

BILLS OF QUANTITIES FOR NEW CONSTRUCTION RWC 682B					
BILL NO. 1: PRELIMINARIES AND GENERAL ITEMS					
ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
1.01	Provide or rent accommodation for Engineer's senior and junior staff (i) Type I - 1 No.	Month	24	65,000.00	1,560,000.00
	(ii) Type II - 2 No.	Month	24	55,000.00	1,320,000.00
	(iii) Type III - 3 No.	Month	24	40,000.00	960,000.00
	(iv) Type IV - 4 No.	Month	24	30,000.00	720,000.00
	(v) Type V - 5 No.	Month	24	21,000.00	504,000.00
	Total				5,064,000.00
1.02	E.O item 1.01 for Contractor's overhead and profit	%			-
1.03	Provide or rent and maintain Engineer's Representative's office as shown on the drawings or as instructed by the Engineer for use during the duration of the Contract, ownership to revert to the Contractor at the end of the Contract	LS	1		-
1.04	Provide or rent and maintain Engineer's Site Laboratory for the duration of the Contract, ownership to revert to the Contractor at the end of the Contract	LS	1		-
1.05	Provide and maintain Laboratory equipment, reagents and other items as priced in Appendix 'A' to the Bill of Quantities for use by the Engineer's representative for the duration of the contract, ownership to revert to the Employer at the end of the Contract.	LS	1		-
1.06A	Provide and maintain furniture , tools and other items for the Engineers Representative office for the duration of the Contract as priced in Appendix 'B' , ownership to revert to the Employer at the end of Contract.	LS	1		-
1.06B	Provide and maintain survey equipment as priced in Appendix C for the duration of the contract, ownership to revert to the Employer at the end of Contract.	LS	1		-
1.09	Provide with drivers, fuel and maintain two (2) new 4WD fully loaded double cabin pick-up of minimum diesel engine capacity 2500 CC approved by the Engineer for his exclusive use, inclusive of the first 5000km per vehicle month. Vehicle to revert to the Contractor at the end of the project.	Veh Month	60		-
1.10	E.O item 1.09 for total aggregated mileage in excess of 5000 km per vehicle month.	Km	60,000		-
1.13	Ditto item 1.09, but one(1) new 4WD Single cabin pick-ups with fibre glass body of minimum diesel engine capacity 2500cc approved by the Engineer for his exclusive use, inclusive of the first 5000km per vehicle month. Vehicle to revert to the Contractor at the end of the project.	Veh Month	24		-
1.14	E.O item 1.13 for total aggregated mileage in excess of 5000 km per vehicle per month.	Km	2,400		-
1.15	Allow a Prime Cost Sum of Kshs. 3,000,000 for the RE's miscellaneous account to be spent in whole or part as directed by the RE against receipts.	PC Sum	1		-
1.16	E.O. item 1.15 for Contractor's overheads and profits.	%	10%		-
1.17	Allow a Prime Cost Sum of Kshs. 16,800,000 for attendance upon the Resident Engineer' staff.	PC Sum	1		-
1.18	E.O. item 1.17 for Contractor's overheads and profits.	%	10%		-
1.19	Provide, erect and maintain publicity signs as directed by the Engineer.	No	6		-
1.20	Allow for Prime Cost Sum of Kshs. 2,000,000.00 for training of Engineers	PC Sum	1		-
1.21	E.O. item 1.20 for Contractor's overheads and profits.	%	10%		-
1.24	Provide and maintain for the duration of the contract a mobile weigh bridge with manufacturers warranty, as specified in Appendix E in a PDF file. The weigh bridge to revert to employer at commencement of the project. Allowances for repairs and maintenance must be included in the quotation	No	1		-
	Bill No. 1 Total Carried Forward to Grand Summary				5,064,000.00
BILL NO. 4 : SITE CLEARANCE AND TOP SOIL STRIPPING					
ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	<i>Note: No separate payments shall be made for gravel for blinding or hauling to spoil unsuitable excavation materials and the cost of such shall be included in the rates and prices</i>				
4.01	Clear site on road reserve including removal of all growths, bushes,hedges, trees, stumps, grub up roots, and other deleterious materials and back-fill and compact to 100% MDD(AASHTO T99) with approved material as directed by the Engineer.	Ha.	20		-
