



District Road Works

VOLUME

2

Contract Documentation Manuals

Manual A4:

Unit Rate Analysis for Rehabilitation Works, Periodic Maintenance and Minor Works



ACKNOWLEDGEMENTS

These manuals have been prepared by the Ministry of Works, Housing and Communications, Uganda.

The aim of the manuals is to complement the Ministry's effort in providing guidance and building capacity of Local Governments to enable them handle their mandated roles in planning and management of the road sector development.

This manual is part of a set titled District Road Works. The set consists of 5 Volumes, each volume comprising a series of manuals covering varying aspects under the following headings:

- Volume 1 Planning Manuals
- Volume 2 Contract Management Manuals
- Volume 3 Implementation and Monitoring Manuals
- Volume 4 Technical Manuals
- Volume 5 District Administrative and Operational Guidelines

The Manuals describe in detail the organization and techniques for planning, implementation and administration of a district road network. The manuals support Government strategies on sustainable maintenance of district roads; they encourage community participation, promote use of labour based methods and gender balance, ensure protection of the environment, foster work place safety and health in implementation of road works by adopting appropriate contracting practices and support the local construction industry.

They are primarily aimed at Road Engineers, Planners and Managers involved in the planning and management of district road works.

In line with the topics covered in these manuals, related training modules have been designed and are incorporated in the curriculum of the Mount Elgon Labour Based Training Centre.

The manuals are the property of the Ministry of Works, Housing and Communications, but copying and local distribution is not restricted.

We wish to acknowledge the efforts of COWI Consulting Engineers and Planners AS who assisted in the compilation of the Drafts and the invaluable support of the Danish International Development Agency for the financial assistance extended to the Ministry in preparing the manuals.



L.Lutaaya

Engineer in Chief / DE

Volume 2 Manual A4

Unit Rate Analysis (URA)

for Rehabilitation Works, Periodic Maintenance Works & Minor Works

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Section A4-1

General Information

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Section A4-1

General Information

General Information Page 1-1

General Information

This Basic Cost data and Unit Rate Analysis has two aims:

1. Provide District Authorities with a costing system that is easy to use and allows the development of fair and realistic Unit Rates when preparing Engineer's Estimates.
2. Provide Contractors with a pricing system that allows the development of realistic but competitive Unit Rates for Contract Tendering purposes.

This system of Unit Rate Analysis (URA) has been developed for use either manually, or by means of a simple computer spreadsheet.

Using the summary sheets provided in the next section, **Basic Input Data for Unit Rate Analysis**, users are guided in the development of the required basic input data.

Individual **URA** work sheets for each **BoQ** Item are provided which have been designed to guide users through a comprehensive and logical estimating exercise.

The URA system also allows the user to make his/her own realistic cost analysis of whether to use labour or equipment, or a combination of both, as the primary technology option for undertaking the Works of the Contract. In other words, the URA system provides for -

- Recognition of actual resource availability in terms of labour, materials and equipment. The pre-tender Site Visit (Conditions of Tender & Instructions to Tenderers, **Clause 10**) provides the opportunity for Contractor(s) to see for themselves exactly what resources are available to undertake the Works.
- Where a range of technology options are available, determination of which option will provide an opportunity for the Contractor to quote lower Item unit rates in the Tender thereby giving him/her a competitive advantage and better chance of being awarded the Contract.
- Greater opportunity by the Employer to examine in detail whether (or not) the Item unit rates quoted in the Contractor's Tender fully reflect; the quantum of Works to be performed, the likelihood of being able to meet the required Technical Specifications, and an appropriate choice of technology.

Section A4-1 : General Information

Section A4-2

Basic Cost Data for Unit Rate Analysis (URA)

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Section A4-2

Basic Cost Data for Unit Rate Analysis (URA)

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Construction Material - List of Prices and Rates.	Page	2-4
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Equipment - List of Rates	Page	2-6

Basic Input Data for Unit Rate Analysis

Basic input data requirements for use in the system of Unit Rate Analysis include:

- The Pre-Tender Site Visit and resulting inspection records
- Tender documents including BoQ, Technical Specifications and Drawings
- Productivity tables (for labour and equipment); refer Technical Specifications
- List of daily wage rates of casual labour; refer **Schedule 2**
- List of prices and rates for hand tools; refer **Schedule 2**
- List of prices and rates for materials; refer **Schedule 2**
- List of monthly wage rates for staff / skilled labour; refer **Schedules 2 and 3**
- List of equipment rates; refer **Schedules 1, 2 and 4**
- Contractor's Overheads, including costs of Site supervision but excluding those included in **Bill 6; "Preliminary and General Items"** (P&G Items)
- Risk allowances and Profit Margins

1. CASUAL LABOUR - LIST OF DAILY WAGE RATES

Casual Labour	No.	Daily Wage Rate (USh)	BoQ Rate (USh)
Gang leader / Headperson			
Qualified Artisan			
Watchman			
Labourer, skilled			
Labourer, unskilled			

Rates for Casual Labour include all of the following:

Actual Wage (salary paid to casual labour)

- Basic wage
- Housing (if applicable)
- Allowances for provision of food, etc.

Site Charges

- Social Charges, Workman Compensation and Taxes
- Hand tools – refer 2, below
- Safety Measures and Protective Clothing
- Contingencies
- Mark up for unproductive casual labour and working days (site support labour, bad weather, losses and others)

Contractor Charges

- Contractor Charges, often referred to as company costs, provide for the costs associated with property, vehicles, interest on loans, administration expenses and other relevant costs, and are calculated on an annual basis and assigned pro-rata to any individual Contract based on its Price and duration. **Note** - these costs or Contractor Charges are **not** included in the above listed Daily Wage Rates but are included in the Unit Rate Analysis work sheets under '**Indirect Costs**'.

The “BoQ Rate” is simply the multiplication of the “Daily Wage Rate” by a factor to fully provide for:

- **The Actual Wage** (as listed above)
- **Site Charges** (as listed above)

Refer **Annex 1** below.

Note: This information shall be included in **Schedule 2 of the Contractor’s Tender**

2. HAND TOOLS - LIST OF PRICES AND RATES

To be included in Casual Labour Rates; refer "Site Charges" in 1 above.

Basic input data includes:

- a) the estimated number of Casual Labourers to be employed,
- b) the estimated number of each hand tool required by each labourer to carry out the work, and,
- c) acknowledgement of the economic useful life of each of the hand tools.

Enter hand tool prices in column **Unit Price**, and their number in column **Qty**.

The **BoQ Rate** for hand tools is calculated by dividing the **Grand Annual Total** by the number of worker days in one year; i.e. 20 days/month x 12 months/year x the number of skilled and unskilled labourers employed for the Contract; refer **Annex 1** below.

Hand Tools	Qty	Unit Price (US\$)	Total Price (US\$)	Life span (month)	Annual Cost (US\$)	Tool Maint. (10%)	Total Annual Cost (US\$)
Hoe							
Pick							
Mattock							
Shovel							
Handles (for replacement of							
Crowbar							
Bush Knife							
Saw							
Axe							
Grass Cutter (Slasher)							
Heavy Duty Spreader or							
Wheelbarrow							
Hand Rammer							
Sledge Hammer							
Bucket							
Spirit Level, 450mm							
Tape Measure (5m)							
Tape Measures (30m)							
Line Level							
Set of Boning Rods							
Ranging Rod							
Ditch, Slope and other							
Profile Board							
Mason Tool Set							
Carpenter Tool Set							
First Aid Kid							
					Total	US\$	

Note: The above information shall be included in Schedule 2 of the Contractor's Tender

3. CONSTRUCTION MATERIAL - LIST OF PRICES AND RATES

Material	Unit	Price (US\$)	BoQ Rate (US\$)
Cement	50kg Bag		
Sand	m ³		
Aggregate	m ³		
Hardcore	m ³		
Timber (for form work)	m ²		
Reinforcement Bars, mild steel	kg		
Reinforcement bars, high-yield-stress	kg		
Weld Mesh	m ²		
Surfacing materials	m ³		
Selected Fill materials	m ³		
Concrete Pipe Culvert Rings	m		
Steel Pipe Culvert Rings	m		
Gabion Basket Mesh	m ²		
Concrete Blocks	No.		

The "BoQ Rate" excludes the Contractor's Charges or company costs.

Refer Annex 1 below.

Note: This information shall be included in Schedule 2 of the Contractor's Tender

4. STAFF / SKILLED LABOUR - LIST OF MONTHLY WAGE RATES

Professional Staff Skilled Labour	No.	Monthly Wage Rate (US\$)	BoQ Rate (US\$)
Site Supervisor			
Site Foreperson			
Plant Operator			
Store Person			

Rates for Staff / Skilled Labour include all of the following:

Actual Wage (salary paid to staff)

- Basic wage
- Transport
- Housing
- Allowances, Bonus

Site Charges

- Social Charges, Insurances and Taxes
- Safety Measures and Protective Clothing
- Training
- Contingencies

Contractor Charges

Contractor Charges, often referred to as company costs, provide for the costs associated with property, vehicles, interest on loans, administration expenses and other relevant costs, and are calculated on an annual basis and assigned pro-rata to any individual Contract based on its Price and duration.

Note - these costs are **not** included in the above listed Daily Wage Rates but are included in the Unit Rate Analysis work sheets under **Indirect Costs**.

The “BoQ Rate” is simply the multiplication of the “Monthly Wage Rate” by a factor to fully provide for:

- **The Actual Wage** (as listed above)
- **Site Charges** (as listed above)

Refer **Annex 1** below.

Note: This information shall be included in Schedule 2 of the Contractor’s Tender

5. EQUIPMENT (COMPANY OWNED AND/OR HIRED) - LIST OF RATES

Equipment	No.	Hourly / Daily Rate (US\$)	BoQ Rate (US\$)
Tipper (...m ³)			
Tipper (...m ³)			
Lorry, flat bed (...m ³)			
Lorry, flat bed (...m ³)			
Tractor			
Trailer			
Water Bowser, self propelled			
Dozer			
Grader			
Loader			
Compactor, self propelled			
Pedestrian vibrating roller			
Roller (dead weight, towed)			
Pick-up			
Water Pump			
Concrete Mixer			
Concrete Vibrator			
Towed Grader			
Towed Water Bowser			

Refer Annex 1 below.

