sup>2</sup>	3,600		
<b>2.3</b>	<b>Formwork</b>				
	Provide and fix shuttering including propping, strutting and striking all as specified				
	<b>(i) Formed Surface F3 -</b>				
2.3.1	Outside Side of the diversion culvert - Plain or inclined	m <sup>2</sup>	4,000		
2.3.2	Inside the diversion culvert - Plain or inclined	m <sup>2</sup>	4,000		
	<b>(ii) Unformed Surface F3</b>				
2.3.3	Diversion culvert channel base	m <sup>2</sup>	4,000		
<b>2.4</b>	<b>Construction Joints</b>				
	Provide and install the following waterstops in construction joints including all surface treatment, formwork, forming of rebate and sealing of rebate with polysulphide sealant all as per Drawings and Specification				
2.4.1	200mm wide expandite super-cast water foil PVC or similar approved waterstop in construction joints in walls (Provisional)	m	3,500		
<b>2.5</b>	<b>Expansion Joint</b>				
2.5.1	Provide and place 20mm thick "Flexcell" low compression joint filler to expansion joints	m	3,500		
2.5.2	Apply sealant at joint interface	m	3,500		
2.5.3	As item above but "Thioflex 600" or similar approved cold poured polysulphide sealant	m <sup>2</sup>	2,000		
<b>Page Total Carried Forward to Bill No 2 Collection Page</b>					







<b>ISIOLO DAM WATER PROJECT</b>					
<b>BILL No. 3: DAM EMBANKMENT</b>					
<b>ITEM</b>	<b>DESCRIPTION</b>	<b>UNIT</b>	<b>QTY</b>	<b>RATE (Ksh.)</b>	<b>AMOUNT (Ksh.)</b>
<b>3.1</b>	<b>Site Clearance</b>				
	NOTE: All costs and charges connected with haulage are to be included within the unit rates entered by tenderers against the items described in this Bill of Quantities. No separate items for overhaul are included in any section of this Bill and no additional payment whatsoever will be made for haulage. Tenderers are therefore deemed to have included, in the unit rates entered against an item, for all costs and charges associated with haulage.				
3.1.1	General clearance of the reservoir and of the area of the Works	ha	160		
3.1.2	Remove top soil not exceeding 200mm depth and stockpile for reuse from work area and as directed by the Engineer.	m <sup>3</sup>	18,000		
3.1.3	Allow a provisional sum of Kshs. 5,000,000 for removal of any structures and obstructions as directed by the Engineer. Payment to be on Dayworks basis.	Prov. Sum	1		
<b>3.2</b>	<b>Excavation</b>				
	Excavate to cofferdam, dam, core trench, bottom outlet gallery, inspection gallery, guard house and left bank paved area, treatment works paved areas				
3.2.1	Bulk excavation, Soft material	m <sup>3</sup>	60,000		
3.2.2	Bulk excavation, for excavation in hard material	m <sup>3</sup>	75,000		
3.2.3	Extra over bulk excavation, for excavation by hand methods in had material, without blasting	m <sup>3</sup>	18,750		
3.2.4	Trench excavation, in common material, to clean out faults and fissures	m <sup>3</sup>	5,000		
3.2.5	Slope adjustment to bulk or trench excavation, in common material	m <sup>3</sup>	30,000		
3.2.6	Trimming of bulk or trench excavation, in soft material	m <sup>3</sup>	10,000		
3.2.7	Trimming of bulk or trench excavation, in hard material	m <sup>3</sup>	10,000		
<b>3.3</b>	<b>Drilling for Grouting</b>				
3.3.1	Mobilization of plant, machinery, equipment, apparata, materials, personnel, temporary camp facilities, office accommodation, storage facilities, etc.	Item	1		
	Provide personnel and materials; supply, set-up, dismantle and shift between boreholes, plant, machinery, equipment, apparata, etc.; as required for drilling:				
3.3.2	- exploratory and control holes	No.	150		
3.3.3	- curtain grouting holes	No.	2,500		
3.3.4	Drill hole by percussion (wagon drill) method, minimum hole diameter 30 mm, to depth n.e. 10 m, at dam site	m	1,500		
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<b>ISIOLO DAM WATER PROJECT</b>					
<b>BILL No. 3: DAM EMBANKMENT</b>					
<b>ITEM</b>	<b>DESCRIPTION</b>	<b>UNIT</b>	<b>QTY</b>	<b>RATE (Ksh.)</b>	<b>AMOUNT (Ksh.)</b>
	Drill hole by rotary or roto-percussion method, without core recovery, minimum hole diameter 46 mm (AX), to the following depth stages below ground level:				
3.3.5	- from 0 m to 20 m	m	50,000		
3.3.6	- from 20 m to 40 m	m	50,000		
3.3.7	- from 40 m to 60 m	m	50,000		
3.3.8	- from 60 m to 80 m	m	50,000		
	Drill hole by rotary method, with continuous core recovery, minimum hole diameter 76 mm (NX), to the following depth stages below ground level measured vertically:				
3.3.9	- from 0 m to 20 m	m	4,500		
3.3.10	- from 20 m to 40 m	m	6,750		
3.3.11	- from 40 m to 60 m	m	10,125		
3.3.12	- from 60 m to 80 m	m	15,200		
3.3.13	Allow for Re-drilling for downstage (Progress procedure) curtain grouting (provisional item)	m	2,250		
3.3.14	Allow for Re-drilling for downstage (Progress Procedure) for contact or blanket grouting (Provisional Item)	m	2,250		
<b>3.4</b>	<b>Water Pressure Test</b>				
	Perform water pressure test in borehole, to be carried out in stages by means of single or double packers; including provision of personnel and materials; supply, set-up, dismantling and shifting between boreholes plant, machinery, equipment, apparatus, etc., as required to perform water pressure test:				
3.4.1	Lugeon water tests as specified in the specifications	No.	8,400		
3.4.2	Simplified water tests as specified in the specifications	No.	31,200		
<b>3.5</b>	<b>Grouting</b>				
	Supply, transport, deliver, handle and store grouting materials; for use at dam site:				
3.5.1	- cement	tonne	22,500		
3.5.2	- bentonite	tonne	750		
3.5.3	- additives	Kg	450		
3.5.4	- sand or other approved filler	tonne	2,250		
	Mix and grout water-cement, with or without additives and/or bentonite, and/or filler, per tonne of dry cement; for use at dam site:				
	contact or blanket grouting (upstage/Reverse Procedure or downstage/Progress Procedure):				
3.5.5	- grout mix	tonne	10,125		
3.5.6	- packer installation (single or double)	No.	14,040		
	- up-stage (Reverse Procedure) curtain grouting:				
3.5.7	- grout mix	tonne	15,200		
3.5.8	- packer installation (single or double)	No.	21,060		
3.5.9	- down-stage (Progress Procedure) curtain grouting:				
3.5.10	- grout mix	tonne	3,330		
3.5.11	- packer installation (single or double)	No.	1,575		
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<b>ISILO DAM WATER PROJECT</b>					
<b>BILL No. 3: DAM EMBANKMENT</b>					
<b>ITEM</b>	<b>DESCRIPTION</b>	<b>UNIT</b>	<b>QTY</b>	<b>RATE (Ksh.)</b>	<b>AMOUNT (Ksh.)</b>
3.5.12	Supply, transport, deliver, handle, store and install PVC pipe c/w removable cap or plug; in concrete or reinforced concrete structures	m	750		
3.5.13	Allow a lump sum in respect of all labour, materials, plant, machinery, equipment and apparatus required to perform air and air/water washing-out of blanket grouting boreholes	Lump Sum	1		
3.5.14	Demobilization on completion of drilling and grouting works	Item	1		
<b>3.6</b>	<b>Relief Wells</b>				
3.6.1	Allow a provision for drilling 240mm diameter hole per linear meter drilled (provisional Item)	m	500		
3.6.2	Allow for backfilling of the relief well.	kg	113		
<b>3.7</b>	<b>Foundation Preparation and treatment</b>				
	Allow for all labour and equipment required for preparation of foundation on hard material for concrete structure				
3.7.1	Provide, Supply and place dental concrete to rock cavities in foundations	m <sup>3</sup>	3,500		
3.7.2	Provide, Supply and Place concrete type C20/25 to the fault zones	m <sup>3</sup>	2,000		
3.7.3	Supply and Place slush grout to seal rock fissures in foundations	m <sup>3</sup>	3,500		
<b>3.8</b>	<b>Fill and backfill</b>				
3.8.1	Provide, Supply and put into place compacted fill red clay for core	m <sup>3</sup>	1,000,000		
3.8.2	Provide, Supply and put into place compacted rock fill type R1	m <sup>3</sup>	375,000		
3.8.3	Provide, Supply and put into place compacted rock fill type R2	m <sup>3</sup>	750,000		
3.8.4	Compacted rock fill type R5	m <sup>3</sup>	250,000		
3.8.5	Provide place and compact placed clay core material in pre-cofferdam	m <sup>3</sup>	2,000		
<b>3.9</b>	<b>Filter, Transition and riprap</b>				
3.9.1	Provide, Supply and put into place Filter type F1 as shown in the drawing or as instructed by the Engineer	m <sup>3</sup>	150,000		
3.9.2	Provide, Supply and put into place Filter type F2 as shown in the drawing or as instructed by the Engineer	m <sup>3</sup>	150,000		
3.9.3	Provide, Supply and put into place Filter type T1 as shown in the drawing or as instructed by the Engineer	m <sup>3</sup>	150,000		
3.9.4	Riprap type R3	m <sup>2</sup>	65,000		
3.9.5	Supply, place and compact drainage to embankment foundations, as per the Specification				
3.9.6	Geotextile fabric	m <sup>2</sup>	300,000		
<b>3.2.</b>	<b>Crest road</b>				
3.2.1	Sub-base course	m <sup>3</sup>	550		
3.2.2	Base course	m <sup>3</sup>	810		
3.2.3	50mm thick Bituminous surfacing	m <sup>2</sup>	100		
3.2.4	Guardrail	m	1,250		
<b>3.11</b>	<b>Paved area</b>				
3.11.1	Base course	m <sup>3</sup>	830		
3.11.2	50mm thick Bituminous surfacing	m <sup>2</sup>	110		