4.02	Strip top soil upto 0.2m in thickness along alignment or material sites including removal of all grass and other vegetation,transport to spoil and spread or stock pile for re-use as directed by the Engineer.	m³	48,000		-
4.03	Provide KShs.2,000,000 for the removal of structures and obstructions as instructed by the Engineer to be paid on dayworks basis	Prov. Sum	1		-
4.04	E.O. item 4.03 for Contractor's overheads and profits.	%			-
4.04	Demolish reinforced or mass concrete structures and cart to spoil or stockpile for re-use as directed by the Engineer	m³	200		-
	Bill No. 4 Total Carried Forward to Grand Summary				0.00
BILL NO. 5 : EARTHWORKS					
ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	<i>Note: No separate payments shall be made for gravel for blinding or hauling to spoil unsuitable excavation materials and the cost of such shall be included in the rates and prices</i>				
5.01	Fill in soft material including benching of shoulders and embankments and compaction to 95% MDD (AASHTO T99) in layers not exceeding 150mm	m³	28,200		0.00
5.02	Extra Over Item 5.01 for compaction of the top 300 subgrade to 100% MDD.	m³	4,050		0.00
5.03	Ditto item 5.01 but in hard material	m³	4,230		0.00
5.04	Cut to spoil in soft material	m³	18,450		0.00
5.05	Ditto item 5.04 but in hard material	m³	1,845		0.00
5.06	Provide improved subgrade material as instructed by the Engineer and compaction to 100% MDD (AASHTO T99)	m²	7,050		0.00
5.07	Compaction of top 300mm below formation level in cuts to 100% MDD.(AASHTO T99)	m²	3,900		0.00
5.08	Compaction of 150mm original ground below fills to 95% MDD.(AASHTO T99)	m²	2,250		0.00
5.09	Top-soiling prior to planting grass as directed by the Engineer	m²	2,550		0.00
5.10	Grassing as directed by the Engineer	m²	2,550		0.00
5.11	Provide Rock Fill to swampy areas as directed by Engineer	m³	300		0.00
5.12	Provide Filter fabric to swamp under, over and around rock fill	m²	60		0.00
5.14	Scarify existing bituminous pavement material and store for re-use or cart away to spoil	m³	5,000		-
	Bill No. 5 Total Carried Forward to Grand Summary				0.00
BILL NO. 7 : EXCAVATION AND FILLING OF STRUCTURES					
ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	<i>Note: No separate payments shall be made for gravel for blinding or hauling to spoil unsuitable excavation materials and the cost of such shall be included in the rates and prices</i>				
7.01	Excavate to spoil in soft materials.	m³	615		-
7.02	As item 7.01 but in hard material.	m³	45		-
7.03	Provide,place and compact rockfill below and around structures.	m²	380		-
7.04	Provide and place 150mm thick stone pitching as directed by the Engineer including cement grouting	m²	15,500		-
	Bill No. 7 Total Carried Forward to Grand Summary				0.00
BILL NO. 8. CULVERTS AND DRAINAGE WORKS					
ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	<i>Note: No separate payments shall be made for gravel for blinding or hauling to spoil unsuitable excavation materials and the cost of such shall be included in the rates and prices</i>				
8.01	Excavate for inlet,outfall,mitre and catch water drains in soft material	m³	2,400		-
8.02	As per item 8.01, but for hard material.	m³	100		-
8.03	Excavation in soft material for pipe culverts,headwalls, wingwalls, apron,towalls,and drop inlets and compact as directed by the Engineer	m²	2,300		-
8.04	As per item 8.03, but for hard material	m³	100		-
8.05	Provide,Jay and joint 600mm dia. concrete pipes (precast to BS 5911 Parts 1 & 3) for access roads	m	800		-
8.06	As for item 8.05 but 900mm dia concrete pipes (precast to BS 5911 parts 1 & 3) for cross culverts	m	850		-
8.08	Provide and place class 15/20 concrete to beds, surround and haunches	m³	400		-
8.09	Provide, place and compact class 25(20) concrete for headwalls, wingwalls, aprons, and towalls to access and cross pipe culverts including all form work and the provision and placing of reinforcement as shown in the drawings	m	575		-
8.10	Provide and place invert block drains with two course side slabs	m	900		-
8.11	Construct in concrete class 15(20) side drains scour checks as instructed	m³	320		-