Note: This information shall be included in Schedules 2 and 4 of the Contractor's Tender

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Section A4-3

Unit Rate Analysis (URA)

Section A4-4 : URA Work Sheets

Annex 1 : Worked examples for Basic Cost Data

Annex 2 : Worked Examples for Unit Rate Analysis (URA) including Instructions for Using URA Work Sheet, and Sample Final Bills of Quantity (BoQ)

Section A4-3

Unit Rate Analysis (URA)

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Typical Unskilled Labour Task Rates	Page	3-1

Unit Rate Analysis (URA)

The following URA consists of individual work sheets for each BoQ Work Item.

Use the following steps to fill data into these sheets and calculate the Unit Rate for each Work Item included in the Contract.

1. Following the Site Visit and determination of the scope of the Works in the Contract together with identification of local resource availability and prices, develop all basic cost data for Casual Labour (including hand tools), Construction Materials, Staff / Skilled Labour, Equipment and Contractor's Charges.
2. Transfer this data to the summary sheets provided above for; Casual Labour, Hand Tools, Construction Materials, Staff / Skilled Labour, and Equipment, and calculate the appropriate BoQ Rates.
3. For each BoQ Item fill the relevant work sheet:
 - a. decide on the most appropriate choice of technology for implementation of the Works included in the Contract,
 - b. decide which activities need to be carried out taking into account the selected choice of technology,
 - c. decide on the productivity rates to be used; refer Typical Task Rates for use of unskilled labour proved below,
 - d. transfer the relevant data from the summary sheets to the work sheets,
 - e. calculate the percentage for **Overheads**,
 - f. decide on the percentages for **Risk Allowance** and **Profit**,
 - g. calculate the total Unit Rate for each Item of Work included in the Contract, and
 - h. includes the calculated Unit Rates for each and every Work Item in the Contract BoQ; refer **Section 3** below.
4. Refer **Annexes 1** and **2** below for Worked Examples regarding the determination of basic Cost Data and preparation of Unit Rate Analysis and the Final Bill of Quantities.

TYPICAL UNSKILLED LABOUR TASK RATES

The following Tables provide detailed information regarding unskilled labour productivity for the full range of activities associated with district road rehabilitation, periodic maintenance and minor works/spot repairs.

TYPICAL TASK RATES		
ACTIVITY	UNIT	TASK RATE RANGE
Setting out of alignment including cross sections, etc.	m	100
Bush clearing including disposal of cuttings out of clearing width	m ² /wd	200 ~ 1000
Grubbing including disposal of grubbed materials out of clearing width	m ² /wd	150 ~ 300
Tree and stump removal (tree girth from 0.3 to 1.0 m - measured at 1 m above ground) including disposal of all vegetations out of clearing width	Nos.	2 ~ 5
Boulder removal including disposal out of clearing width	m ³ /wd	2 ~ 4
Excavation excluding gravel excavation Rock excavation	m ³ /wd	2.5 ~ 5.0 0.8
Slotting at specified intervals of 20 m	m ³ /wd	1.5 ~ 2.0
Ditching including throwing suitable material to the center of road	m ³ /wd	2.5 ~ 3.5
Sloping and Backsloping including throwing suitable material to the center of road for camber formation	m ³ /wd	3.0 ~ 4.0
Camber formation in formation activity to required camber slope	m ² /wd	180
Gravel excavation including stockpiling on the side of the pit	m ³ /wd	2.5 ~ 3.5
Loading	m ³ /wd	6 ~ 9
Unloading	m ³ /wd	12 ~ 16
Spreading	m ³ /wd	6 ~ 9
Combined unloading and spreading	m ³ /wd	4 ~ 6
Wheelbarrow hauling excluding excavation	m ³ /wd	1.8~7.6
Camber formation in gravelling activity to required camber slope	m ² /wd	140
Watering by using watering cans and buckets for hauling	m ³ /wd	4 ~ 6
Watering by water bowser with a water pump	trips	5 ~ 15
Compaction by hand rammers	m ² /wd	9
Compaction by roller (1 operator per roller required)	m ² /rollerday	700
Scour check construction (excluding collection of stone, sticks)	Nos./wd	4 ~ 8
Stone collection within 200 m radius	m ³ /wd	2 ~ 3
Stick collection within 200 m radius	Nos./wd	80 ~ 100
Installation of culverts (including excavation of trench and backfilling but excluding outlet drain, head walls and wing walls) - 600 mm pipe - 900 mm pipe - 1200 mm pipe	m/wd	1.0 ~ 1.2 0.7 ~ 0.9 0.4 ~ 0.6
Head walls and wing walls construction including preparation of mortar	m ³ /wd	1.0
Concrete works including mixing, hauling, placing and curing	m ³ /wd	0.5 ~ 1.0
Wet stone masonry works including stone and mortar preparation but excluding stone collection	m ³ /wd	0.7
Dry stone masonry works including preparation of stone but excluding stone collection	m ³ /wd	2.5
Brick/Concrete block masonry works including mortar preparation	m ³ /wd	1.0
Wet stone pitching including stone and mortar preparation but excluding stone collection	m ² /wd	4 ~ 8
Dry stone pitching including preparation of stone but excluding stone collection	m ² /wd	9
Gabion works including assembling of baskets and placing rock fill but excluding stone collection	m ³ /wd	2.5

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Section A4-4

URA Work Sheets

- Annex 1 : Worked examples for Basic Cost Data
- Annex 2 : Worked Examples for Unit Rate Analysis (URA) including Instructions for Using URA Work Sheet, and Sample Final Bills of Quantity (BoQ)

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URA Work Sheets

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Bill 2: Setting Out and Clearing	Page	4.2-1
Bill 3: Earth Works	Page	4.3-1
Bill 4: Drainage Works	Page	4.4-1
Bill 5: Gravelling Works	Page	4.5-1
Bill 6: Preliminary & General	Page	4.6-1

Bill 1
Site Preparatory Works

BILL 1

Bill 1

Site Preparatory Works

- Item 1.1: Construction of access roads to quarry sites including
maintenance throughout the working period Page 4.1- 1

 - Item 1.2: Construction of detour including maintenance throughout
the working period Page 4.1- 3
-

Contract No:			Date:			
Bill 1: SITE PREPARATORY WORK		Item: 1.1 Construction of access roads to quarry site including maintenance throughout				
USING LABOUR		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		LS				
• Labourer (setting out)						
• Labourer (clearing)						
• Labourer (levelling)						
• Labourer (drainage opening)						
• Labourer (excavate/load/unload gravel)						
• Labourer (maintenance)						
•						
Equipment:		LS				
• Tractor/Trailer (hauling gravel)						
• Tipper (hauling gravel)						
• Bowser (Compaction)						
• Roller (Compaction)						
• Water pump (water extraction)						
•						
•						
Material:		Unit	Quantity	Rate	Cost	
• Gravel (filling potholes, ruts)		m ³				
• Water (if it has to be purchased)		Lt				
• Culvert pipe rings 600mm		No.				
• Culvert pipe rings 900mm		No.				
• Culvert pipe rings 1200mm		No.				
•						
•						
•						
•						
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 1.1		(LS)		USh		

Contract No:			Date:			
Bill 1: SITE PREPARATORY WORK		Item: 1.1 Construction of access roads to quarry site including maintenance throughout				
USING EQUIPMENT		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		LS				
• Labourer (excavation/load/unload gravel)						
• Labourer (maintenance)						
•						
•						
•						
•						
•						
Equipment:		LS				
• Grader (clearing & levelling)						
• Tipper (hauling gravel)						
• Roller (compaction)						
• Bowser (compaction)						
• Water pump (water extraction)						
•						
Material:		Unit	Quantity	Rate	Cost	
• Gravel (filling potholes, ruts)		m ³				
• Water (if it has to be purchased)		Lt				
• Culvert pipe rings 600mm		No.				
• Culvert pipe rings 900mm		No.				
• Culvert pipe rings 1200mm		No.				
•						
•						
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 1.1		(LS)		USh		

Contract No:			Date:			
Bill 1: SITE PREPARATORY WORK		Item: 1.2 Construction detours including maintenance throughout				
USING LABOUR		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		LS				
• Labourer (setting out)						
• Labourer (levelling/clearing)						
• Labourer (drainage)						
• Labourer (camber formation)						
• Labourer (excavate/load/unload gravel)						
• Labourer (maintenance)						
•						
Equipment:		LS				
• Tractor/Trailer (hauling gravel)						
• Tipper (hauling gravel)						
• Bowser (Compaction)						
• Roller (Compaction)						
• Water pump (water extraction)						
•						
•						
Material:		Unit	Quantity	Rate	Cost	
• Gravel (filling potholes, ruts)		m ³				
• Water (if it has to be purchased)		Lt				
• Culvert pipe rings 600mm		No.				
• Culvert pipe rings 900mm		No.				
• Culvert pipe rings 1200mm		No.				
•						
•						
•						
•						
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 1.2		(LS)		USh		

Contract No:			Date:			
Bill 1: SITE PREPARATORY WORK		Item: 1.2 Construction detours including maintenance throughout				
USING EQUIPMENT		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		LS				
• Labourer (maintenance)						
•						
•						
•						
•						
•						
•						
Equipment:		LS				
• Grader (clearing, levelling & formation)						
• Tipper (hauling gravel)						
• Roller (compaction)						
• Bowser (compaction)						
• Water pump (water extraction)						
•						
Material:		Unit	Quantity	Rate	Cost	
• Gravel (filling potholes, ruts)		m ³				
• Water (if it has to be purchased)		Lt				
• Culvert pipe rings 600mm		No.				
• Culvert pipe rings 900mm		No.				
• Culvert pipe rings 1200mm		No.				
•						
•						
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 1.2		(LS)		USh		

Bill 2
Setting Out and Site Clearing Works

BILL 2

Bill 2

Setting Out and Site Clearing Works

- Item 2.1: (Re) Establishment of road alignment and setting out of road works Page 4.2- 1
- Item 2.2: Clear site of grass, bushes and boulders (up to 1.5m maximum girth) and Grub all roots of grass and bushes including excavaiton of top soil from road formation Page 4.2- 3
- Item 2.3: Cut and remove from site trees (up to 1m girth), including removal of stumps and roots Page 4.2- 7
-