<u>ISILO DAM WATER PROJECT</u>					
<u>BILL No. 3: DAM EMBANKMENT</u>					
ITEM	DESCRIPTION	UNIT	QTY	RATE (Ksh.)	AMOUNT (Ksh.)
	Page Total Carried Forward to Bill No 3 Collection Page				







<b>ISOLO DAM WATER PROJECT</b>					
<b>BILL No. 4: INTAKE TOWER</b>					
<b>ITEM</b>	<b>DESCRIPTION</b>	<b>UNIT</b>	<b>QTY</b>	<b>RATE (Ksh.)</b>	<b>AMOUNT (Ksh.)</b>
4.1	<b>CLASS D: DEMOLITION AND SITE CLEARANCE</b>				
4.1.3	Strip normal soil to a depth of 0.5m	m <sup>3</sup>	370		
4.1.4	Strip soft material to a depth of 1m	m <sup>3</sup>	730		
4.2	<b>CLASS E: EARTH WORKS</b>				
	<b>NOTE :-</b> Excavate below stripped level to invert level in material, cart for use as fill or cart away to approved disposal site , all as directed by the Engineer.				
4.2.1	Excavation in hard material to a depth of 2 m	m <sup>3</sup>	1460		
4.2.2	Ditto but to depth of 2-5m	m <sup>3</sup>	2190		
4.2.3	Ditto but to depth of 5-8m	m <sup>3</sup>	2190		
4.2.4	Ditto but to depth of 8-11m	m <sup>3</sup>	2190		
4.2.5	Ditto but to a depth exceeding 11m	m <sup>3</sup>	1100		
4.3	<b>Connection of intake tower and Diversion culvert</b>				
4.3.1	Excavate in hard material to a depth of 15m both vertically and horizontally to create conduit connecting the intake tower and the diversion culverts	m <sup>3</sup>	1000		
4.4	<b>PREPARATION AND TREATMENT</b>				
4.4.1	Dental concrete	m <sup>3</sup>	100		
	<b>Fill and Backfill</b>				
4.4.3	Compacted Fill selected granular material as shown in the drawing or as directed by the Engineer	m <sup>3</sup>	300		
4.5	<b>CONCRETE WORKS</b>				
4.5.1	Provide and place class 15/20 blinding concrete	m <sup>2</sup>	800		
	Provide Vibrated, Reinforced Concrete Class 30/20. Rate to include for the curing as per the specifications and as directed by the Engineer.				
4.5.2	From base of tower to 1526.7masl	m <sup>3</sup>	300		
	Circular intake tower walling, from 1526.7masl - 1580masl (53.3m high).				
4.5.3	From 1526.7masl - 1536.27masl, 500mm thick circular reinforced concrete walling	m <sup>3</sup>	350		
4.5.4	From 1536.27masl-1546.27masl, 450mm thick circular reinforced concrete walling	m <sup>3</sup>	120		
4.5.5	From 1546.27masl- 1556.27masl, 425mm thick circular reinforced concrete walling	m <sup>3</sup>	100		
4.5.6	From 1556.27masl- 1566.27masl , 400mm thick circular reinforced concrete walling	m <sup>3</sup>	100		
4.5.7	From 1566.27masl-1576.27 , 400mm thick circular reinforced concrete walling	m <sup>3</sup>	100		
4.5.8	From 1576.27 masl and above, 200mm thick circular reinforced concrete walling	m <sup>3</sup>	50		
4.5.9	Concrete class 30/20 for embedding mechanical parts	m <sup>3</sup>	1500		
4.5.10	Ditto but for culvert intake downstream valve chamber	m <sup>3</sup>	50		
4.6	<b>Reinforcement</b>				
	Provide and fix high tensile steel reinforcement to SRN 127 including cutting, bending, propping, with spacers and tying as specified				
4.6.1	High yield steel bars	kg	500,000		

<b><u>ISIOLO DAM WATER PROJECT</u></b>					
<b><u>BILL No. 4: INTAKE TOWER</u></b>					
<b>ITEM</b>	<b>DESCRIPTION</b>	<b>UNIT</b>	<b>QTY</b>	<b>RATE (Ksh.)</b>	<b>AMOUNT (Ksh.)</b>
	Page Total Carried Forward to Bill No 4 Collection Page				

<b>ISOLO DAM WATER PROJECT</b>					
<b>BILL No. 4: INTAKE TOWER</b>					
<b>ITEM</b>	<b>DESCRIPTION</b>	<b>UNIT</b>	<b>QTY</b>	<b>RATE (Ksh.)</b>	<b>AMOUNT (Ksh.)</b>
<b>4.7</b>	<b>CLASS G: CONCRETE ANCILLARIES</b>				
	<b>Formwork</b>				
	Provide and fix shuttering including propping, strutting and striking all as specified				
	<b>(i) Formed Surface F3 -</b>				
4.7.1	Curved for the internal and external walling of the intake tower and for sloping surfaces. From Elevation 1526.7amsl - 1580amsl	m <sup>2</sup>	7000		
4.7.2	For intake downstream valve chamber	m <sup>2</sup>	500		
	<b>(ii) Unformed Surface F3</b>				
4.7.3	base	m <sup>2</sup>	100		
<b>4.8</b>	<b>Joint</b>				
<b>4.8.1</b>	<b>Rubber water stop type A</b>	m	620		
4.8.2	Preformed joint filler	m <sup>2</sup>	500		
4.8.3	Joint sealing compound	kg	500		
<b>4.9</b>	<b>Steel Work</b>				
4.9.1	Galvanized steel plate	kg	2200		
4.9.2	Painted steel	kg	700		
4.9.3	Black steel	kg	80		
<b>4.10</b>	<b>CLASS J: Pipework - Fittings &amp; Valves</b>				
	<b>Supply, Transport to Site and Store in Secure Place Including Jointing Material, Bolts, Gaskets, Packing, Jointing Glue, etc., As Applicable</b>				
	<b>Provide, handle, install and test the following DN 900 Epoxy coated, epoxy lined steel pipes and fittings, valves and specials. Special rates shall include for completing all pipe joints as specified in the specification.</b>				
4.10.1	Flanged bell mouth	No.	8		
4.10.2	Double flanged butterfly valve	No.	8		
4.10.3	Double flanged 90 degrees Short radius bend	No.	2		
4.10.4	Double flanged 90 degrees Long radius bend	No.	2		
4.10.5	Double flanged 45 degrees bend	No.	2		
4.10.6	Double flanged 30 degrees bend	No.	2		
4.10.7	Double flanged 22.5 degrees bend	No.	2		
4.10.8	Double flanged 11.25 degrees bend	No.	2		
4.10.9	V.J Adapter	No.	8		
4.10.10	Blank flange	No.	8		
4.10.11	All flanged tee	No.	8		
4.10.12	Flexible coupling	No.	8		
4.10.13	Plain ended/flanged pipe with trust flange	No.	5		
4.10.14	Double flanged 90 Duckfoot bend	No.	2		
4.10.15	Double flanged 350mm Straight pipe	No.	8		
4.10.16	Double flanged 750mm Straight pipe	No.	2		
4.10.17	Double flanged 1750mm Straight pipe	No.	10		
4.10.18	Double flanged 2000mm Straight pipe	No.	45		
4.10.19	Double flanged 1200mm Straight pipe	No.	4		
4.10.20	Plain ended pipe	m	100		
4.10.21	Submerged discharge valve	No.	2		
	<b>Page Total Carried Forward to Bill No 4 Collection Page</b>				