8.13	Provide subsoil filter drains fabric to isolated wet spots inclusive of artesian cloth, and 14/20mm single size aggregates as directed by the Engineer	m	100		-
8.14	Remove existing pipe culverts of any diameter either for re-use or to be discarded as directed by the Engineer	m	380		-
8.15	Remove existing invert block drains with two course side slabs or stone pitching and discard as directed by the Engineer	m	1,400		-
8.16	Clean existing drainage structures of any description and size	m	960		-
8.17	Clean and shape existing outfall and mitre drains to free flow conditions	m	600		-
8.19	Provide,jay and joint ducts and sleeves including 150mm concrete (C15/20) 300mm heavy duty PVC class B with 150mm surround (precast to BS 5911 Parts 1 & 3) ducts/sleeves	m	250		-
	Bill No. 8 Total Carried Forward to Grand Summary				-
BILL NO. 9: PASSAGE OF TRAFFIC					
ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	<i>Note: Notwithstanding the provision of Section 9 of the Standard Specification, no extra payments shall be due as all costs shall be deemed to be included in the rates inserted herein</i>				
9.02	Grade, water and compact existing road; provide, spread, water and compact gravel as directed by the Engineer for maintenance ahead of works.	m³	2,925		-
9.03	Allow for the passage of traffic through and around the works	LS	1		-
	Bill No. 9 Total Carried Forward to Grand Summary				-
BILL NO. 10: GRADING AND GRAVELLING					
ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
10.01	Provide gravel wearing course, spread and compact to a finished thickness of 150mm to at least 95% M.D.D (AASHTO T-180) and shape to level and tolerance.	m³	15,225		-
	Bill No. 10 Total Carried Forward to Grand Summary				-
BILL NO. 12 : NATURAL MATERIAL FOR SUBBASE AND BASE					
ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	<i>Note: No overhaul will be paid for separately under these items as it shall be deemed to have been included in the Contractor's rates</i>				
12.01	Provide gravel sub-base material, spread, compact to at least 100% M.D.D (AASHTO T-180) and shape to level and tolerance.	m³	9,000		-
12.02	Ditto item 12.01 but for base	m³	8,000		-
	Bill No. 12 Total Carried Forward to Grand Summary				0.00
BILL NO. 14 : CEMENT OR LIME TREATED SUBBASE AND BASE					
ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	<i>Note: No overhaul will be paid for separately under these items as it shall be deemed to have been included in the Contractor's rates</i>				
14.01	Provide and spread Lime as an improvement agent for subbase and base layers	Tonne	500		-
14.02	Provide and spread Cement as an improvement agent for sub-base and base layers	Tonne	1,300		-
14.03	Mix and process natural material with improvement agent for pavement layers as instructed by the Engineer or as specified	m³	17,000		-
14.04	Protection and curing of cement / lime treated base and sub-base layers	m²	76,500		-
	Bill No. 14 Total Carried Forward to Grand Summary				0.00
BILL NO. 15: BITUMINOUS SURFACE TREATMENT & SURFACE DRESSING TO SHOULDERS					
ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
15.01	Prepare surface of carriageway and shoulders, provide, heat and spray MC 30 cutback bitumen prime coat at 0.8-1.2 Litres/m2.	Litres	131,000		-
15.08	Provide & spray KJ-60 as tack coat on carriageway, shoulders and on rumble strips at a rate of 0.5-0.8 l/m²	Litres	77,000		-
15.10	Repair cracks as directed by the Engineer	m	500		-
	Bill No. 15 Total Carried Forward to Grand Summary				0.00
BILL NO. 16: BITUMINOUS MIXES					
ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
16.01	Provide, place and compact Asphalt Concrete Type II to a thickness of 50 mm on carriageway Shoulders and bus bays as directed by the Engineer at Bitumen Content of 5.5 - 7.0% by weight of total mix.	m³	2,430		0.00
16.06	Provide, place and compact Asphalt Concrete Type I (0/14) for bumps and rumble strips as directed by the Engineer at Bitumen Content of 5.5 - 7.0% by weight of total mix.	m³	200		0.00
	Bill No. 16 Total Carried Forward to Grand Summary				0.00