Contract No:			Date:			
Bill 2: SETTING OUT & CLEARING		Item: 2.1 (Re) Establishment of road alignment and setting out works				
USING LABOUR		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		m				
• Labourer (setting out centre line)						
• Labourer (setting out cross sections)						
• Labourer (setting out drainage works)						
• Labourer (setting out structure works)						
• Labourer (setting out gravelling works)						
•						
Equipment:						
•						
•						
•						
•						
•						
•						
Material:		Unit	Quantity	Rate	Cost	
• Wooden pegs for setting out		No.				
• Nails (100mm)		kg				
•						
•						
•						
•						
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 2.1		(m)		USh		

Contract No:			Date:			
Bill 2: SETTING OUT & CLEARING		Item: 2.2 Clear site of grass, bushes and grub including boulders up to 1.5m girth				
USING LABOUR		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		m				
• Labourer (clear/cut bush)						
• Labourer (cut grass)						
• Labourer (grub roots & excav. top soil)						
• Labourer (remove boulders)						
• Labourer (excavate anthills)						
• Labourer (haul & dispose the above)						
•						
Equipment:						
•						
•						
•						
•						
•						
•						
•						
Material:		Unit	Quantity	Rate	Cost	
•						
•						
•						
•						
•						
•						
•						
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 2.2		(m)	USh			

Contract No:			Date:			
Bill 2: SETTING OUT & CLEARING		Item: 2.2 Clear site of grass, bushes and grub including boulders up to 1.5m girth				
USING EQUIPMENT		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		day work				
• Labour (drilling - blasting)						
• Labourer (haul and deposit debris)						
•						
•						
•						
•						
•						
Equipment:		day work				
• Compressor with hammer / drill						
• Dozer (rolling/pushing)						
• Excavator (rolling/pushing/burying)						
• Tipper (hauling)						
• Explosive detonator						
•						
Material:		Unit	Quantity	Rate	Cost	
• Explosives		kg				
• Explosive connector cable		m				
• Water (for dust reduction)		Lt				
•						
•						
•						
•						
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 2.2			(m)	USh		

Contract No:			Date:			
Bill 2: SETTING OUT & CLEARING		Item: 2.2.1 Extra over item 2.2 for boulders over 1.5m girth				
USING LABOUR		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		day work				
• Labourer (rolling)						
• Labourer (split by weathers & feathers)						
• Labourer (split by fire and water)						
• Labourer (bury)						
• Labour (haul and deposit debris)						
•						
Equipment:		day work				
• Tractor/trailer (hauling)						
•						
•						
•						
•						
•						
Material:		Unit	Quantity	Rate	Cost	
• Fire wood		m ³				
• Water		Lt				
•						
•						
•						
•						
•						
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 2.2.1		(daywork)		USh		

Contract No:			Date:			
Bill 2: SETTING OUT & CLEARING		Item: 2.2.1 Extra over item 2.2 for boulders over 1.5m girth				
USING EQUIPMENT		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		day work				
• Labour (drilling - blasting)						
• Labourer (haul and deposit debris)						
•						
•						
•						
•						
•						
Equipment:		day work				
• Compressor with hammer / drill						
• Dozer (rolling/pushing)						
• Excavator (rolling/pushing/burying)						
• Tipper (hauling)						
• Explosive detonator						
•						
Material:		Unit	Quantity	Rate	Cost	
• Explosives		kg				
• Explosive connector cable		m				
• Water (for dust reduction)		Lt				
•						
•						
•						
•						
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 2.2.1		(daywork)		US\$		

Contract No:			Date:			
Bill 2: SETTING OUT & CLEARING		Item: 2.3 Cut and remove trees up to 1 m girth including stumps and roots removal				
USING LABOUR		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		No.				
• Labourer (cut free-standing tree)						
• Labourer (excavating stump)						
• Labourer (cut & haul debris to spoil)						
•						
•						
•						
•						
Equipment:						
•						
•						
•						
•						
•						
•						
•						
Material:		Unit	Quantity	Rate	Cost	
•						
•						
•						
•						
•						
•						
•						
•						
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 2.3		(No.)		USh		

Contract No:			Date:			
Bill 2: SETTING OUT & CLEARING		Item: 2.3 Cut and remove trees up to 1 m girth including removal of stumps and roots				
USING EQUIPMENT		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		No.				
• Labourer (cutting with chain saw)						
• Labourer (excavating stump)						
• Labourer (hauling to spoil)						
•						
•						
•						
•						
Equipment:		No.				
• Chain Saw (cutting)						
• Dozer or excavator (stump removal)						
• Tractor/trailer (haul debris to spoil)						
• Lorry (haul debris to spoil)						
• Tractor (pull down trees)						
•						
Material:		Unit	Quantity	Rate	Cost	
•						
•						
•						
•						
•						
•						
•						
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 2.3		(No.)		USh		

Contract No:			Date:			
Bill 2: SETTING OUT & CLEARING		Item: 2.3.1 Extra over item 2.3 for trees over 1 m girth				
USING LABOUR		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		No.				
• Labourer (cut free-standing tree)						
• Labourer (excavating stump)						
• Labourer (cutting & hauling to spoil)						
•						
•						
•						
•						
Equipment:						
•						
•						
•						
•						
•						
•						
•						
Material:		Unit	Quantity	Rate	Cost	
•						
•						
•						
•						
•						
•						
•						
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 2.3.1		(No.)		USh		

Contract No:				Date:		
Bill 2: SETTING OUT & CLEARING		Item: 2.3.1 Extra over item 2.3 for trees over 1 m girth				
USING EQUIPMENT		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		No.				
• Labourer (cutting with chain saw)						
• Labourer (excavating stump)						
• Labourer (cutting & hauling to spoil)						
•						
•						
•						
•						
Equipment:		No.				
• Chain Saw (cutting)						
• Dozer or excavator (stump removal)						
• Tractor/trailer (haul debris to spoil)						
• Lorry (haul debris to spoil)						
• Tractor (pull down trees)						
•						
•						
Material:		Unit	Quantity	Rate	Cost	
•						
•						
•						
•						
•						
•						
•						
•						
•						
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 2.3.1		(No.)		US\$		

Bill 3
Earth Works

BILL 3

Bill 3

Earth Works

Item 3.1: Rehabilitation of existing road formation	Page 4.3- 1
Item 3.2: (Re-) Construction of road formation	Page 4.3- 7
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Item 3.4: Excavation of rock	Page 4.3-17

Contract No:			Date:			
Bill 3: EARTH WORKS		Item: 3.1.1 Reshaping existing road including watering and compaction				
USING LABOUR		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		m				
• Labourer (slotting)						
• Labourer (reshape & form camber)						
•						
•						
•						
•						
•						
•						
Equipment:		m				
• Roller (compacting)						
• Bowser (compaction)						
• Water pump (water extraction)						
•						
•						
Material:		Unit	Quantity	Rate	Cost	
• Water (if it has to be purchased)		Lts				
•						
•						
•						
•						
•						
•						
•						
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 3.1.1		(m)		USh		

Contract No:			Date:			
Bill 3: EARTH WORKS		Item: 3.1.1 Reshaping existing road including watering and compaction				
USING EQUIPMENT		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		m				
• Labourer (assist grader)						
•						
•						
•						
•						
•						
•						
•						
Equipment:		m				
• Grader (scarify & grade formation)						
• Roller (compacting)						
• Bowser (compaction)						
• Water pump (water extraction)						
•						
Material:		Unit	Quantity	Rate	Cost	
• Water (if it has to be purchased)		Lts				
•						
•						
•						
•						
•						
•						
•						
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 3.1.1		(m)		USh		

Contract No:			Date:			
Bill 3: EARTH WORKS		Item: 3.1.2 Opening of existing side, mitre, catchwater and other specified drains				
USING LABOUR		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		m				
• Labourer (clear overgrown vegetation)						
• Labourer (re-excavate side drains)						
• Labourer (re-excavate mitre drains)						
• Labourer (re-excavate catch water drains)						
•						
•						
Equipment:						
•						
•						
•						
•						
•						
•						
Material:		Unit	Quantity	Rate	Cost	
•						
•						
•						
•						
•						
•						
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 3.1.2		(m)		USh		

Contract No:			Date:			
Bill 3: EARTH WORKS		Item: 3.1.3 Opening existing culverts and outlets				
USING LABOUR		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		m				
• Labourer (open culverts & inlets)						
•						
•						
•						
•						
•						
•						
•						
•						
Equipment:						
•						
•						
•						
•						
•						
•						
•						
Material:		Unit	Quantity	Rate	Cost	
•						
•						
•						
•						
•						
•						
•						
•						
•						
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 3.1.3		(m)		USh		

Contract No:			Date:			
Bill 3: EARTH WORKS		Item: 3.2 (Re-) Construction of road formation 3.2.1 Excavation to level				
USING LABOUR		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		m ³				
• Labourer (slotting, 10m intervals)						
• Labourer (cutting and filling a/p slots)						
•						
•						
•						
•						
•						
Equipment:		m ³				
• Roller (compacting)						
• Bowser (compaction)						
• Water pump (water extraction)						
•						
•						
Material:		Unit	Quantity	Rate	Cost	
• Water (if it has to be purchased)		Lts				
•						
•						
•						
•						
•						
•						
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 3.2.1		(m³)		US\$		

Contract No:			Date:			
Bill 3: EARTH WORKS		Item: 3.2 (Re-) Construction of road formation 3.2.1 Excavation to level				
USING EQUIPMENT		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		m ³				
• Labourer (assisting on grading)						
•						
•						
•						
•						
•						
•						
•						
Equipment:		m ³				
• Grader (cut and fill)						
• Roller (compacting)						
• Bowser (compaction)						
• Water pump (water extraction)						
•						
Material:		Unit	Quantity	Rate	Cost	
• Water (if it has to be purchased)		Lts				
•						
•						
•						
•						
•						
•						
•						
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 3.2.1		(m³)		USh		

Contract No:			Date:			
Bill 3: EARTH WORKS		Item: 3.2.2 Excavation of side, mitre, catchwater and other specified drains				
USING LABOUR		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		m				
• Labourer (excavate side drain ditches)						
• Labourer (sloping of ditches)						
• Labourer (back sloping of ditches)						
• Labourer (excavate mitre drains)						
• Labourer (excavate catch water drains)						
• Labourer (excavate other spec. drains)						
•						
Equipment:						
•						
•						
•						
•						
•						
•						
•						
Material:		Unit	Quantity	Rate	Cost	
•						
•						
•						
•						
•						
•						
•						
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 3.2.2		(m)		USh		