<b>ISIOLO DAM WATER PROJECT</b>					
<b>BILL No. 5: SPILLWAY</b>					
ITEM	DESCRIPTION	UNIT	QTY	RATE (Ksh.)	AMOUNT (Ksh.)
<b>5.1</b>	<b>CLASS D: DEMOLITION AND SITE CLEARANCE</b>				
5.1.1	Clear area within Spillway Site of all girth and vegetation and cart away to tips as directed by the Engineer	m <sup>2</sup>	75,000		
5.1.2	Strip top soil in normal soil material for re-use on the structure as directed by the Engineer	m <sup>3</sup>	21,600		
5.1.3	Strip top soil in normal soil material for the disposal site	m <sup>3</sup>	10,000		
5.1.4	Strip soft Material to a depth of 0.3m	m <sup>3</sup>	1,794		
<b>5.2</b>	<b>CLASS E: EARTH WORKS</b>				
	<b>NOTE</b> :- Excavate below stripped level to invert level in soft/normal material, cart for use as fill or cart away to approved disposal site , all as directed by the Engineer. Excavation covers for the ogee side channel, outflow section, flip bucket dissipator and the bridge				
	<b>Excavation</b>				
5.2.1	Excavation in normal/soft material to a depth of 0.3m	m <sup>3</sup>	3,000		
5.2.2	Ditto but to depth of 0.3 - 1.5m	m <sup>3</sup>	6,000		
5.2.3	Ditto but to depth of 1.5- 6.0m	m <sup>3</sup>	18,000		
5.2.4	Ditto but to a depth exceeding 6.0m	m <sup>3</sup>	3,000		
	<b>River training</b>				
5.2.5	Excavate/ train river channel to a depth of 4m to create area for the flip bucket 20m wide	m <sup>3</sup>	400		
	<b>Excavation in hard Material</b>				
5.2.6	Excavate in hard material	m <sup>3</sup>	110,000		
	<b>Cleaning and preparation of foundation</b>				
5.2.7	Clean, trim and prepare foundation for spillway structure	m <sup>2</sup>	25,000		
<b>5.3</b>	<b>CLASS F: CONCRETE WORKS</b>				
	<b>Vibrated, Reinforced Concrete Class 30/20</b>				
	Rate to include for the curing as per the specifications and as directed by the Engineer.				
5.3.1	Ogee spillway	m <sup>3</sup>	40		
	For the spillway base, the stilling basin and chute	m <sup>3</sup>	1,500		
	For retaining wall	m <sup>3</sup>	600		
5.3.2	For lining the retaining wall 5m high	m <sup>3</sup>	240		
<b>Page Total Carried Forward to Bill No 5 Collection Page</b>					

<b>ISOLO DAM WATER PROJECT</b>					
<b>BILL No. 5: SPILLWAY</b>					
<b>ITEM</b>	<b>DESCRIPTION</b>	<b>UNIT</b>	<b>QTY</b>	<b>RATE (Ksh.)</b>	<b>AMOUNT (Ksh.)</b>
<b>5.4</b>	<b>FOUNDATION TREATMENT</b>				
5.4.1	Grouting along the spillway - 230m long to a depth of 10m - (2 rows)	RM	13,800		
5.4.2	Dental concrete	m <sup>3</sup>	2,040		
<b>5.5</b>	<b>Reinforcement</b>				
	Provide and fix high tensile steel reinforcement to SRN 127 including cutting, bending, propping, with spacers and tying as specified				
5.5.1	High yield steel bars	kg	1,100,000		
<b>5.6</b>	<b>CLASS G: CONCRETE ANCILLARIES</b>				
	<b>Formwork</b>				
	Provide and fix shuttering including propping, strutting and striking all as specified				
	<b>(i) Formed Surface F3 -</b>				
5.6.1	Ogee side channel - Palin and curved	m <sup>2</sup>	2,240		
5.6.2	Sides of spillway channel	m <sup>2</sup>	24,000		
	<b>(ii) Unformed Surface F3</b>				
5.6.3	Spillway channel base	m <sup>2</sup>	720		
<b>5.7</b>	<b>Construction Joints</b>				
	Provide and install the following waterstops in construction joints including all surface treatment, formwork, forming of rebate and sealing of rebate with polysulphide sealant all as per Drawings and Specification				
5.7.1	200mm wide expandite super-cast water foil PVC or similar approved waterstop in construction joints in walls (Provisional)	m	100		
<b>5.8</b>	<b>Joint</b>				
5.8.1	Rubber water stop type A or similar approved by Engineer	m	620		
5.8.2	Preformed joint filler	m <sup>2</sup>	500		
5.8.3	Joint sealing compound	kg	500		
<b>5.9</b>	<b>Upvc pipe</b>				
5.9.1	100mm diameter	m	50		
5.9.2	150mm diameter	m	50		
<b>5.10</b>	<b>Reinforced concrete pipe</b>				
5.2.1	500 mm diameter	m	80		
<b>5.11</b>	<b>Perforated concrete pipe</b>				
5.11.1	500 mm diameter	m	280		
5.11.2	800 mm diameter	m	310		
<b>Page Total Carried Forward to Bill No 5 Collection Page</b>					







<b>ISIOLO DAM WATER PROJECT - DAM</b>					
<b>BILL No. 6: SPILLWAY BRIDGE</b>					
<b>ITEM</b>	<b>DESCRIPTION</b>	<b>UNIT</b>	<b>QTY</b>	<b>RATE (Ksh.)</b>	<b>AMOUNT (Ksh.)</b>
<b>6.1</b>	<b>EXCAVATION AND FILLING FOR STRUCTURES</b>				
6.1.1	Excavate to spoil in soft material for foundations	m <sup>3</sup>	3667		
6.1.3	As for item 7.01 and 7.02 in hard material	m <sup>3</sup>	367		
6.1.4	Porous filter material	m <sup>3</sup>	1448		
6.1.5	Selected granular material	m <sup>3</sup>	1526		
6.1.8	Excavate for gabions in soft material	m <sup>3</sup>	305		
6.1.9	EO 7.08 for excavation in hard material	m <sup>3</sup>	8		
6.1.10	Provide and place gabion mesh for construction	m <sup>3</sup>	158		
6.1.11	Rock-fill to gabion boxes and mattresses	m <sup>3</sup>	276		
<b>6.2</b>	<b>CONCRETE WORKS</b>				
6.2.1	Concrete class 25/20	m <sup>3</sup>	1491		
6.2.2	Blinding concrete class 15/40	m <sup>3</sup>	6		
<b>6.3</b>	<b>Formwork</b>				
6.3.1	Vertical formwork to achieve class F1 Finish	m <sup>2</sup>	5581		
6.3.2	F1 finish formwork at 10o and 85o to vertical	m <sup>2</sup>	10		
6.3.3	F1 finish formwork - vertical less than 300mm wide	m <sup>2</sup>	81		
6.3.4	Vertical formwork to achieve class F3 Finish.	m	3177		
6.3.5	Horizontal formwork to achieve class F3 Finish.	m <sup>2</sup>	760		
6.3.6	F3 finish formwork to edges of slabs less than 300mm high	m	79		
<b>6.4</b>	<b>Reinforcement</b>				
6.4.1	High yield high bond strength to BS 4461 of size 16mm diam and above	Ton	179		
6.4.2	As item 17.07 above but of size 12mm and below.	Ton	167		
6.4.3	Steel fabric reinforcement to BS 4483 size A252.3 where directed by the Engineer	m <sup>2</sup>	38		
<b>6.5</b>	<b>MISCELLANEOUS BRIDGE WORKS</b>				
6.5.1	Fixed elastometric laminated rubber bearings of size 279mm x229mm x 39mm complete with 32 mm dowel and cap	No.	5		
6.5.2	Ditto but free bearings	No.	5		
<b>Page Total Carried Forward to Bill No 6 Collection Page</b>					