BILL NO. 20: ROAD FURNITURE					
ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
20.01	Provide Road Reserve Boundary posts	No.	80		-
20.02	Excavate for, provide & place 250 x 125mm precast concrete raised or ramped kerbs haunched in 100mm thick class 15/20 concrete base bedding and mortar joined in support to carriageway, busbays and junctions as directed by the Engineer. a) Straight kerbs b) Kerbs radius 12m - 6m c) Ditto but radius 5m - 1m	m m m	3,000 1,000 1,000		- - -
20.03	As 20.02 but for flush kerbs 100 x 125mm	m	3,000		-
20.04	Provide and erect permanent road signs where instructed by the Resident Engineer and in accordance with Special Specifications Clause 2004 as follows: a) warning signs b) Priority prohibitory and mandatory signs c) Standard informatory signs d) Non standard informatory signs area i) Less than 10m² ii) More than 1.0m² but less than 5m²	No. No. No. No. No.	10 10 10 10 5		- - - - -
20.05	Provide, deliver, paint and mark the road as specified or as directed by the Engineer, with white reflectorized thermoplastic paint from an approved supplier.	m²	8,000		-
20.06	As item 20.05 but for yellow reflectorized thermoplastic paint	m²	3,000		-
20.07	Provide and erect concrete posts for guardrails complete with spacers (size and interval) as per specifications or as directed by the Engineer	No.	250		-
20.08	Provide and erect flex-beam guardrails complete with connections as shown on the drawings or as directed by the Engineer	m	1,000		-
20.09	Provide Edge marker posts	No.	50		-
20.14	Provide and install cat-eyes as directed by the Engineer	No.	1,000		-
20.15	Provide, plant, and nurture tree seedlings for a period not less than half the construction period of the project or as directed by the Engineer.	No.	1,000		-
					0.00
BILL NO. 22: SCHEDULE OF DAYWORKS					
ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	PLANT				
	<i>The rates inserted herein are to include all operational and Maintenance costs, fuel, oil, grease, drivers/operators wages, supervision, overheads and profit. Only time actually employed upon the work will be paid for and the rates should include for idle time, travelling time and overtime. In accordance with clause 2202 (a) of the specifications. Note: All items of plant must be priced.</i>				
22.01	Crawler dozers with hydraulic attachments to include ripper a) Up to 135 kw rated flywheel power b) Over 135 kw rated flywheel power	hrs hrs	10 10		- -
22.02	Motor Grader a) Up to 110kw rated flywheel power b) Over 110kw rated flywheel power	hrs hrs	0 10		- -
22.03	Vibratory Roller a) 6.5 - 8.81 tonne un-ballasted weight b) Over 8.91 tonne un-ballasted weight	hr hr	0 10		- -
22.04	Hand propelled vibrating roller 650 - 1300kg	hrs	10		-
22.05	Car 950K wheel loader or equivalent	hrs	10		-
22.06	10 Tonne tipper lorry	hrs	10		-
22.07	Small dumpers, 750-1000kg rated payload	hrs	10		-
22.08	Dual purpose hydraulic excavator with backhoe/loader and a rated bucket capacity of upto 1m3.	hrs	10		-
22.09	Articulated wheel loader with 1.5-2.0m³ SAE rated bucket capacity	hrs	10		-
22.10	50mm delivery water pump and motor	hrs	10		-
22.11	Self propelled water tanker 4,500m³ min. capacity with pick-up pump	hrs	10		-
22.12	Concrete Mixer of 100 - 150litres	hrs	10		-
22.13	Concrete poker vibrator	hrs	10		-
	LABOUR		0		
	<i>The rates inserted herein are to include all costs of labour such as insurance, accommodation, travelling time, over-time, use and maintenance of small tools of trade.Only the actual time engaged upon the work will be paid for.supervision, overheads and Profit.</i>		0		
22.14	Unskilled Labour	hrs	10		-
22.15	Artisans	hrs	10		-
22.16	Office attendants and chairmen	hrs	10		-
22.17	Watchmen (all round surveillance)	hrs	10		-
	TOTAL CARRIED FORWARD TO THE NEXT PAGE				-
ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	TOTAL BROUGHT FORWARD				0
	MATERIALS				
	<i>All materials are to comply with the Specification. The rates inserted herein are to include for delivery to the site, storage, handling, overheads and profit</i>				