Contract No:			Date:			
Bill 3: EARTH WORKS		Item: 3.2 (Re-) Construction of road formation 3.2.3 Form, water and compact roadbed				
USING LABOUR		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		m				
• Labourer (first spreading in centre)						
• Labourer (2nd spreading + camber)						
•						
•						
•						
•						
•						
•						
Equipment:		m				
• Roller Ped. (compaction)						
• Bowser (compaction)						
• Water pump (water extraction)						
•						
•						
Material:		Unit	Quantity	Rate	Cost	
• Water (if it has to be purchased)		Lts				
•						
•						
•						
•						
•						
•						
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 3.2.3		(m)		USh		

Contract No:			Date:			
Bill 3: EARTH WORKS		Item: 3.2 (Re-) Construction of road formation 3.2.3 Form, water and compact roadbed				
USING EQUIPMENT		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		m				
• Labourer (assist grader)						
•						
•						
•						
•						
•						
•						
•						
Equipment:		m				
• Grader (scarify & grade formation)						
• Roller (compacting)						
• Bowser (compaction)						
• Water pump (water extraction)						
•						
Material:		Unit	Quantity	Rate	Cost	
• Water (if it has to be purchased)		Lts				
•						
•						
•						
•						
•						
•						
•						
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 3.2.3		(m)		USh		

Contract No:			Date:			
Bill 3: EARTH WORKS		Item: 3.3 Provision of fill material				
		3.3.1 Preparation of borrow pit				
USING LABOUR		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		m ²				
• Labourer (remove fences, structures)						
• Labourer (cut grass and bushes)						
• Labourer (cut trees, remove stumps)						
• Labourer (haul and deposit above)						
• Labourer (excavate topsoil)						
• Labourer (haul and deposit above)						
• Labourer (removal of boulders)						
•						
Equipment:						
•						
•						
•						
•						
•						
•						
•						
Material:		Unit	Quantity	Rate	Cost	
•						
•						
•						
•						
•						
•						
•						
•						
•						
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 3.3.1		(m²)		USH		

Contract No:			Date:			
Bill 3: EARTH WORKS		Item: 3.3 Provision of fill material				
		3.3.1 Preparation of borrow pit				
USING EQUIPMENT		Unit	Product.	Daily Rate	Cost	Total Price
Labour:						
•						
•						
•						
•						
•						
•						
•						
•						
•						
Equipment:		m ²				
• Dozer (All activities)						
•						
•						
•						
•						
•						
•						
Material:		Unit	Quantity	Rate	Cost	
•						
•						
•						
•						
•						
•						
•						
•						
•						
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 3.3.1		(m²)	USh			

Contract No:			Date:			
Bill 3: EARTH WORKS		Item: 3.3 Provision of fill material 3.3.2 Embankment; fill and compact				
USING LABOUR		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		m ³				
• Labourer (excavate and stockpile)						
• Labourer (load)						
• Labourer (offload and spread)						
•						
•						
•						
•						
Equipment:		m ³				
• Tractor/Trailer (haul)						
• Roller Ped. (compaction)						
• Bowser (compaction)						
• Water pump (water extraction)						
•						
Material:		Unit	Quantity	Rate	Cost	
• Water (if it has to be purchased)		Lt				
•						
•						
•						
•						
•						
•						
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 3.3.2		(m³)		USh		

Contract No:			Date:			
Bill 3: EARTH WORKS		Item: 3.3 Provision of fill material 3.3.2 Embankment; fill and compact				
USING EQUIPMENT		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		m ³				
• Labourer (load)						
•						
•						
•						
•						
•						
•						
•						
Equipment:		m ³				
• Tipper (haul)						
• Motorized Grader (spread)						
• Dozer (excavate & stockpile)						
• Roller (compaction)						
• Bowser (compaction)						
• Water pump (water extraction)						
•						
Material:		Unit	Quantity	Rate	Cost	
• Water (if it has to be purchased)		Lt				
•						
•						
•						
•						
•						
•						
•						
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 3.3.2		(m³)		USh		

Contract No:			Date:			
Bill 3: EARTH WORKS		Item: 3.4 Excavation of rock				
USING LABOUR		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		day work				
• Labourer using pick axe)						
• Labourer (split by wedges and feather)						
• Labourer (split by fire and water)						
• Labour (haul and deposit all above)						
•						
•						
•						
Equipment:		day work				
• Tractor/trailer (hauling)						
•						
•						
•						
•						
•						
•						
Material:		Unit	Quantity	Rate	Cost	
• Fire wood		m ³				
• Water		Lt				
•						
•						
•						
•						
•						
•						
•						
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 3.4		(daywork)		USh		

Contract No:			Date:			
Bill 3: EARTH WORKS		Item: 3.4 Excavation of rock				
USING EQUIPMENT		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		day work				
• Labour (drilling - blasting)						
• Labourer (haul and deposit debris)						
•						
•						
•						
•						
•						
Equipment:		day work				
• Compressor with hammer / drill						
• Dozer (ripping, pushing)						
• Tipper (hauling)						
• Explosive detonator						
•						
Material:		Unit	Quantity	Rate	Cost	
• Explosives		kg				
• Explosive connector cable		m				
• Water (for dust reduction)		Lt				
•						
•						
•						
•						
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 3.4		(daywork)		USh		

Bill 4
Drainage Works

Bill 4

Drainage Works

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Item 4.6: Provide material and build cement bound masonry work	Page 4.4-25
Item 4.7: Provide stones and build dry stone masonry work	Page 4.4-29
Item 4.8: Provide, erect and remove formwork for concrete	Page 4.4-31
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Item 4.10: Provide, place and compact hardcor foundation layer for structures	Page 4.4-37
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Item 4.12: Provide gabion baskets and stones, place and fill baskets	Page 4.4-45
Item 4.13: Provide material and build grouted stone pitching, 150mm thickness	Page 4.4-47
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Item 4.16: Clear swamp for structures, 50m upstream from inlet and 100m downstream from outlet of structure over full width of structure including head walls and wing walls	Page 4.4-53
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Contract No:			Date:			
Bill 4: DRAINAGE WORKS		Item: 4.1 Provide and install scour checks 4.1.1 Using stones				
USING LABOUR		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		No.				
• Labourer (collect stones & haul)						
• Labourer (load & offload stones)						
• Labourer (build scour check)						
•						
•						
•						
•						
Equipment:		No.				
• Tractor/trailer (hauling stones)						
• Tipper (hauling stones)						
•						
•						
•						
•						
Material:		Unit	Quantity	Rate	Cost	
• Stones (extraction cost)		m ³				
• Stones (purchase + transport)		m ³				
•						
•						
•						
•						
•						
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 4.1.1		(No.)		USh		

Contract No:			Date:			
Bill 4: DRAINAGE WORKS		Item: 4.1 Provide and install scour checks 4.1.2 Using sticks				
USING LABOUR		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		No.				
• Labourer (collect and cut sticks & haul)						
• Labourer (collect stones & haul)						
• Labourer (load & offload stones)						
• Labourer (build scour check)						
•						
•						
Equipment:		No.				
• Tractor/trailer (hauling stones)						
• Tipper (hauling stones)						
•						
•						
•						
•						
Material:		Unit	Quantity	Rate	Cost	
• Stones (extraction)		m ³				
• Stones (purchase + transport)		m ³				
• Sticks (extraction)		No.				
• Sticks (purchase + transport)		No.				
•						
•						
•						
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 4.1.2		(No.)		USh		

Contract No:			Date:			
Bill 4: DRAINAGE WORKS		Item: 4.2 Excavation of foundation for structures 4.2.1 In soil not more than 1m deep				
USING LABOUR		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		m ³				
• Labourer (excavate & deposit material)						
• Labourer (trench drainage, if necessary)						
•						
•						
•						
•						
•						
•						
•						
Equipment:						
•						
•						
•						
•						
•						
•						
•						
Material:		Unit	Quantity	Rate	Cost	
•						
•						
•						
•						
•						
•						
•						
•						
•						
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 4.2.1		(m³)		USh		

Contract No:			Date:			
Bill 4: DRAINAGE WORKS		Item: 4.2 Excavation of foundation for structures 4.2.2 In soil more than 1m deep				
USING LABOUR		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		m ³				
• Labourer (excavate)						
• Labourer (hauling of material)						
• Labourer (trench drainage, if necessary)						
•						
•						
•						
•						
Equipment:						
•						
•						
•						
•						
•						
•						
•						
Material:		Unit	Quantity	Rate	Cost	
•						
•						
•						
•						
•						
•						
•						
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 4.2.2		(m³)		USh		

Contract No:			Date:			
Bill 4: DRAINAGE WORKS		Item: 4.3 Supply and install concrete culvert pipes 4.3.1 600mm diameter				
USING LABOUR		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		m				
• Labourer (excavate trench)						
• Labourer (excavate inlets and outlets)						
• Labourer (lower pipes and place)						
• Mason (align + join pipes, haunch if req.)						
• Labourer (backfill, compact, build ramp)						
• Labourer (haunch if required)						
•						
Equipment:		m				
• Roller Ped. (compacting)						
• Tractor/trailer (haul gravel for ramp)						
• Bowser (compaction)						
• Water pump (water extraction)						
•						
•						
•						
Material:		Unit	Quantity	Rate	Cost	
• Plain concrete rings diameter 600mm		No.				
• Sand (for bedding and joining)		m ³				
• Cement (for joining)		Bag				
• Water (if it has to be purchased)		Lts				
• Selected backfill or gravel for ramp		m ³				
•						
• Concrete (for haunching if required; check		m ³				
Item 4.11 and transfer rate here)						
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 4.3.1		(m)		US\$		