<b>ISIOLO DAM WATER PROJECT - DAM</b>					
<b>BILL No. 7: INSTRUMENTATION</b>					
<b>Item</b>	<b>Description</b>	<b>Unit</b>	<b>Qty</b>	<b>Unit Price</b>	<b>Amount (Kshs)</b>
<b>Rockfill Embankment</b>					
7.1	Preparation and supply of operation and maintenance manuals and training of employers staff for Engineer approval	ITEM	item	10,000,000.00	10,000,000.00
7.2	Supply and installation of geodetic pillars as instructed by the Engineer.	No	2		
7.3	Supply and installation of open standpipe (casagrande) piezometers. Allow for locable well cover. The location and type to be determined by the engineer.	No	6		
7.4	Supply and installation of seepage measuring piezometer 8No at the side of reservoir (4 on each side), foundation 4no at an interval of 60m, 20 at the embankment at an interval of 20m and vertical distance of 20m for engineers approval. Allow fro well locable cover	No	32		
7.5	Supply and install side observation wells equipped with piezometers the location be approved by the Engineer.	No	6		
7.6	Supply, installation and testing of Automatic Data Acquisition Systems for engineers approval	No	2		
7.7	provide and test water level meter with a water proof tape 60m minimal for engineer approval.	No	4		
7.8	Construction and equipping of the terminal structures	No	1		
<b>BILL No. 7: TOTAL CARRIED FORWARD TO GRAND SUMMARY</b>					

<b>ISILO DAM WATER PROJECT - DAM</b>					
<b>BILL No. 8: ELECTRICAL WORKS</b>					
ITEM	DESCRIPTION	UNIT	QTY	RATE (Ksh.)	AMOUNT (Ksh.)
<b>8.1</b>	<b>Power Transmission line</b>				
	11 KV 3 phase transmission line including switch NRC fuses lighting arrestors grounding and all ancillary equipment necessary to the connection on the existing network	Sum	1		
<b>8.2</b>	<b>Step Down Transformer</b>				
	11kV /440V 100kVA pole mounted transformer including pole support grounding etc.	Sum	1		
<b>8.3</b>	<b>Distribution and Control Gear</b>				
	Distribution switchboard / Control Gear and instrument panel in the downstream chamber	Sum	1		
<b>8.4</b>	<b>Lighting and Small Power</b>				
	Lighting and Small Power including all switches sockets outlets light fittings columns lanterns				
8.4.1	Internal lighting and small power	Sum	1		
8.4.2	External lighting	Sum	1		
8.4.3	Emergency lighting	Sum	1		
8.4.4	Internal lighting and small power cabling	Sum	1		
8.4.5	External lighting cabling	Sum	1		
<b>8.5</b>	<b>General</b>				
8.5.1	Allow for minor electrical works as ordered by the Engineer (Provisional Sum)	PS	1		
8.5.2	Tools and spare parts	Sum	1		
<b>8.6</b>	<b>Incoming Supply</b>				
8.6.1	Allow for provision of metering and connection on the KPLC network (Provisional Sum)	PS	1		
<b>8.7</b>	<b>Measuring Equipment</b>				
8.7.1	Reservoir water level transducer signal Equipment	Sum	1		
8.7.2	Overspeed transducer signal equipment	Sum	1		
<b>8.8</b>	<b>Ventilation Equipment</b>				
8.8.1	Blower and accessories	Sum	1		
8.8.2	Ventilation duct and support	Sum	1		
<b>8.9</b>	<b>Drainage Pump</b>				
8.9.1	Drainage pump complete with all discharge pipes valves strainer and control Float switch Q= 100m3/hr and head of 150m	Sum	1		
<b>8.10</b>	<b>Earthing Circuits</b>				
8.2.1	Earthing circuits including earthing Electrodes earth bars earth conductors and all accessories for installation and fixing	Sum	1		
<b>Page Total Carried Forward to Bill No 8 Collection Page</b>					







<b>ISILO DAM WATER PROJECT</b>					
<b>BILL NO. 9: ROAD WORKS</b>					
<b>ITEM</b>	<b>DESCRIPTION</b>	<b>UNIT</b>	<b>QTY</b>	<b>RATE (Ksh.)</b>	<b>AMOUNT (Ksh.)</b>
<b>9.1</b>	<b><u>SITE CLEARANCE AND STRIPPING</u></b>				
9.1.1	Clear the site within the road reserve extending to the boundary of the works plus 2m, including removal of trees, hedges, bushes, and other vegetation or deleterious organic material, and back filling of holes left by removal of stumps and roots using approved material to 100% MDD (AASHTO T99), in accordance with the specification	ha	3		
9.1.2	Remove topsoil on the roadway, junctions and accesses to an approved depth and cart away to spoil or stock pile for re-use as directed by the Engineer (Average depth = 200mm)	m <sup>3</sup>	7000		
<b>9.2</b>	<b><u>EARTHWORKS</u></b>				
	<b>NOTE: All costs and charges connected with haulage are to be included within the unit rates entered by tenderers against the items described in this Bill of Quantities. No separate items for overhaul are included in any section of this Bill and no additional payment whatsoever will be made for haulage. Tenderers are therefore deemed to have included, in the unit rates entered against an item, for all costs and charges associated with haulage.</b>				
9.2.1	Excavate from borrow, transport over any distance and fill in the embankment soft material, including watering and compaction, all in accordance with the specifications or as directed by the Engineer (min CBR 15%)	m <sup>3</sup>	11600		
9.2.2	Excavate, transport over any distance and fill in hard material, all in accordance with the specifications or as directed by the Engineer	m <sup>3</sup>	1200		
9.2.3	Cut to spoil in soft material	m <sup>3</sup>	5800		
9.2.4	As item 5.03 but hard material	m <sup>3</sup>	5800		
9.2.5	Compaction to 150mm depth of existing ground below fills and cuts to 95% MDD (AASHTO T99)	m <sup>3</sup>	4000		
9.2.6	Excavate material, transport over any distance lay, water and compact improved sub grade, all in accordance with the specifications or as directed by the Engineer. The rate to include all treatment required for the upper 300mm below formation both in cut and fill all in accordance with the specifications (min CBR 20%)	m <sup>3</sup>	7000		
9.2.7	Top soiling prior to grassing, minimum compacted thickness of topsoil shall be 50mm to embankments; all in accordance with Specifications.	m <sup>2</sup>	8500		
9.2.8	Grassing - Planting of sprigs of approved indigenous grass types; to embankments, cuttings or where directed by the Engineer in accordance with the Specifications, including tending, watering and cutting until the grass is firm and established.	Ha	1		
<b>Page Total Carried Forward to Bill No 9 Collection Page</b>					