22.18	Ordinary Portland Cement 42.5 N	Ton	5		-
22.19	Hydrated Lime	Ton	5		-
22.20	Mild Steel(any diameter)	Ton	5		-
22.21	High Yield Steel (any diameter)	Ton	5		-
22.22	Fine Aggregate for Concrete	m³	50		-
22.23	Coarse Aggregate for Concrete	m³	50		-
22.24	Wrot Shuttering Timber	m²	50		-
22.25	Rough shuttering timber.	m²	50		-
22.26	Bitumen Emulsion KJ-60.	Litre	100		-
22.27	Straight run bitumen Grade 80/100.	Litre	100		-
22.28	Kerosene	Litre	100		-
22.29	14/20 mm nominal size surface precoated chippings	m³	50		-
22.30	6/10mm nominal size surface precoated chippings	m³	50		-
22.31	AC Type I Ex-plant	m³	25		-
22.32	AC Type II Ex-plant	m³	25		-
22.33	Dense Bitumen Macadam	m³	25		-
	Bill No. 22 Total Carried Forward to Grand Summary				0.00
BILL NO. 23: PILING WORKS					
ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
23.01	Allow for bringing all plant, equipment and materials necessary for piling and removal after completion.	L/sum			
23.02	Move and set up piling rig for piling on each pile position	No.			
23.03	Form 600mm diameter cast insitu reinforced concrete piles. Pile capacity 1750KN reinforced full length. Pile length not exceeding 10m	M			
23.04	Allow for setting of projecting steel reinforcements 1000mm from top of the piles	No.			
23.05	Allow for trimming piles to level and bedding projecting reinforcement to shape	No.			
23.06	Allow for testing working piles (2No at abutments position) to one and half working load including all equipment and labour necessary	No.			
23.07	Allow for provision and erection of framed piles as per specifications or as directed by the Engineer.	LS.			
	Bill No. 23: Total Carried Forward to Grand Summary				
BILL NO. 24: STREET LIGHTING					
ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	Supply, install, test and commission the following lighting component to the satisfaction of the Engineer.				
24.01	10m steel galvanised streetlighting column made from Class "B" steel galvanised pipe complete with bracket for mounting 4No. LED floodlights. Provide a triangular opening with lock and three common keys , and mounting base for Item no. below. And as approved by the Engineer.	No.	8	95,000.00	760,000.00
24.02	10m steel galvanised streetlighting column made from Class "B" steel galvanised pipe complete with bracket for mounting 2No. LED floodlights. Provide a triangular opening with lock and three common keys , and mounting base for Item no. below. And as approved by the Engineer.	No.	146	95,000.00	13,870,000.00
24.03	Class 25 concrete for foundation base for mounting street lights poles with anchoring bolts & nuts. 600mm * 600mm * 1000mm. As approved by the Engineer.	No.	154	19,755.00	3,042,270.00
24.04	25Amp single phase cut-out complete with a 5A HRC fuse or 6Amps MCB or equivalent. As approved by the Engineer.	No.	154	550.00	84,700.00

CONTRACT NO.: RWC 682B

GRAND SUMMARY OF BILL OF QUANTITIES

BILL ITEM	DESCRIPTION	AMOUNT(KShs)