Contract No:			Date:			
Bill 4: DRAINAGE WORKS		Item: 4.3 Supply and install concrete culvert pipes 4.3.2 900mm diameter				
USING LABOUR		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		m				
• Labourer (excavate trench)						
• Labourer (inlets and outlets)						
• Labourer (lower pipes and place)						
• Mason (align + join pipes, haunch if req.)						
• Labourer (backfill, compact, build ramp)						
• Labourer (haunch if required)						
•						
Equipment:		m				
• Roller Ped. (compacting)						
• Tractor/trailer (haul gravel for ramp)						
• Bowser (compaction)						
• Water pump (water extraction)						
•						
•						
•						
Material:		Unit	Quantity	Rate	Cost	
• Plain concrete rings diameter 900mm		No.				
• Sand (for bedding and joining)		m ³				
• Cement (for joining)		Bag				
• Water		Lt				
• Selected backfill or gravel for ramp		m ³				
•						
• Concrete (for haunching if required; check Item 4.11 and transfer rate here)		m ³				
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 4.3.2		(m)		USh		

Contract No:			Date:			
Bill 4: DRAINAGE WORKS		Item: 4.3 Supply and install concrete culvert pipes 4.3.3 1200mm diameter				
USING LABOUR		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		m				
• Labourer (excavate trench)						
• Labourer (inlets and outlets)						
• Labourer (lower pipes and place)						
• Mason (align + join pipes, haunch if req.)						
• Labourer (backfill, compact, build ramp)						
• Labourer (haunch if required)						
•						
Equipment:		m				
• Roller Ped. (compacting)						
• Tractor/trailer (haul gravel for ramp)						
• Bowser (compaction)						
• Water pump (water extraction)						
•						
•						
Material:		Unit	Quantity	Rate	Cost	
• Plain concrete rings diameter 1200mm		No.				
• Sand (for bedding and joining)		m ³				
• Cement (for joining)		Bag				
• Water		Lt				
• Selected backfill or gravel for ramp		m ³				
•						
• Concrete (for haunching if required; check Item 4.11 and transfer rate here)		m ³				
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 4.3.3		(m)		USh		

Contract No:			Date:			
Bill 4: DRAINAGE WORKS		Item: 4.4 Supply and install steel culvert pipes 4.4.1 600mm diameter				
USING LABOUR		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		m				
• Labourer (excavate trench)						
• Labourer (inlets and outlets)						
• Labourer (lower pipes, place + join)						
• Labourer (backfill, compact, build ramp)						
• Labourer (excav. & load bed material)						
• Labourer (offload/spread from borrow)						
• Labourer (haul by w/barrow from s/pile)						
•						
Equipment:		m				
• Roller Ped. (compacting)						
• Tractor/trailer (hauling)						
• Bowser (compaction)						
• Water pump (water extraction)						
•						
•						
•						
Material:		Unit	Quantity	Rate	Cost	
• Steel culverts diameter 600mm		No.				
• Water (if it has to be purchased)		Lts				
• Selected backfill material		m ³				
•						
•						
•						
• Concrete (for haunching if required - check Item 4.11 and transfer rate here)		m ³				
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 4.4.1		(m)		USh		

Contract No:			Date:			
Bill 4: DRAINAGE WORKS		Item: 4.4 Supply and install steel culvert pipes 4.4.2 900mm diameter				
USING LABOUR		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		m				
• Labourer (excavate trench)						
• Labourer (inlets and outlets)						
• Labourer (lower pipes, place + join)						
• Labourer (backfill, compact, build ramp)						
• Labourer (excav. & load bed material)						
• Labourer (offload/spread from borrow)						
• Labourer (haul by w/barrow from s/pile)						
•						
Equipment:		m				
• Roller Ped. (compacting)						
• Tractor/trailer (hauling)						
• Bowser (compaction)						
• Water pump (water extraction)						
•						
•						
•						
Material:		Unit	Quantity	Rate	Cost	
• Steel culverts diameter 900mm		No.				
• Water (if it has to be purchased)		Lts				
• Selected backfill material		m ³				
•						
•						
•						
• Concrete (for haunching if required - check Item 4.11 and transfer rate here)		m ³				
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 4.4.2		(m)		USh		

Contract No:			Date:			
Bill 4: DRAINAGE WORKS		Item: 4.4 Supply and install steel culvert pipes 4.4.3 1200mm diameter				
USING LABOUR		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		m				
• Labourer (excavate trench)						
• Labourer (inlets and outlets)						
• Labourer (lower pipes, place + join)						
• Labourer (backfill, compact, build ramp)						
• Labourer (excav. & load bed material)						
• Labourer (offload/spread from borrow)						
• Labourer (haul by w/barrow from s/pile)						
•						
Equipment:		m				
• Roller Ped. (compacting)						
• Tractor/trailer (hauling)						
• Bowser (compaction)						
• Water pump (water extraction)						
•						
•						
•						
Material:		Unit	Quantity	Rate	Cost	
• Steel culverts diameter 1200mm		No.				
• Water (if it has to be purchased)		Lts				
• Selected backfill material		m ³				
•						
•						
•						
• Concrete (for haunching if required - check Item 4.11 and transfer rate here)		m ³				
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 4.4.3		(m)		USh		

Contract No:			Date:			
Bill 4: DRAINAGE WORKS		Item: 4.4 Supply and install steel culvert pipes 4.4.4 Larger than 1200mm diameter				
USING LABOUR		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		m				
• Labourer (excavate trench)						
• Labourer (inlets and outlets)						
• Labourer (lower pipes, place + join)						
• Labourer (backfill, compact, build ramp)						
• Labourer (excav. & load bed material)						
• Labourer (offload/spread from borrow)						
• Labourer (haul by w/barrow from s/pile)						
•						
Equipment:		m				
• Roller Ped. (compacting)						
• Tractor/trailer (hauling)						
• Bowser (compaction)						
• Water pump (water extraction)						
•						
•						
•						
Material:		Unit	Quantity	Rate	Cost	
• Steel culverts diameter mm		No.				
• Water		Lt				
• Selected backfill material		m ³				
•						
•						
•						
• Concrete (for haunching if required - check Item 4.11 and transfer rate here)		m ³				
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 4.4.4		(m)		USh		

Contract No:			Date:			
Bill 4: DRAINAGE WORKS		Item: 4.5 Demolish existing structures and cart debris away				
USING LABOUR		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		LS				
• Labourer (break out & clean up)						
• Labourer (load, haul and dep.)						
•						
•						
•						
•						
•						
Equipment:		LS				
• Tractor/trailer (hauling)						
•						
•						
•						
•						
•						
•						
Material:		Unit	Quantity	Rate	Cost	
•						
•						
•						
•						
•						
•						
•						
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 4.5		(LS)		USh		

Contract No:			Date:			
Bill 4: DRAINAGE WORKS		Item: 4.5 Demolish existing structures and cart debris away				
USING EQUIPMENT		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		LS				
• Labourer (load/offload & deposit)						
•						
•						
•						
•						
•						
•						
•						
Equipment:		LS				
• Compressor (with Hammer)						
• Dozer or Excavator (break out)						
• Lorry (hauling)						
•						
•						
Material:		Unit	Quantity	Rate	Cost	
•						
•						
•						
•						
•						
•						
•						
•						
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 4.5		(LS)		USh		

Contract No:			Date:			
Bill 4: DRAINAGE WORKS		Item: 4.6.1 Provide material and build cement bound masonry work in Stones				
USING LABOUR		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		m ³				
• Labourer (collect stones & haul)						
• Labourer (load & offload stones)						
• Labourer (assist mason to construct)						
• Mason (construct)						
• Labourer (cure mortar)						
•						
•						
Equipment:		m ³				
• Tractor/trailer (hauling stones)						
• Tipper (hauling stones)						
•						
•						
•						
•						
•						
Material:		Unit	Quantity	Rate	Cost	
• Stones (extraction cost)		m ³				
• Stones (purchase + transport)		m ³				
• Cement		kg				
• Pit sand		m ³				
• Water		Lts				
•						
•						
•						
•						
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 4.6.1		(m³)		USh		

Contract No:			Date:			
Bill 4: DRAINAGE WORKS		Item: 4.6.2 Provide material, build cement bound masonry work in Concrete Blocks				
USING LABOUR		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		m ³				
• Labourer (assisting mason)						
• Mason (construct)						
• Labourer (cure mortar)						
•						
•						
•						
•						
Equipment:						
•						
•						
•						
•						
•						
•						
•						
Material:		Unit	Quantity	Rate	Cost	
• Concrete blocks (supply + tpt to site)		m ³				
• Cement		kg				
• Pit sand		m ³				
• Water		Lts				
•						
•						
•						
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 4.6.2		(m³)		USh		

Contract No:			Date:			
Bill 4: DRAINAGE WORKS		Item: 4.7 Provide stones and build Dry Stone Masonry walls				
USING LABOUR		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		m ³				
• Labourer (collect stones & haul)						
• Labourer (load & offload stones)						
• Labourer (assisting mason)						
• Mason (construct)						
•						
•						
•						
Equipment:						
• Tractor/trailer (hauling stones)						
• Tipper (hauling stones)						
•						
•						
•						
•						
•						
Material:		Unit	Quantity	Rate	Cost	
• Stones (extraction cost)		m ³				
• Stones (purchase + transport)		m ³				
•						
•						
•						
•						
•						
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 4.7		(m³)		USh		

Contract No:			Date:			
Bill 4: DRAINAGE WORKS		Item: 4.8 Provide, erect and remove formwork for concrete				
USING LABOUR		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		m ²				
• Labourer (assist)						
• Carpenter (construct)						
• Carpenter (removing formwork)						
• Labourer (assist removing, cleaning)						
•						
•						
Equipment:		m ²				
•						
•						
•						
•						
•						
•						
Material:		Unit	Quantity	Rate	Cost	
• Timber Planks (+ 20% waste)		m ²				
• Formwork Support Material (beams, etc.)		m				
• Nails , Clamps, etc.		kg				
• Oil (for oiling formwork inside)		Lt				
•						
(Note: calculate how many times the formwork material can be reused and apply the resulting factor for the timber rates)						
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 4.8		(m²)		USh		

Contract No:			Date:			
Bill 4: DRAINAGE WORKS		Item: 4.9 Provide and fix steel reinforcement 4.9.1 Steel bars				
USING LABOUR		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		kg				
• Artisan (cut and bend)						
• Artisan (lay and tie)						
• Labourer (assist laying & tying)						
•						
•						
•						
•						
Equipment:						
•						
•						
•						
•						
•						
•						
•						
Material:		Unit	Quantity	Rate	Cost	
• Bar, dia 6mm (+10% for waste)		m				
• Bar, dia 8mm (+10% for waste)		m				
• Bar, dia 10mm (+10% for waste)		m				
• Bar, dia 16mm (+10% for waste)		m				
• Bar, dia 20mm (+10% for waste)		m				
• Bar, diamm (+10% for waste)		m				
• Binding wire		Roll				
• Blocks (to keep cover distance)		No.				
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 4.9.1		(kg)		USh		