<b>ISILO DAM WATER PROJECT</b>					
<b>BILL No. 10: RAW WATER MAINS</b>					
<b>ITEM</b>	<b>DESCRIPTION</b>	<b>UNIT</b>	<b>QTY</b>	<b>RATE (Ksh.)</b>	<b>AMOUNT (Ksh.)</b>
<b>10.1 CLEARANCE</b>					
10.1.1	Clear route of small trees and bushes 3.5m width	m	1100		
10.1.2	Ditto - trees of girth more than 0.5m but not exceeding 1m	nr	50		
10.1.3	Ditto - trees with girth more than 1m but not exceeding 2.5m	nr	20		
10.1.4	Ditto - trees with girth more than 2.5m but not exceeding 4m	nr	20		
<b>10.2 EXCAVATION</b>					
10.2.1	Excavate trench in natural materials for 900mm dia. pipe. Depth not exceeding 1.0m	m <sup>3</sup>	4400		
10.2.2	E.O for excavation in hard material (provisional)	m <sup>3</sup>	1100		
<b>10.3 PIPEWORK</b>					
10.3.1	900mm Epoxy coated/cement lined steel pipe with compression joints	m	1100		
10.3.2	900mm dia. special long radius single flanged 90° bend (Mark 1)	No.	1		
10.3.3	900mm dia. Double flanged pipe 1075mm long with puddle flange at 275mm from one end.(Mark 2)	No.	1		
10.3.4	900mm dia. Long radius double flanged 90° bend (Mark 3)	No.	2		
10.3.5	900mm dia. flanged spigot pipe 550mm long (cut to suit on site) (Mark 4)	No.	1		
10.3.6	900 x 200mm all flanged tee	No.	4		
10.3.7	Double flanged Sluice valve nominal bole 900mm	No.	1		
10.3.8	900mm dia. Double flanged pipe 900mm long with puddle flange at 275mm from one end.(Mark 2)	No.	4		
10.3.9	900mm dia. Long radius double flanged 90° bend (Mark 3)	No.	4		
10.3.10	900mm dia. flanged spigot pipe 500mm long (cut to suit on site) (Mark 4)	No.	4		
10.3.11	900mm dia. Flange COUPLING	No.	1		
10.3.12	900mm dia. Flange COUPLING	No.	4		
10.3.13	900mm dia. Flange COUPLING	No.	4		
<b>10.4 AIR VALVES</b>					
10.4.1	Excavate for, provide all materials and construct complete air valve chambers. Internal dimensions 2000 x 2000 x 2000 mm. Rates to include for all thrust blocks, pipe supports, inspection covers, etc. as detailed in the drawings.	No.	1		
<b>Page Total Carried Forward to Bill No 10 Collection Page</b>					

<b>ISILO DAM WATER PROJECT</b>					
<b>BILL No. 10: RAW WATER MAINS</b>					
<b>ITEM</b>	<b>DESCRIPTION</b>	<b>UNIT</b>	<b>QTY</b>	<b>RATE (Ksh.)</b>	<b>AMOUNT (Ksh.)</b>
	Provide, handle, install and test the following steel and uPVC pipes and fittings, valves and specials. Special rates shall include for completing all pipe joints as specified in the specification				
	<b>1No. Single Air Valves (DAVs) at Chainage 280m</b>				
10.4.2	900/900mm dia V/J stepped coupling	No.	2		
10.4.3	900 mm dia x 1.2m single flanged GI pipe	No.	2		
10.4.4	900mm x 150mm double flanged GI tee	No.	1		
10.4.5	150mm dia x 0.4 m long double flanged GI pipe	No.	1		
10.4.6	150mm dia sluice valve	No.	1		
10.4.7	150mm single orifice air valve	No.	1		
<b>10.5</b>	<b>WASHOUTS (W/O)</b>				
10.5.1	Excavate for, provide all materials and construct complete w/o chambers of internal dimensions 2000 x 2000 x 2000 mm. Rates to including thrust blocks, pipe supports as shown in the drawings.	No.	1		
	Provide, handle, install and test the following steel and uPVC pipes and fittings, valves and specials. Special rates shall include for completing all pipe joints as specified in the specification				
	<b>For 1No. Washout at Chainage 560m</b>				
10.5.2	900/900 mm dia Stepped coupling	No.	2		
10.5.3	900 mm dia single flanged GI pipe	No.	2		
10.5.4	900mm x 400mm level invert scour GI tee with flanged branch	No.	1		
10.5.5	400 mm dia sluice valve	No.	1		
10.5.6	400 mm dia x 2000 mm long single flanged GI pipe	No.	1		
10.5.7	4000 / 400 mm dia uPVC / GI adaptor	No.	1		
10.5.8	400 mm UPVC pipe PN6	m	6		
10.5.9	400mm GI flanged pipe 500 mm long with a flap valve	No.	1		
<b>10.6</b>	<b>BENDS</b>				
10.6.1	900mm dia. steel 90 degrees bend	nr	2		
<b>10.7</b>	<b>ANCHOR BLOCKS</b>				
10.7.1	Supply all materials and construct anchor block for 900mm dia. Steel 900 bend	nr	2		
	<b>Page Total Carried Forward to Bill No 10 Collection Page</b>				



<b>ISILO DAM WATER PROJECT</b>					
<b>BILL No. 11: SCHEDULE OF DAYWORKS</b>					
<b>ITEM</b>	<b>DESCRIPTION</b>	<b>UNIT</b>	<b>QTY</b>	<b>RATE (Ksh.)</b>	<b>AMOUNT (Ksh.)</b>
<b>11.1</b>	<b>Labour</b>				
	The cost for each class of labour as entered in the schedule of Dayworks shall be the actual cost of wages plus a percentage to cover transport to site, small tools, supervision overheads and profit. The cost for each class of labour as entered in the schedule of Dayworks shall be the actual cost of wages plus a percentage to cover transport to site, small tools, supervision overheads and profit.				
11.1.1	Unskilled Workman	hr	3000		
11.1.2	Skilled workman	hr	2000		
11.1.3	Diver	hr	500		
11.1.4	Plant operator	hr	1000		
11.1.5	Watchman	hr	300		
<b>11.2</b>	<b>Materials</b>				
	<b>The actual quantity invoiced as delivered to site at the rate given in the schedule of dayworks which shall include delivery overheads and profits</b>				
11.2.1	Cement	ton	12		
11.2.2	Fine Aggregate/ Sand	m3	40		
11.2.3	Coarse Aggregate/ Ballast	m3	40		
<b>11.3</b>	<b>Plants and Equipment</b>				
	At the rates given in the schedule of dayworks which shall include delivery and \ removal from site, fuel, and lubricants.				
11.3.1	Compressor 5m3/hr.	hr	200		
11.3.2	Compressor 5/15m3/hr.	hr	100		
11.3.3	Compressor 15/30 m3/hr.	hr	50		
11.3.4	Mobile crane 20/40 tons max	hr	50		
11.3.5	Mobile crane 5/20 tons max	hr	50		
11.3.6	Mobile crane 5 tons max	hr	50		
11.3.7	Dumper 4/6 ton payload	hr	50		
11.3.8	Dumper 6/10 ton payload	hr	50		
11.3.9	Dumper 10/20 ton payload	hr	50		
11.3.10	Dumper 20/40 ton payload	hr	50		
11.3.11	Excavator 50hp max	hr	50		
11.3.12	Excavator 50/100hp max	hr	50		
11.3.13	Excavator 100/200hp max	hr	50		
11.3.14	Excavator 200/400hp max	hr	50		
11.3.15	Lorry 1.5 tons pay load	hr	50		
11.3.16	Lorry 1.5/5 tons pay load	hr	50		
11.3.17	Lorry 5/15 tons pay load	hr	100		
11.3.18	Lorry 15/35 tons pay load	hr	100		
11.3.19	Concrete mixer 500liters max	hr	50		
11.3.20	Concrete mixer greater than 500liters	hr	50		
11.3.21	Water pump 3kW capacity	hr	50		
11.3.22	Water pump 3/8 kW capacity	hr	50		
<b>Page Total Carried Forward to Bill No 11 Collection Page</b>					