1	Preliminaries and General Items	
4	Site Clearance and Top Soil Stripping	
5	Earth Works	
7	Excavation and Filling of Structures	
8	Culverts and Drainage Works	
9	Passage to Traffic	
10	Grading and Graveling	
12	Natural Gravel Base and Subbase	
14	Lime/Cement Improved gravel Subbase and Base	
15	Bituminous Surface Treatment and Surface Dressing	
16	Bituminous Mixes	
20	Road Furniture	
22	Schedule of Dayworks.	
25	HIV/AIDS, Gender & Social Issues, Local Participation	
26	Relocation of Services and Land Acquisition	
(A)	Sub-Total (1)	
(B)	Add 15% Variation of Price On Sub-Total 1	
(C)	Add 10% Contingency on Sub-Total 1	
(D)	Sub-Total 2 = A + B + C + D	
(E)	Add .03% For PPCBL of sub total (1)	
(F)	Add ...16% VAT of sub-total (2)	
TOTAL (D+ E)		

RWC

S/NO	DESCRIPTION	AMOUNT(KSHS)
1	BID SUM 1	-
2	BID SUM 2	0.00
	TOTAL AMOUNT	-

APPENDIX A					
APPENDIX TO BILL ITEM 1.05: PROVIDE AND MAINTAIN FURNITURE AND EQUIPMENT FOR THE ENGINEER'S LABORATORY					
ITEM	DESCRIPTION	UNIT	QUANTITY	RATE (KSHS)	AMOUNT (KSHS)
	I. FURNITURE				
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 ³ , 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 ²	No	2		
A104/1.08	Two Plate electric heater	No	1		
A104/1.09	Fire extinguisher, 10 litre capacity, CO ₂ type	No	4		
A104/1.10	Complete first aid kit	No	2		
	EQUIPMENT <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 (ASHTO) Standard)</i>				
	2. General Equipment				
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 ³	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		
C/Forward to next page					
	B/Forward from previous page				
	3. Density (Sand replacement method BS 1377)				
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 300mmm	No	4		
A104/3.09	Cold steel chisel 10mm x 250mmm	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		
	5. CBR (AASHTO T193)				
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 Nox 61.4 mm, 1 No x 50.8 mm and 2 Nox 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 stabilising bar (electric and hand operated) including proving rings for 10KN, 28KN and 50KN, piston and bracket	No	1		
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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 guage calibrated in 0.01 mm divisions	No	2		
A104/5.15	Soaking tank for CBR mould sufficient for 50 moulds	No	1		
	6. Relative Density of Aggregates (BS 812)				
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 ²	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		
	7. Flakiness (BS 812)				
A104/7.01	Thickness gauge (various sizes)	No	2		
	8. Sieve Analysis (BS 1377)				
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		
	9. Miscellaneous Equipment				
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		
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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		
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 purpose pliers,	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		
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	11. Concrete: Slump and Cube Manufacture (BS 1881)				
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		
	12. Concrete: Cube Compression Testing				
A104/12.01	Concrete compression machine to BS1610 Grade A with 300 mm gauge, rectangular platens, capacity 1560 kN with load spacer				
A104/12.02	Safety guard for above	No	1		
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				
	13. Aggregate and Chippings				
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		
A104/13.08	Thermometer, 0°C to +250°C	No	2		
A104/13.09	Reagent grade Silica gel, 500g container	No	50		
	14. Bitumen Spray Test (BS 1707)				
A104/14.1	Transverse distribution of spray test bitumen distributor (depot tray test to BS 1707) or equivalent.	Set	1		
A104/14.02	Steel tray 20 mm deep x0.1m ² (for measuring bitumen spray rates) with purpose made detachable block 1.5m long.	No.	4		
	16. Bitumen Extraction Test				
	A) Extractor Bottle Method BS 598 Part 2				
A104/16.01	Electronic top pan balance 4kg capacity, sensitive to 0.1gm	No	1		
A104/16.02	Flat bottomed scoop	No	3		
A104/16.03	Steel garden trowel	No	2		
A104/16.04	Large steel spoon	No	2		
A104/16.05	Heat resistant gloves	pair	10		
A104/16.06	Foot pump for pressurising air water assemblies up to a maximum of 700KN/m ² and fitted with flexible hose approximately 1.2m long and connector	No	2		
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A104/16.07	Steel bottle 600ml capacity with 49mm rubber stopper	No	2		
A104/16.08	Steel bottle 2500ml capacity with 71mm rubber stopper	No	2		
A104/16.09	Steel bottle 7000ml capacity with 71mm rubber stopper	No	2		