Contract No:			Date:			
Bill 4: DRAINAGE WORKS		Item: 4.9 Provide and fix steel reinforcement 4.9.2 Weld Mesh				
USING LABOUR		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		m ²				
• Artisan (cut)						
• Artisan (lay and tie)						
• Labourer (assist laying & tying)						
•						
•						
•						
•						
Equipment:						
•						
•						
•						
•						
•						
•						
•						
Material:		Unit	Quantity	Rate	Cost	
• Weld Mesh, (+10% for waste)		m ²				
• Weld Mesh, (+10% for waste)		m ²				
• Binding wire		Roll				
• Blocks (to keep cover distance)		No.				
•						
•						
•						
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 4.9.2		(m²)		US\$		

Contract No:			Date:			
Bill 4: DRAINAGE WORKS		Item: 4.10 Provide, place and compact hardcore foundation layer for structures				
USING LABOUR		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		m ³				
• Labourer (collect stones & haul)						
• Labourer (load & offload stones)						
• Labourer (assisting mason)						
• Mason (construct)						
•						
•						
Equipment:		m ³				
• Tractor/trailer (hauling stones)						
• Tipper (hauling stones)						
• Compactor						
•						
•						
•						
Material:		Unit	Quantity	Rate	Cost	
• Stones (extraction cost)		m ³				
• Stones (purchase + transport)		m ³				
•						
•						
•						
•						
•						
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 4.10		(m³)		USh		

Contract No:			Date:			
Bill 4: DRAINAGE WORKS		Item: 4.11 Provide, cast and cure concrete in 4.11.1 Class Lean (1:4:8)				
USING LABOUR		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		m ³				
• Labourer (mix concrete)						
• Labourer (haul & place)						
• Mason (mix, cast and compact)						
• Labourer (cure concrete)						
•						
Equipment:		m ³				
• Vibrator						
•						
•						
•						
•						
Material:		Unit	Quantity	Rate	Cost	
• Cement		kg				
• Water		Lts				
• Coarse aggregate		m ³				
• Fine aggregate (river sand)		m ³				
•						
•						
•						
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 4.11.1		(m³)		USh		

Contract No:			Date:			
Bill 4: DRAINAGE WORKS		Item: 4.11 Provide, cast and cure concrete in 4.11.2 Class 15 (1:3:6)				
USING LABOUR		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		m ³				
• Labourer (mix concrete)						
• Labourer (haul & place)						
• Mason (mix, cast and compact)						
• Labourer (cure concrete)						
•						
•						
Equipment:		m ³				
• Vibrator						
•						
•						
•						
•						
Material:		Unit	Quantity	Rate	Cost	
• Cement		kg				
• Water		Lts				
• Coarse aggregate		m ³				
• Fine aggregate (river sand)		m ³				
•						
•						
•						
•						
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 4.11.2		(m³)		USH		

Contract No:			Date:			
Bill 4: DRAINAGE WORKS		Item: 4.11 Provide, cast and cure concrete in 4.11.3 Class 20 (1:2:4)				
USING LABOUR		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		m ³				
• Labourer (mix concrete)						
• Labourer (haul & place)						
• Mason (mix, cast and compact)						
• Labourer (cure concrete)						
•						
•						
Equipment:		m ³				
• Vibrator						
•						
•						
•						
•						
•						
•						
Material:		Unit	Quantity	Rate	Cost	
• Cement		kg				
• Water		Lts				
• Coarse aggregate		m ³				
• Fine aggregate (river sand)		m ³				
•						
•						
•						
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 4.11.3		(m³)		USH		

Contract No:			Date:			
Bill 4: DRAINAGE WORKS		Item: 4.12 Provide gabion baskets and stones, place and fill baskets				
USING LABOUR		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		m ³				
• Labourer (collect stones & haul)						
• Labourer (load & offload stones)						
• Labourer (assisting mason)						
• Mason (construct)						
•						
•						
Equipment:		m ³				
• Tractor/trailer (hauling stones)						
• Tipper (hauling stones)						
•						
•						
•						
•						
Material:		Unit	Quantity	Rate	Cost	
• Stones (extraction cost)		m ³				
• Stones (purchase & transport)		m ³				
• Gabion basket (2 x 1 x 0.5 m)		m ³				
• Gabion basket (2 x 1 x 1 m)		m ³				
• Gabion basket (mattress 3 x 2 x 0.23 m)		m ³				
• Galvanised wire (tying and binding)		Roll				
•						
•						
•						
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 4.12		(m³)		US\$		

Contract No:			Date:			
Bill 4: DRAINAGE WORKS		Item: 4.13 Provide material and build grout stone, pitching, 150 mm thickness				
USING LABOUR		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		m ²				
• Labourer (collect stones & haul)						
• Labourer (load & offload stones)						
• Labourer (assisting mason)						
• Mason (construct)						
•						
•						
Equipment:		m ²				
• Tractor/trailer (hauling stones)						
• Tipper (hauling stones)						
•						
•						
•						
•						
Material:		Unit	Quantity	Rate	Cost	
• Stones (extraction cost)		m ³				
• Stones (purchase & transport)		m ³				
• Cement		kg				
• Pit sand		m ³				
• Water		Lts				
•						
•						
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 4.13		(m²)		USh		

Contract No:			Date:			
Bill 4: DRAINAGE WORKS		Item: 4.14 Provide select material and backfill structures				
USING LABOUR		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		m ³				
• Labourer (excavate & stockpile)						
• Labourer (load)						
• Mason (offload and spread)						
• Labourer (compact with rammer)						
•						
•						
Equipment:		m ³				
• Roller Pedistrain (compaction)						
• Tractor/trailer (haul)						
• Bowser (compaction)						
• Water pump (water extraction)						
•						
•						
•						
Material:		Unit	Quantity	Rate	Cost	
• Water (if it has to be purchased)		Lts				
•						
•						
•						
•						
•						
•						
•						
•						
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 4.14		(m³)		USh		

Contract No:			Date:			
Bill 4: DRAINAGE WORKS		Item: 4.14 Provide select material and backfill structures				
USING EQUIPMENT		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		m ³				
• Labourer (load)						
•						
•						
•						
•						
•						
•						
•						
•						
Equipment:		m ³				
• Tipper (haul)						
• Dozer (excavate & stockpile)						
• Roller Pedistrain (compaction)						
• Bowser (compaction)						
• Water pump (water extraction)						
•						
•						
Material:		Unit	Quantity	Rate	Cost	
• Water (if it has to be purchased)		Lts				
•						
•						
•						
•						
•						
•						
•						
•						
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 4.14		(m³)		USh		

Contract No:			Date:			
Bill 4: DRAINAGE WORKS		Item: 4.15 Excavate water diversions and/or construct barriers				
USING LABOUR		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		LS				
• Labourer (excavation)						
• Labourer (load/haul with wheel barrow)						
• Labourer (offload and deposit)						
• Labourer (fill and place sandbags)						
• Labourer (maintain)						
•						
Equipment:		LS				
• Tractor/trailer (haul)						
•						
•						
•						
•						
•						
Material:		Unit	Quantity	Rate	Cost	
• Sandbags						
• Sand						
•						
•						
•						
•						
•						
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 4.15		(Lump Sum)		USh		

Contract No:			Date:			
Bill 4: DRAINAGE WORKS		Item: 4.15 Excavate water diversions and/or construct barriers				
USING EQUIPMENT		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		LS				
• Labourer (fill and place sandbags)						
• Labourer (maintain)						
•						
•						
•						
•						
•						
•						
•						
Equipment:		LS				
• Excavator (excavation of diversions)						
• Tipper (haul)						
•						
•						
•						
•						
•						
Material:		Unit	Quantity	Rate	Cost	
• Sandbags						
• Sand						
•						
•						
•						
•						
•						
•						
•						
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 4.15		(Lump Sum)		USh		

Contract No:			Date:			
Bill 4: DRAINAGE WORKS		Item: 4.16 Clear swamps for structures, 50m upstream and 100m downstream				
USING LABOUR		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		LS				
• Labourer (cut vegetation)						
• Labourer (haul/deposit with wheelbarrow)						
• Labourer (load/offload debris)						
•						
•						
•						
•						
Equipment:		LS				
• Tractor/trailer (haul)						
•						
•						
•						
•						
•						
•						
Material:		Unit	Quantity	Rate	Cost	
•						
•						
•						
•						
•						
•						
•						
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 4.16		(Lump Sum)		USh		

Contract No:			Date:			
Bill 4: DRAINAGE WORKS		Item: 4.17 Other drainage erosion protection works as directed (Provisional Item)				
USING LABOUR		Unit	Product.	Daily Rate	Cost	Total Price
Labour:						
• Labourer						
• Labourer						
• Labourer						
• Artisan						
•						
•						
•						
•						
Equipment:						
•						
•						
•						
•						
•						
•						
•						
Material:		Unit	Quantity	Rate	Cost	
•						
•						
•						
•						
•						
•						
•						
•						
•						
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 4.17		(Provisional Item)		USh		

Bill 5
Gravelling and Completion Works

Bill 5

Gravelling and Completion Works

Item 5.1: Preparation of quarry site including clearing of vegetation and removing top soil	Page 4.5- 1
Item 5.2: Excavate gravel, stockpile, load, haul, offload, spread, water and compact	Page 4.5- 3
Item 5.3: Restoration of site(s), quarries and barrow pits	Page 4.5- 5

Contract No:			Date:			
Bill 5: GRAVELLING WORKS		Item: 5.1 Preparation of quarry site including clearing vegetation & removing topsoil				
USING LABOUR		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		m ²				
• Labourer (remove fences, structures)						
• Labourer (cut grass & bushes)						
• Labourer (cut trees, remove stumps)						
• Labourer (haul & deposit above)						
• Labourer (excavate topsoil)						
• Labourer (haul & deposit above)						
• Labourer (remove boulders)						
•						
Equipment:		m ²				
•						
•						
•						
•						
•						
•						
•						
Material:		Unit	Quantity	Rate	Cost	
•						
•						
•						
•						
•						
•						
•						
•						
•						
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 5.1		(m²)		USh		