<b>ISILO DAM WATER PROJECT</b> <b>APPENDIX TO BILL ITEM 1.04:</b> <b>PROVIDE AND MAINTAIN FURNITURE AND EQUIPMENT FOR THE ENGINEER'S LABORATORY</b>					
ITEM	DESCRIPTION	UNIT	QTY	RATE (Ksh.)	AMOUNT (Ksh.)
<b>1. FURNITURE</b>					
A104/1.01	Desk 2.2x0.9 m with chair and lockup drawers	No	2		
A104/1.02	Desk chair (standard)	No	15		
A104/1.03	Stationery cupboard, 1.2 m <sup>3</sup> , lockable	No	2		
A104/1.04	Steel filing cabinet, 4 drawers, lockable	No	2		
A104/1.05	Steel filing cabinet, 2 drawers, lockable	No	2		
A104/1.06	Bookshelf, 3 shelves 1.2 m long (to hold box files)	No	2		
A104/1.07	Table - 6 m <sup>2</sup>	No	2		
A104/1.08	Two Plate electric heater	No	1		
A104/1.09	Fire extinguisher, 10 litre capacity, CO <sub>2</sub> type	No	4		
A104/1.10	Complete first aid kit	No	2		
<b>EQUIPMENT</b>					
<i>(The following equipment shall be purpose made for use in the Engineer's laboratories and shall comply with the relevant British (BS) or American (AASHTO) Standard)</i>					
<b>2. General Equipment</b>					
A104/2.02	2.49kg. Compaction hammer, drop regulated to 304.8mm	No	2		
A104/2.03	4.535kg compaction hammer drop regulated to 457.2mm	No	2		
A104/2.04	Electric vibrating Kango Hammer fitted with steel tamper(BS 1377) with support frame	No	1		
A104/2.05	Straight edge 300 mm long with handles	No	4		
A104/2.06	Steel Tamper (BS1377) compatible with Kango hammer	No	3		
A104/2.07	Compaction mould 152.4 mm. dia x 116.43 mm complete with base plate and extension collar, 101.6 mm	No	2		
A104/2.08	Galvanized metal tray 1m x 0.5m x 75 mm deep	No	4		
A104/2.09	75mm brush	No	2		
A104/2.10	Semi-automatic balance, 25kg Capacity accurate to 1g, including weights	No	1		
A104/2.11	20mm BS Sieve, 300mm diameter	No	1		
A104/2.12	Stop Clock	No	2		
A104/2.13	Thermostatically controlled electric oven 105-110°C, capacity 0.225 m <sup>3</sup>	No	2		
A104/2.14	As above but gas heated	No	1		
A104/2.15	Moisture content tins, 75 mm dia, Cadmium or aluminium plated	No	60		
A104/2.16	Cone penetrometer with gauge and automatically controlled test cup	No	2		
<b>C/Forward to next page</b>					

<b>ISILO DAM WATER PROJECT</b> <b>APPENDIX TO BILL ITEM 1.04:</b> <b>PROVIDE AND MAINTAIN FURNITURE AND EQUIPMENT FOR THE ENGINEER'S LABORATORY</b>					
ITEM	DESCRIPTION	UNIT	QTY	RATE (Ksh.)	AMOUNT (Ksh.)
	<b>B/Forward from previous page</b>				
	<b>3. Density (Sand replacement method BS 1377)</b>				
A104/3.01	Metal containers 450mm diameter	No	2		
A104/3.02	Stainless steel tray 305mm diameter	No	2		
A104/3.03	Metal tray with 150 mm diameter hole in the centre, 300mmx300 mm square or equivalent area, 40mm deep	No	2		
A104/3.04	Metal tray with 200mm diameter hole in the centre, 500mm x 500 mm square , 50 mm deep	No	2		
A104/3.05	Steel pegs for fixing tray in position	No	15		
A104/3.06	Sand pouring cylinder, 150 mm diameter	No	2		
A104/3.07	Sand pouring cylinder, 215 mm diameter	No	2		
A104/3.08	Cold steel chisel 20mm x 300mm	No	4		
	<b>C/Forward to next page</b>				

<b>ISILO DAM WATER PROJECT</b> <b>APPENDIX TO BILL ITEM 1.04:</b> <b>PROVIDE AND MAINTAIN FURNITURE AND EQUIPMENT FOR THE ENGINEER'S LABORATORY</b>					
ITEM	DESCRIPTION	UNIT	QTY	RATE (Ksh.)	AMOUNT (Ksh.)
<b>B/Forward from previous page</b>					
A104/3.09	Cold steel chisel 10mm x 250mm	No	4		
A104/3.10	1.5kg, 3.5kg hammers and 1kg rubber mallet	Set	1		
A104/3.11	Scoop for removing excavated material from hole, 250 mm long handle	No	6		
A104/3.12	100mm brush, soft	No	3		
A104/3.13	50mm brush, soft	No	3		
A104/3.14	Primus gas stove	No	1		
A104/3.15	Calibrating can 150 mm diameter x 150 mm deep	No	3		
A104/3.16	Ditto but 200 mm diameter x 250 mm deep	No	3		
<b>5. CBR (AASHTO T193)</b>					
A104/5.01	CBR mould, 152.4 mm dia x 178 mm high, complete with perforated base plate and extension collar 50.8 mm high that can be fitted to either side of mould	No	50		
A104/5.02	Perforated swell plate 150 mm dia with an adjustable centre post of rust proof metal provided with a lock-nut	No	40		
A104/5.03	2.25 kg split surcharge weight	No	2		
A104/5.04	Set of annular surcharge weights	No	1		
A104/5.05	Solid base plate for CBR mould	No	2		
A104/5.06	Static compaction displacer discs 1 No x 61.4 mm, 1 No x 50.8 mm and 2 No x 38.8 mm thick with handles	set	1		
A104/5.07	Disk lifting handle	No	2		
A104/5.08	Central extruder, complete with 20kN hydraulic jack and accessories	No	1		
A104/5.09	Automatic CBR Proctor Compaction press, 50 tonnes capacity with an adjustable distance between platens of 530mm-250mm, rammer weights and automatic count selector	No	1		
A104/5.10	Set of guards for above press.	No	1		
A104/5.11	50 kN CBR Load frame complete with stabilizing bar (electric and hand operated) including proving rings for 10KN, 28KN and 50KN, piston and bracket	No	1		
A104/5.12	Penetration gauge range 0 - 25mm	No	2		
A104/5.13	CBR piston including bracket	No	2		
A104/5.14	Swell measurement tripod complete with gauge calibrated in 0.01 mm divisions	No	2		
A104/5.15	Soaking tank for CBR mould sufficient for 50 moulds	No	1		
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<b>ISILO DAM WATER PROJECT</b> <b>APPENDIX TO BILL ITEM 1.04:</b> <b>PROVIDE AND MAINTAIN FURNITURE AND EQUIPMENT FOR THE ENGINEER'S LABORATORY</b>					
ITEM	DESCRIPTION	UNIT	QTY	RATE (Ksh.)	AMOUNT (Ksh.)
	<b>B/Forward from previous page</b>				
	<b>6. Relative Density of Aggregates (BS 812)</b>				
A104/6.01	Wire mesh basket with apertures not greater than 6.5 mm large enough to contain 2.5 kg of aggregate	No	2		
A104/6.02	A stout watertight container in which the basket can be freely suspended	No	2		
A104/6.03	Soft absorbent cloth (tea towel)	No	10		
A104/6.04	Shallow tray of area not less than 0.065 m <sup>2</sup>	No	2		
A104/6.05	An airtight container of similar capacity to the basket	No	2		
A104/6.06	Pycnometer of 1 litre capacity	No	4		
A104/6.07	Semi automatic 5 kg balance accurate to 0.1g to be of size and type to permit the basket containing the sample to be suspended in water(to be supplied with weights)	No	1		
A104/6.08	Hot air drier (electric)	No	2		
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<b>ISILO DAM WATER PROJECT</b> <b>APPENDIX TO BILL ITEM 1.04:</b> <b>PROVIDE AND MAINTAIN FURNITURE AND EQUIPMENT FOR THE ENGINEER'S LABORATORY</b>					
ITEM	DESCRIPTION	UNIT	QTY	RATE (Ksh.)	AMOUNT (Ksh.)
<b>B/Forward From previous page</b>					
<b>7. Flakiness (BS 812)</b>					
A104/7.01	Thickness gauge (various sizes)	No	2		
<b>8. Sieve Analysis (BS 1377)</b>					
A104/8.01	BS Sieve 300mm diameter in sizes 75, 63, 50, 37.5, 28, 20, 14, 10, 6.3, 5 and 4 mm, plus lid and receiver	Set	2		
A104/8.02	BS Sieve 200mm diameter in sizes 2, 1, 0.6, 0.5, 0.425, 0.300, 0.150 and 0.075 mm, plus lid and receiver	Set	2		
A104/8.03	Electric sieve shaker	No	1		
A104/8.04	BS sieve 200mm diameter 0.425 and 0.075 mm	set	1		
A104/8.05	1 m x 1 m x 75mm deep galvanized metal tray	No	10		
A104/8.06	Riffle box with 50mm slots (BS 1377)	No	1		
<b>9. Miscellaneous Equipment</b>					
A104/9.01	Wheel barrow	No	3		
A104/9.02	Dustpan and brush	No	3		
A104/9.03	Shovel	No	4		
A104/9.04	Pick axe with handle	No	4		
A104/9.05	Metal scoop, large (150mm wide)	No	3		
A104/9.06	Metal scoop, medium (100mm wide)	No	4		
A104/9.07	Garden trowel	No	2		
A104/9.08	Steel tray 0.3m x 0.3m x 0.01m deep	No	15		
A104/9.09	Palette knife 200mm long blade	No	3		
A104/9.10	Palette knife 100mm long blade	No	4		
A104/9.11	BS sieve 450mm diameter, 37.5mm	No	1		
A104/9.12	BS sieve 450mm diameter, 20mm	No	1		
A104/9.13	BS sieve 450mm diameter, 5mm	No	1		
A104/9.14	BS sieve 450mm diameter, 0.425mm	No	1		
A104/9.15	BS sieve 450mm diameter, 0.3mm	No	1		
A104/9.16	BS sieve 450mm diameter, 0.075mm	No	1		
A104/9.17	Set of lid and receiver for metal scoop and steel trays	No	2		
A104/9.18	BS Sieve brush	No	2		
A104/9.19	Measuring cylinder set, 25 ml, 100 ml, 500 ml, 1000 ml, 2000 ml	set	2		
A104/9.20	Glass jar capacity 5 litres with lid	No	10		
A104/9.21	200mm x 200mm x 20mm cadmium plated or aluminium tin	No	20		
A104/9.22	Electronic balance capacity 1000 g, accurate to 0.01gm.	No	1		
A104/9.23	Balance 2000 g capacity accuracy to 0.1g (manual), including weights	No	1		
A104/9.24	Balance 50kg capacity accurate to 10gm including weights	No	1		
A104/9.25	Still for producing distilled water	No	1		
A104/9.26	Polythene or glass 20 litres storage vessel with tap at bottom	No	2		
A104/9.27	Stiff broom	No	2		
A104/9.28	Vernier calipers, 150mm	No	2		
A104/9.29	Vernier calipers, 250mm	No	2		
A104/9.30	Pestle and mortar	No	2		
A104/9.31	Linear shrinkage mould (BS 1377)	No	6		
A104/9.32	Liquid Limit Device	No	2		
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<b>ISILO DAM WATER PROJECT</b> <b>APPENDIX TO BILL ITEM 1.04:</b> <b>PROVIDE AND MAINTAIN FURNITURE AND EQUIPMENT FOR THE ENGINEER'S LABORATORY</b>					
ITEM	DESCRIPTION	UNIT	QTY	RATE (Ksh.)	AMOUNT (Ksh.)
<b>B/Forward from previous page</b>					
A104/9.33	Average least dimension gauge	No	2		
A104/9.34	Lockable tool box containing: 1 pr" Molegrips", 2 x 150mm screwdriver, 2 x 200 mm screwdriver, 2 x 300 mm screwdriver, (1 standard and 1 Phillips head of each) adjustable spanners 200 mm and 300 mm, 1 pair round nosed pliers, 1 pair general	No	1		
A104/9.35	Plastic or metal bucket including lid, 10 litres capacity	No	6		
A104/9.36	Polythene wash bottle (500 ml)	No	5		
A104/9.37	A4 size clipboard	No	4		
A104/9.38	Thermometer, range -10°C to 150°C, glass (BS 593)	No	2		
A104/9.39	Laboratory thermometer, range + 0°C to + 250°C (BS 593)	No	2		
A104/9.40	Maximum and minimum thermometer (BS692)	No	2		
A104/9.41	Rain gauge	No	1		
A104/9.42	Portable dial thermometer + 50°C to +250°C accurate to ± 3%	No	1		
A104/9.43	Ditto with 0.75m long stem	No	1		
A104/9.44	Pocket thermometer + 50°C to +250°C accurate to ± 3% with 0.1 m stem	No	2		
A104/9.45	5 litre capacity steel storage containers with leak and dust proof lids for storage of bitumen samples	No	50		
A104/9.46	Hotplate 200mm diameter with Simmerstat heat control unit.	No	2		
A104/9.47	450mm diameter x 150mm deep metal mason's basin	No	6		
<b>11. Concrete: Slump and Cube Manufacture (BS 1881)</b>					
A104/11.01	Slump cone, tamping rod and base	set	2		
A104/11.02	Concrete cube mould, 150mm cube	No	30		
A104/11.03	Soaking tank for cubes (capacity 50 No.)	No	1		
A104/11.04	Cube tamping bars	No	10		
<b>12. Concrete: Cube Compression Testing</b>					
A104/12.01	Concrete compression machine to BS1610 Grade A with 300 mm gauge, rectangular platens, capacity 1560 kN with load spacer	No	1		
A104/12.02	Safety guard for above				
A104/12.03	50mm distance piece				
A104/12.04	70mm distance piece				
A104/12.05	Electro-mechanical load pacer, 100 mm or equivalent distance piece				
<b>13. Aggregate and Chippings</b>					
A104/13.01	Sand equivalent to AASHTO T176 including graduated plastic cylinder, rubber stopper, irrigation tube weighted foot assembly, siphon assembly, 85ml tin box (57mm dia.), 100 mm dia wide mouth funnel, stop clock, mechanical shaker and 10 litre jar	Set	1		
A104/13.02	Beaker 250ml	No	2		
A104/13.03	Aggregate Crushing Value Apparatus, 150 mm nominal diameter, including plunger and base plate	No	2		
A104/13.04	Tamping rod and metal measure for above	Set	4		
A104/13.05	Los Angeles Abrasion to ASTM standards	No	1		
A104/13.06	Set of 12 abrasive charges	No	2		
A104/13.07	Thermometer, 0°C to +50°C	No	2		
<b>C/Forward to next page</b>					