A104/16.10	Flask funnel for fitting to the 700ml steel bottle with rim of funnel retaining sieve 200mm nominal diameter	No	2		
A104/16.11	Bottle roller compact bench mounted unit designed to rotate 2 bottles simultaneously about longitudinal axis	No	1		
A104/16.12	Pressure filter complete with cutting tool for making hole in the filter paper	No	1		
A104/16.13	Filter funnel to take 200mm nominal diameter sieves	No	2		
A104/16.14	Centrifuge complying with BS 598	No	1		
A104/16.15	Binder recovery	No	1		
A104/16.16	Volumetric flask 250ml, 500ml, 1000ml and 2000ml capacity	set	2		
A104/16.17	Recovery still for Dichloromethane	No	1		
	B) Hot Extractor Method BS 598 Part 2				
A104/16.18	Hot extractor complete with wire gauze container gasket, cork lid and support assembly	No	2		
A104/16.19	Dean and Stark receiver with condenser to suite Trichloroethylene	No	2		
A104/16.20	Gyratory compactor ELE Servo Pac or equivalent with 1 x 100mm and 1 x 150mm moulds	No	2		
A104/16.21	PRD Vibrating hammer compactor complete with 6 moulds, 7 base plates from ELE	SET	1		
A104/16.22	Two (2) sets of Tamping foot 102mm diameter and 146mm diameter and shanks to fit the supplied vibratory hammer	SET	2		
	17. Consumables				
A104/17.01	Paraffin wax	Kg	50		
A104/17.02	Gunny sack	No	500		
A104/17.03	Plastic bag 900x450x1000 gauge	No	500		
A104/17.04	Plastic bag 450x300x1000 gauge	No	500		
A104/17.05	Filter paper 150mm diameter Whatman No. 5 (Boxes of 100)	No	20		
A104/17.06	Filter paper 400mm diameter Whatman No. 5 (Boxes of 100)	No	20		
A104/17.07	Filter paper 100mm diameter Whatman No. 5 (Boxes of 100)	No	20		
A104/17.08	Filter paper 400mm diameter Whatman No. 54 (Boxes of 100)	No	10		
A104/17.09	Filter paper 270mm diameter with 33 diameter hole at centre Whatman No. 5 (Boxes of 100)	No	15		
A104/17.10	Trichloroethylene (205 Litre Drum)	No	5		
A104/17.11	Dichloromethane	kg	200		
A104/17.12	Cotton waste	kg	50		
A104/17.13	13kg Gas cylinders filled with gas and with compatible gas burners	No	5		
A104/17.14	Sodium sulphate	kg	45		
A104/17.15	Sand for density test	kg	250		
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APPENDIX B

APPENDIX TO BILL ITEM 1.06A: PROVIDE, FURNISH AND MAINTAIN THE R.E.'S OFFICE

DESCRIPTION	UNIT	QUANTITY	RATE (KSHS)	AMOUNT (KSHS)
1. ENGINEER'S MAIN OFFICE AND FURNITURE				
Executive desk 2.2x0.9 m with six lockup drawers	No	2		
Desk 2.2x0.9 m with chair and three lockup drawers	No	4		
Office tables 2.2x0.9 m	No	5		
Executive Swivel orthopeadic chair adjustable height	No	6		
Standard office chairs	No	10		
Typist's desk	No	1		
Typist's chair	No.	1		
Lockable steel stationery cupboard, 1.2 m³, 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 and doors	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 windows OS, MS Office, Professional and MS Project	No	5		
Autocad Civil 3D 2016 and Licences for above computers	No	1		
Laptop PC with Intel Core i7-4510U Processor 15.4" screen, CPU @ 2.6GHz 8GB RAM 1TB 8xDVD+/-RW approved with Microsoft Windows professional	No	4		
Latest HP (A4) Laser Printer with accessories	No	5		
Latest HP (A3) Laser Colour Printer with accessories	No	1		
UPS 600 VA	No	6		
wall clocks, battery powered min size 350mm x 350mm	No	6		
First Aid Kit	No	4		
Fire Extinguisher	No	4		
Filing Tray - set of 3no.	set	10		
Refrigerator minimum capacity 0.2 m³	No	1		
Drinking water dispenser, hot/cold	No	3		
Table - 0.8 m² surface area	No	1		
Cupboard, 0.15 m³, lockable	No	1		
13 Kg Gas cylinder with three gas burners	No	2		
C/Forward				
DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
B/Forward				
A3 Photocopier (approved make), with feeder sorting trays, scanner and print capability	No	1		
Reams of A4 photocopying paper	No	120		
Reams of A3 photocopying paper	No	24		
Electronic scientific calculator, Casio fx 991ES PLUS or equivalent approved	No	6		
Stapling machine Ofrex size 50 or similar with 5000 staples	No	6		
Heavy duty punch and spiral binder, IBICO AG or similar approved	No	2		
Digital Camera, 16.1 Megapixel(min), 1920x1080 full HD movie recording, optical steadyShot, sweep panorama, 2.7" LCD screen, minimum 5x digital zoom, multimedia card/SD 8GB memory, 12 scene selection modes, all inclusive.	No	2		
Provision of mobile phones for supervision team with the latest android version to the approval of the Engineer.	item	8		
Total carried to Bill Item 1.06A				

APPENDIX C

APPENDIX TO BILL ITEM 1.06B ENGINEERS’S SURVEY EQUIPMENT					
ITEM	Description	UNIT	QTY	RATE	AMOUNT(Kshs)