Contract No:			Date:			
Bill 5: GRAVELLING WORKS		Item: 5.1 Preparation of quarry site including clearing vegetation & removing topsoil				
USING EQUIPMENT		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		m ²				
•						
•						
•						
•						
•						
•						
•						
•						
•						
Equipment:		m ²				
• Dozer (all activities)						
•						
•						
•						
•						
•						
•						
Material:		Unit	Quantity	Rate	Cost	
•						
•						
•						
•						
•						
•						
•						
•						
•						
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 5.1		(m²)		USh		

Contract No:			Date:			
Bill 5: GRAVELLING WORKS		Item: 5.2 Excavate gravel, stockpile, load, haul, offload, spread, water and compact				
USING LABOUR		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		m ³				
• Labourer (excavate & stockpile)						
• Labourer (remove oversize material & load)						
• Labourer (offload & spread)						
• Labourer (reshape where necessary)						
•						
•						
Equipment:		m ³				
• Tractor/Trailer (hauling gravel)						
• Tipper (hauling gravel)						
• Bowser (compaction)						
• Roller (compaction)						
• Water pump (water extraction)						
•						
Material:		Unit	Quantity	Rate	Cost	
• Gravel		m ³				
• Water (if it has to be purchased)		Lt				
•						
•						
•						
•						
•						
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 5.2		(m³)		USh		

Contract No:			Date:			
Bill 5: GRAVELLING WORKS		Item: 5.2 Excavate gravel, stockpile, load, haul, offload, spread, water and compact				
USING EQUIPMENT		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		m ³				
•						
•						
•						
•						
•						
•						
•						
•						
•						
Equipment:		m ³				
• Dozer (excavate & stockpile)						
• Front end loader (loading)						
• Tipper (haul)						
• Roller (compaction)						
• Bowser (compaction)						
• Water pump (water extraction)						
•						
Material:		Unit	Quantity	Rate	Cost	
• Gravel		m ³				
• Water (if it has to be purchased)		Lt				
•						
•						
•						
•						
•						
•						
•						
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 5.2		(m³)		USh		

Contract No:			Date:			
Bill 5: GRAVELLING WORKS		Item: 5.3 Restoration of site(s), quarries and borrow pits				
USING LABOUR		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		LS				
• Labourer (level)						
• Labourer (loosen topsoil)						
• Labourer (load/haul with wheelbarrow)						
• Labourer (spread & rake)						
• Labourer (plant grass, trees)						
• Labourer (remove boulders)						
• Labourer (erosion control works)						
•						
Equipment:		LS				
• Tractor/Trailer (haul)						
•						
•						
•						
•						
•						
Material:		Unit	Quantity	Rate	Cost	
•						
•						
•						
•						
•						
•						
•						
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 5.3		(LS)		USh		

Contract No:			Date:			
Bill 5: GRAVELLING WORKS		Item: 5.3 Restoration of site(s), quarries and borrow pits				
USING EQUIPMENT		Unit	Product.	Daily Rate	Cost	Total Price
Labour:		LS				
• Labourer (plant grass, trees)						
• Labourer (erosion control works)						
•						
•						
•						
•						
•						
Equipment:		LS				
• Dozer (loosen, spread)						
• Front-end loader (loosen, haul, spread)						
•						
•						
•						
Material:		Unit	Quantity	Rate	Cost	
•						
•						
•						
•						
•						
•						
•						
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 5.3		(LS)		USh		

Bill 6

Preliminary and General Items

Bill 6

Preliminary and General Items

Item 6.1: Mobilisation and Demobilisation	Page 4.6- 1
Item 6.2: Insurances and Bonds	Page 4.6- 2
Item 6.3: Traffic Accomodation	Page 4.6- 3
Item 6.4: Bill Boards	Page 4.6- 4
Item 6.5: Maintenance of the Whole of the Works	Page 4.6- 5
Item 6.6: Supervision of Works by the Employer including testing facilities	Page 4.6- 6
Item 6.7: Site Meetings with local communities including HIV/AIDS awareness	Page 4.6- 7

Contract No:				Date:	
Bill 6: PRELIMINARY & GENERAL			Item: 6.1 Mobilisation and demobilisation		
INPUT ITEM DESCRIPTION	Unit	Quantity	Rate	Cost	Total Price
• Rent office, workshop & stores	months				
• Maintenance of office, workshop & stores	months				
• Accommodation - Foreman	months				
• Maintenance of Foreman accommodation	months				
• Accommodation - Asst. Foreman	months				
• Maintenance of Asst. Foreman accomm.	months				
• Accommodation - Drivers/operators	months				
• Maintenance of Drivers accommodation	months				
• Accommodation - Site Mechanic	months				
• Maintenance of Mechanic accommodation	months				
• Supply water @ 1 m ³ perday to camp	m ³				
• Security of campsite	wd				
• Purchase furniture & fittings	Set				
• Bring in furniture & fittings - transport	km				
• Move out furniture & fittings - transport	km				
• Equipment, plant tools onto site	km				
• Equipment, plant tools off site	km				
• Removal & clean up of site	wd				
•					
•					
•					
•					
•					
•					
•					
•					
TOTAL DIRECT COST					
Indirect Cost:	(% of direct cost)			%	
• Overhead (excluding P&G)					
• Risk					
• Profit					
•					
TOTAL INDIRECT COST					
TOTAL ITEM 6.1		(LS)	USh		

Contract No:			Date:			
Bill 6: PRELIMINARY & GENERAL		Item: 6.2 Insurances & Bonds				
INPUT ITEM DESCRIPTION	Unit	Quantity	Rate	Cost	Total Price	
• Performance security	No.					
• Insurance (all risk)	No.					
•						
•						
•						
•						
•						
•						
•						
•						
•						
•						
•						
•						
•						
•						
•						
•						
•						
•						
•						
TOTAL DIRECT COST						
Indirect Cost:	(% of direct cost)			%		
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 6.2		(LS)	US\$			

Contract No:				Date:		
Bill 6: PRELIMINARY & GENERAL			Item: 6.3 Traffic accommodation			
INPUT ITEM DESCRIPTION	Unit	Quantity	Rate	Cost	Total Price	
• Supply signs	No.					
• Supply lean concrete	m ³					
• Labourer - Install signs	wd					
•						
•						
•						
•						
•						
•						
•						
•						
•						
•						
•						
•						
•						
•						
•						
•						
•						
•						
TOTAL DIRECT COST						
Indirect Cost:	(% of direct cost)			%		
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 6.3		(LS)	USh			

Contract No:				Date:		
Bill 6: PRELIMINARY & GENERAL		Item: 6.4 Bill boards				
INPUT ITEM DESCRIPTION	Unit	Quantity	Rate	Cost	Total Price	
• Supply billboards	No.					
• Supply lean concrete	m ³					
• Labourer - Install billboards	wd					
•						
•						
•						
•						
•						
•						
•						
•						
•						
•						
•						
•						
•						
•						
•						
•						
•						
•						
•						
TOTAL DIRECT COST						
Indirect Cost:	(% of direct cost)			%		
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 6.4		(No.)	USh			

Contract No:			Date:			
Bill 6: PRELIMINARY & GENERAL		Item: 6.5 Maintenance of the whole of the works				
INPUT ITEM DESCRIPTION	Unit	Quantity	Rate	Cost	Total Price	
• Maintainkm @ UGX 360,000 per km/yr	yrs					
•						
•						
•						
•						
•						
•						
•						
•						
•						
•						
•						
•						
•						
•						
•						
•						
•						
•						
•						
•						
TOTAL DIRECT COST						
Indirect Cost:			(% of direct cost)	%		
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 6.5		(LS)	USh			

Contract No:			Date:			
Bill 6: PRELIMINARY & GENERAL		Item: 6.6 Supervision of the Project by the Employer				
INPUT ITEM DESCRIPTION	Unit	Quantity	Rate	Cost	Total Price	
• 2% of total value of bills 1, 2, 3, 4 & 5	LS					
•						
•						
•						
•						
•						
•						
•						
•						
•						
•						
•						
•						
•						
•						
•						
•						
•						
•						
•						
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)		%		
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 6.6		(LS)	USh			

Contract No:				Date:	
Bill 6: PRELIMINARY & GENERAL		Item: 6.7 Site meetings with local communities including HIV/AIDS awareness			
INPUT ITEM DESCRIPTION	Unit	Quantity	Rate	Cost	Total Price
• 1% of total value of bills 1, 2, 3, 4 & 5	LS				
•					
•					
•					
•					
•					
•					
•					
•					
•					
•					
•					
•					
•					
•					
•					
•					
•					
•					
•					
•					
•					
•					
•					
•					
•					
TOTAL DIRECT COST					
Indirect Cost:		(% of direct cost)		%	
• Overhead (excluding P&G)					
• Risk					
• Profit					
•					
TOTAL INDIRECT COST					
TOTAL ITEM 6.7		(LS)		USh	

Annex 1

Worked Examples for Basic Cost Data

Annex 1

Worked Examples for Basic Cost Data

Daily Labour Rates	Page	1
Daily Rate for Tools	Page	2
Equipment Hire Rates	Page	4
Material Rates Inclusive of Transport	Page	6
Company Costs, Risk and Profit	Page	8
Indicative Unit Task Rates Using Unskilled Labour	Page	11

A. DAILY LABOUR RATES (CASUAL LABOUR)

	Basic rate	Tools	Lunch	Unprod.	Overtime	Conting.	Total
Column >>>	A	B	C	D	E	F	G
Formula >>>		Daily rate for tools		(2% x A)	(4% x A)	(3% x A)	(A+B+C +D+E+F)
1. Unskilled worker	1,500	473	500	30	60	45	2,608
2. Skilled worker	4,000	473	1,000	80	160	120	5,833

Rates for casual labour include all of the following:

1. Actual Wage (Amount actually paid to the worker)

- Basic wage
- Housing allowance (if applicable)
- Allowances for provision of food

2. Site Charges

- Social charges (e.g. taxes, workman's compensation fund, social security, etc.)
- Hand tools incl. safety provision
- Mark up for unproductive casual labour & working days (site support, bad weather, losses, etc.)
- Overtime
- Contingencies
- Basic wage
This is the basic minimum wage as set by law or as dictated by the market.
- Housing allowance (if applicable)
This allowance is also determined by law, if it is obligatory.
- Allowances for provision of food
This amount is to satisfy the relevant clause in the General Conditions of Contract.
- Social charges
These charges are determined by the law of the land.
- Hand tools incl. safety provision
This rate is calculated as shown in B.
- Mark up for unproductive casual labour & working days
This amount is judged rather than calculated as it will vary significantly from project to project and from area to area.
- Overtime
Often, towards the end of the contract, the workforce has to put in overtime to finish the project on schedule. Since this implies an extra cost, it must be allowed for. Once again, this allowance has to be judged rather than calculated.
- Contingencies
This allowance caters for the inaccuracies of this entire calculation. It is a judged amount too.