**ISILO DAM WATER PROJECT  
APPENDIX B**

**APPENDIX TO BILL ITEM 1.33: PROVIDE, FURNISH AND MAINTAIN THE R.E.'S OFFICE**

DESCRIPTION	UNIT	QTY	RATE (Ksh.)	AMOUNT (Ksh.)
<b>1. ENGINEER'S MAIN OFFICE AND FURNITURE</b>				
Executive desk 2.2x0.9 m with six lockup drawers	No.	2		
Desk 2.2x0.9 m with chair and three lockup drawers	No.	5		
Office tables 2.2x0.9 m	No.	3		
Executive Swivel orthopedic chair adjustable height	No.	2		
Standard office chairs	No.	10		
Typist's desk	No.	1		
Typist's chair	No.	1		
Lockable steel stationery cupboard, 1.2 m <sup>3</sup> , lockable	No.	2		
Medium size steel filing cabinet, 4 drawers lockable	No.	2		
Medium size steel filing cabinet, 2 lockable drawers	No.	2		
Bookshelf, 1.5 m wide 3 shelves (for box files) sliding glass door	No.	2		
Conference table with 15 chairs	No.	1		
Waste paper basket	No.	10		
Curtains for office and laboratory -for all windows	Set	2		
Ordinary 2 hole paper punch	No.	5		
Heavy duty 2 hole paper punch	No.	2		
Computer meeting the following specifications or equivalent: Personal computer with 17" screen full multimedia, 500GB hard disk, 4.0GB RAM, Core i7 processor, complete with all accessories preloaded with latest versions of Microsoft Office 2010	No.	4		
AutoCAD Civil 3D 2016 and Licenses for above computers	No.	2		
Laptop PC with Intel Core i7-4510U Processor 15.4" screen, CPU @ 2.6GHz 8GB RAM 1TB 8xDVD+/-RW approved with Microsoft Office 2010	No.	4		
Latest HP (A4) Laser Printer with accessories	No.	4		
Latest HP (A3) Laser Colour Printer with accessories	No.	1		
UPS 600 VA	No.	6		
Wall clocks, battery powered min size 350mm	No.	6		
First Aid Kit	No.	4		
Fire Extinguisher	No.	4		
Filing Tray - set of 3no.	set	10		
Refrigerator minimum capacity 0.2 m <sup>3</sup>	No.	1		
Drinking water dispenser, hot/cold	No.	3		
Table - 0.8 m <sup>2</sup> surface area	No.	1		
Cupboard, 0.15 m <sup>3</sup> , lockable	No.	1		
13 Kg Gas cylinder with three gas burners	No.	2		
<b>C/Forward</b>				