1.01	Digital Total Station reading to 1”accuracy (one second) with the following facilities: · Inbuilt data logger · Uploading/downloading software · Data transfer cable · Battery (2 No) · Battery charger · Tool kit · Two face keyboard · User manual It must have the following inbuilt survey programs as a minimum · Survey · Staking out · Resection/intersection · Traverse · Cogo	No.	0		
1.02	The following mandatory total station accessories must be included per Total station instrument				
a)	1No. Heavy duty telescopic tripod(preferably wooden)	No.	0		
b)	Telescopic plumbing prism pole complete with a prism and prism holder with target and plumbing bubble (length not less than 2.15m)	No.	0		
c)	· Triple prism holder set, in a casing, comprising triple prisms, prisms holder with target, tribrach and a tribrach adaptor	No.	0		
d)	· Survey umbrella	No.	1		
e)	· 1No.Telescopic Tripod	No.	0		
1.03	Engineer’s Automatic Level Wild NAK 2 or similar with a tripod and the following specifications · Accuracy of 0.7 mm per 1 km double · Standard magnification of: 32x · Shortest focusing distance of 1.6m · Compensator setting accuracy of 0.3"	No.	2		
	Total carried forward to next page				
ITEM	Description	UNIT	QTY	RATE	AMOUNT(Kshs)
	Brought Forward				
1.04	Hand held GPS with accuracy of 1 Metre	No.	1		
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	Electronic Calculators 12 x 12ms 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		
1.19	Provide with license and install the latest version of (<i>insert software</i>)	L.S			
	Total carried to Bill Item 1.06B				

S/No.	Item	GEODETIC GLOBAL NAVIGATION SATELLITE SYSTEM SPECIFICATIONS (GNSS)	REMARKS
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1	Geodetic GNSS Receivers	General Characteristics Geodetic Set enabled for both Static and RTK functions with respective supporting software and accessories Specific Specifications 1. Channels: At least 120 enabled for simultaneous signal tracking 2. Reception 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 embeded Note: Should be configured to recieve new and upcoming constellations (if any)	
		2. Accuracy : Real Time Kinematics (RTK) Horizontal: 8 mm + 1 ppm RMS Vertical: 15 mm + 1 ppm RMS Initialization time: typically < 5 s - Initialisation reliability >99.9% Post Processing Static Horizontal: 3 mm + 0.5 ppm RMS Vertical: 5 mm + 0.5 ppm RMS Baseline Length: ≤ 80 km	
		3. Special functionalities Extended RTK range - base setup - the base receiver to be able to stream RTK data via integrated GSM modem and to support upto 10 rovers - the base to provide WiFi hotspot functionality for better control/setup of the receiver - the base to provide web interface functionality via any smart phone, tablet or computer - the base to provide NTRIP caster and dyndns functions Increased reliability - rover setup - the rover to provide a mode for better performance under difficult conditions (close to buildings, trees and urban areas) - the rover to be able to connect to any CORS GNSS networks or Single stations via internet	
		4. Communications a) I/O · 2x TNC connector (1 for UMTS antenna and 1 for UHF antenna) · 2x LEMO · 1x high speed USB · Integrated GSM/GPRS modem · Integrated Bluetooth class 2	
		· Optional radio modem (2): Internal Rx/Tx: 403473 MHz External Radio: 1W 35W adjustable (at least 12Km range) · Should be configured to log into any upcoming CORS protocol · Should be enabled to use SIM card	
		b) Radio Transmission Protocols (RTK) RTCM2.1, RTCM2.3, RTCM3.0, CMR, CMR+ input and output NMEA0183 output	
		5. Data Storage: · Must be able to store raw data · Must have at least 4 GB internal storage · Optional external microSD storage · Device should mount as a USB external hard drive	
		6. Power Supply · Battery life: at least 5 hours in RTK mode · Must have External power input option · Each set should be supplied with two internal battery packs	
		7. Software Two types of software a) for Static · Permanent licence to be included (protected by USB dongle) · Must be able to process raw data (GPS L1&L2, Glonas L1&L2) from leading brands · Must be able to define datums and compute various transformations · Must be able to do 3D adjustment · Must be able to export/import raw data to RINEX format and process the same. This feature must be inclusive of the total cost	
		b) for RTK Supplier should provide licence free field data collection software that has the following key survey operational features:- •must provide functions for topo survey •must provide functions for stakeout •Operating platform - Windows Mobile 6.5 or equivalent	
		8. Sourcing 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.	
		9. Warranty Minimum of One year	