**ISIOLO DAM WATER PROJECT  
APPENDIX C**

**APPENDIX TO BILL ITEM 1.35 ENGINEERS'S SURVEY EQUIPMENT**

ITEM	DESCRIPTION	UNIT	QTY	RATE (Ksh.)	AMOUNT (Ksh.)
1.01	Digital Total Station <b>reading to 1" accuracy (one second)</b> with the following facilities: <ul style="list-style-type: none"> <li>· Inbuilt data logger</li> <li>· Uploading/downloading software</li> <li>· Data transfer cable</li> <li>· Battery (<b>2No</b>)</li> <li>· Battery charger</li> <li>· Tool kit</li> <li>· Two face keyboard</li> <li>· User manual</li> </ul> It must have the following inbuilt survey programs as a minimum <ul style="list-style-type: none"> <li>· Survey</li> <li>· Staking out</li> <li>· Resection/intersection</li> <li>· Traverse</li> <li>· Cogo</li> </ul>	No.	1		
1.02	The following mandatory total station accessories must be included per Total station instrument				
a)	1No. Heavy duty telescopic tripod ( <b>preferably wooden</b> )	No.	1		
b)	Telescopic plumbing prism pole complete with a prism and prism holder with target and plumbing bubble ( <b>length not less than 2.15m</b> )	No.	3		
c)	Triple prism holder set, in a casing, comprising triple prisms, prisms holder with target, tribrach and a tribrach adaptor	No.	1		
d)	· Survey umbrella	No.	1		
e)	· 1No. Telescopic Tripod	No.	1		
1.03	Engineer's Automatic Level Wild NAK 2 or similar with a tripod and the following specifications <ul style="list-style-type: none"> <li>· Accuracy of 0.7 mm per 1 km double run</li> <li>· Standard magnification of: 32x</li> <li>· Shortest focusing distance of 1.6m</li> <li>· Compensator setting accuracy of 0.3"</li> </ul>	No.	2		
1.04	Hand held GPS with accuracy of 1 Metre	No.	5		
1.05	Set of two way radio communication with a range of 1 kilometer	set.	1		
1.06	5 M Leveling staff with leveling bubble	No.	4		
1.07	3 M Ranging Rods	No.	10		
1.08	Scientific Calculators FX 912ms or equivalent	No.	3		
1.09	50m. Linen Measuring Tape	No.	5		
1.10	1m stainless steel straight edge	No.	1		
1.11	3 m tape measure	No.	10		
1.12	Sledge hammer 2kg weight	No.	2		
1.13	Mattock	No.	2		
1.14	Pangas (16")	No.	10		
1.15	Marker Pens	No.	20		
1.16	Reflector Jackets	No.	30		
1.17	Levelling Survey books	No.	100		
1.18	Provision of Geodetic GNSS receivers comprising of one base and two rovers as per the specifications in Appendix D	No.	1.00		

**ISIOLO DAM WATER PROJECT****APPENDIX C****APPENDIX TO BILL ITEM 1.35 ENGINEERS'S SURVEY EQUIPMENT**

ITEM	DESCRIPTION	UNIT	QTY	RATE (Ksh.)	AMOUNT (Ksh.)
	Total carried to Bill Item 1.35				

**ISILO DAM WATER PROJECT  
APPENDIX D - GNSS**

ITEM	DESCRIPTION	GEODETTIC GLOBAL NAVIGATION SATELLITE SYSTEM SPECIFICATIONS (GNSS)	REMARKS
1	Geodetic GNSS Receivers	<p><b>General Characteristics</b></p> <p>Geodetic Set enabled for both Static and RTK functions with respective supporting software and accessories</p> <p><b>Specific Specifications</b></p> <p><b>1. Channels:</b> At least 120 enabled for simultaneous signal tracking</p> <p><b>2. Reception</b></p> <p>Must be enabled for Multi - Constellation / Frequency i.e. current systems e.g. GPS (L1, L2, L2C, L5) GLONASS ( L1C/A, L1P, L2C/A); SBAS (EGNOS, WAAS, MSAS, GAGAN, QZSS) Galileo ready: E1, E5A, E5B BeiDou ready (Compass) : B1, B2 Must have some multipath mitigation technology embedded</p> <p><b>Note: Should be configured to receive new and upcoming constellations (if any)</b></p>	
		<p><b>2. Accuracy :</b></p> <p><b>Real Time Kinematics (RTK)</b></p> <ul style="list-style-type: none"> <li>- Horizontal: 8 mm + 1 ppm RMS</li> <li>- Vertical: 15 mm + 1 ppm RMS</li> <li>- Initialization time: typically &lt; 5 s</li> <li>- Initialization reliability &gt;99.9%</li> </ul> <p><b>Post Processing Static</b></p> <ul style="list-style-type: none"> <li>- Horizontal: 3 mm + 0.5 ppm RMS</li> <li>- Vertical: 5 mm + 0.5 ppm RMS</li> <li>- Baseline Length: ≤ 80 km</li> </ul>	
		<p><b>3. Special functionalities</b></p> <p><b>Extended RTK range - base setup</b></p> <ul style="list-style-type: none"> <li>- the base receiver to be able to stream RTK data via integrated GSM modem and to support up to 10 rovers simultaneously</li> <li>- the base to provide Wi-Fi hotspot functionality for better control/setup of the receiver</li> <li>- the base to provide web interface functionality via any smart phone, tablet or computer</li> <li>- the base to provide NTRIP caster and dyndns functions</li> </ul> <p><b>Increased reliability - rover setup</b></p> <ul style="list-style-type: none"> <li>- the rover to provide a mode for better performance under difficult conditions (close to buildings, trees and urban areas)</li> <li>- the rover to be able to connect to any CORS GNSS networks or Single stations via internet</li> </ul>	

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ITEM	DESCRIPTION	GEODETTIC GLOBAL NAVIGATION SATELLITE SYSTEM SPECIFICATIONS (GNSS)	REMARKS
		<p><b>4. Communications</b></p> <p><b>a) I/O</b></p> <ul style="list-style-type: none"> <li>· 2x TNC connector ( 1 for UMTS antenna and 1 for UHF antenna)</li> <li>· 2x LEMO</li> <li>· 1x high speed USB</li> <li>· Integrated GSM/GPRS modem</li> <li>· Integrated Bluetooth class 2</li> </ul>	
		<ul style="list-style-type: none"> <li>· Optional radio modem (2):</li> <li>- Internal Rx/Tx: 403-473 MHz</li> <li>- External Radio: 1W - 35W adjustable (at least 12Km range)</li> <li>. Should be configured to log into any upcoming CORS protocol</li> <li>. Should be enabled to use SIM card</li> </ul>	
		<p><b>b) Radio Transmission Protocols (RTK)</b></p> <ul style="list-style-type: none"> <li>- RTCM2.1, RTCM2.3, RTCM3.0, CMR, CMR+ input and output</li> <li>- NMEA0183 output</li> </ul>	
		<p><b>5. Data Storage:</b></p> <ul style="list-style-type: none"> <li>. Must be able to store raw data</li> <li>. Must have at least 4 GB internal storage</li> <li>. Optional external microSD storage</li> <li>. Device should mount as a USB external hard drive</li> </ul>	
		<p><b>6. Power Supply</b></p> <ul style="list-style-type: none"> <li>· Battery life: at least 5 hours in RTK mode</li> <li>· Must have External power input option</li> <li>· Each set should be supplied with two internal battery packs</li> </ul>	
		<p><b>7. Software</b></p> <p><b>Two types of software</b></p> <p><b>a) for Static</b></p> <ul style="list-style-type: none"> <li>· Permanent license to be included ( protected by USB dongle)</li> <li>· Must be able to process raw data ( GPS L1&amp;L2, Glonas L1&amp;L2) from leading brands</li> <li>. Must be able to define datums and compute various transformations</li> <li>. Must be able to do 3D adjustment</li> <li>· Must be able to export/import raw data to RINEX format and process the same. This feature must be inclusive</li> </ul>	
		<p><b>b) for RTK</b></p> <p>Supplier should provide license free field data collection software that has the following key survey operational</p> <ul style="list-style-type: none"> <li>▪must provide functions for topo survey</li> <li>▪must provide functions for stakeout</li> </ul> <p>•Operating platform - Windows Mobile 6.5 or equivalent</p>	
		<p><b>8. Sourcing</b></p> <p>The equipment must be sourced from manufacturer's authorized dealers in Kenya who must be capable of training users and commissioning the equipment for full use.</p>	
		<p><b>9. Warranty</b></p> <p>Minimum of One year</p>	