B. DAILY RATE FOR TOOLS

Description	Qty	Unit Price (Ush)	Total price (Ush)	Economic life (in months)	Annual purchase cost	Tool mtce. 10% of ann. cost	Total annual cost	
Column >>>	A	B	C	D	E	F	G	
Formula >>>			A x B		(12/D) x C	5% x E	E + F	
1	2m straight edge	6	10,000	60,000	12	60,000	3,000	63,000
2	3mm dia nylon rope 200m	15	30,000	450,000	6	900,000	0	900,000
3	5 lb hammer	10	9,500	95,000	12	95,000	4,750	99,750
4	Anvil (30 kg)	2	200,000	400,000	60	80,000	0	80,000
5	Axes (short handle)	10	9,000	90,000	12	90,000	4,500	94,500
6	Boning rod set	4	35,000	140,000	24	70,000	3,500	73,500
7	Bow saw 26"	2	9,000	18,000	12	18,000	900	18,900
8	Camber template	6	25,500	153,000	36	51,000	2,550	53,550
9	Claw hammer 1.5 lb	4	8,500	34,000	24	17,000	850	17,850
10	Crow bar, chisel & point	10	180,000	1,800,000	24	900,000	45,000	945,000
11	Ditch template	10	15,000	150,000	36	50,000	2,500	52,500
12	Earth rammer 14 lb	15	25,000	375,000	24	187,500	9,375	196,875
13	First Aid kit	3	150,000	450,000	6	900,000	45,000	945,000
14	Flat file 12" second cut	10	4,500	45,000	6	90,000	4,500	94,500
15	Gloves	25	14,000	350,000	6	700,000	0	700,000
16	Gumboots	200	13,000	2,600,000	12	2,600,000	130,000	2,730,000
17	Heavy duty rake, 14 prong	60	12,000	720,000	12	720,000	36,000	756,000
18	Jembe (hoe) 3.5 lb	80	4,000	320,000	12	320,000	16,000	336,000
19	Jerricans	15	3,500	52,500	6	105,000	5,250	110,250
20	Lamp	5	11,000	55,000	12	55,000	2,750	57,750
21	Line level	20	12,000	240,000	24	120,000	6,000	126,000
22	Mason's trowel	10	3,000	30,000	24	15,000	750	15,750
23	Mattock 4.5 lb	80	7,500	600,000	12	600,000	30,000	630,000
24	Mortar pans	10	5,000	50,000	6	100,000	5,000	105,000
25	Overalls	200	35,000	7,000,000	12	7,000,000	0	7,000,000
26	Panga (18") (Bush knife)	15	4,000	60,000	6	120,000	6,000	126,000
27	Pickaxe 7lb	80	6,000	480,000	12	480,000	24,000	504,000
28	Plumb bobs	6	3,000	18,000	36	6,000	300	6,300
29	Profile boards	25	3,000	75,000	12	75,000	3,750	78,750
30	Ranging rods	25	21,000	525,000	12	525,000	26,250	551,250
31	Rip saw	5	32,000	160,000	12	160,000	8,000	168,000
32	Safety goggles	12	8,000	96,000	12	96,000	4,800	100,800
33	Shovel, round nose	95	7,500	712,500	12	712,500	35,625	748,125
34	Slasher grass	20	3,000	60,000	6	120,000	6,000	126,000
35	Sledge hammer 14lb	10	30,000	300,000	24	150,000	7,500	157,500
36	Slope & camber template	2	25,000	50,000	36	16,667	833	17,500
37	Spare axe handle	20	2,000	40,000	12	40,000	2,000	42,000
38	Spare Handle Hoes	200	2,000	400,000	12	400,000	20,000	420,000
39	Spare Handle Matocks	200	2,000	400,000	12	400,000	20,000	420,000
40	Spare Handle Pick axes	200	2,000	400,000	12	400,000	20,000	420,000
41	Spirit level (4 feet)	12	8,000	96,000	12	96,000	0	96,000
42	Square	6	8,500	51,000	12	51,000	0	51,000
43	Square mouthed shovels	40	7,000	280,000	12	280,000	14,000	294,000
44	Steel floats	6	10,000	60,000	12	60,000	3,000	63,000
45	Tape measure 30m	15	18,500	277,500	12	277,500	13,875	291,375
46	Tape measure 5m	15	6,500	97,500	12	97,500	4,875	102,375
47	Water drum (200 litres)(Plast	6	100,000	600,000	36	200,000	10,000	210,000
48	Watering can	20	6,000	120,000	12	120,000	6,000	126,000
49	Wheelbarrows	30	85,000	2,550,000	24	1,275,000	63,750	1,338,750
50	Wooden floats	6	6,000	36,000	12	36,000	1,800	37,800
	Grand total							22,698,200

Assumptions:

1. 200 labourers working
2. Total working days per month = 20

Daily rate calculation:

Total working days per year	=	20 x 12	=	240 days
Total working days for 200 labourers	=	240 x 200	=	48,000 days
Daily rate for tools	=	$\frac{22,698,200}{48,000}$	=	USh 473

C. EQUIPMENT HIRE RATES

#	Item	Formula	Tipper Motorized Bowser	Tractor	Trailer	Roller	Towed Water Bowser	Water Pump	Poker Vibrator	Concrete Mixer	Towed Grader	Other
i	Interest/Bank Charges	i	25%	25%	25%	25%	25%	25%	25%	25%	25%	
ii	Fuel Prices	F	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	1,280	
iii	Lubricants	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	
iv	Maintenance & Repairs	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	
v	Tyre Price	T	300,000	300,000	300,000	500,000	300,000	6,000	0	6,000	300,000	
vi	Tyre Number	tn	7	4	4	2	2	2	0	2	4	
vii	Lincence & Insurance	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	
viii	Driver & Turnman	D	200,000	150,000	-	66,000	-	33,000	33,000	44,000	150,000	
ix	Expected Life (Years)	N	10	8	5	5	5	5	5	5	5	
x	Usage (km/hr)	U	200,000*	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	
xi	Availability(No.of days/year)	A	200	200	200	200	200	200	200	200	200	
xii	Fuel Consumption(Lts/hr)	C	0.35*	5	-	0.63	-	0.63	0.63	0.63	-	
xiii	Replacement of tyres	R	20,000*	2,000	2,000	4,000	2,000	4,000	0	2,000	2,000	
a	Purchase Price	P	87,500,000	30,910,100	7,597,200	12,301,900	6,477,900	3,484,000	3,915,600	5,700,500	9,100,000	
b	Interest	$\frac{(N+1) \times (i) \times P \times N}{2 \times N \times (365 \times N)}$	32,962	11,909	3,122	5,056	2,662	1,432	1,609	2,343	3,740	
c	Depreciation	$\frac{P}{N \times 365}$	23,973	10,586	4,163	6,741	3,550	1,909	2,146	3,124	4,986	
d	Fuel	$\frac{C \times F \times U}{A \times N}$	44,800	32,000	-	6,451	-	6,451	6,451	6,451	-	
e	Lubricants	15% of d	6,720	4,800	-	968	-	968	968	968	-	
f	Maintenance & Repairs	$\frac{100\% \times P}{A \times N}$	43,750	19,319	7,597	12,302	6,478	3,484	3,916	5,701	9,100	
g	Tyres	$\frac{tn \times T \times U}{A \times N \times R}$	10,500	3,000	4,800	2,000	2,400	24	-	48	4,800	
h	Licence & Insurance	$\frac{6\% \times P}{365 \times N}$	1,438	635	250	404	213	115	129	187	299	
j	Driver & Turnman	$\frac{D \times 12}{365}$	6,575	4,932	-	2,170	-	1,085	1,085	1,447	4,932	
k	HIRE RATE / DAY		170,719	87,180	19,932	36,091	15,303	15,467	16,303	20,268	27,857	

NOTE:

- The above table is a sample of 2001 rates.
- The equipment costs can be **calculated** in the way shown above for all equipment, including equipment not shown in this table. These rates include the costs of operators/drivers.
- Equipment costs may also be obtained from the local **market rates** for hiring the equipment as opposed to calculation.

D. MATERIAL RATES INCLUSIVE OF TRANSPORT

Item	Material	Type of vehicle used for transportation	Unit	Purchase quantity	Basic rate	Basic rate per unit item	Tran. rate per km	Dist. to site	Quantity in one full load	Transport rate for full load	Tran. cost per unit item	Load/offload & prep. costs	Wastage cost	Total cost per unit item
	Column >>>			A	B	C	D	E	F	G	H	I	J	K
	Formula >>>					B/A				D x E	G/F	5% x C	% x C	C+H+I+J
1	Cement	3 tonne truck	kg	50	15,000	300	1,500	23	3,000	34,500	12	15	8	334
2	Aggregate	3 tonne truck	m ³	1.00	26,700	26,700	1,500	6	2	9,000	4,500	1,335	668	33,203
3	Concrete blocks	3 tonne truck	m ³	0.018	2,000	111,111	1,500	6	2	9,000	4,500	5,556	50	121,217
4	Weld mesh	3 tonne truck	m ²	1	8,000	8,000	1,500	23	100	34,500	345	400	200	8,945
5	Shutterboards	3 tonne truck	m ²	1.08	7,200	6,667	1,500	23	75	34,500	460	333	180	7,640
6	Timber	3 tonne truck	m	3.6	2,000	556	1,500	23	2,000	34,500	17	28	50	651
7	600 dia concrete pipes	3 tonne truck	m	1	60,000	60,000	1,500	10	13	15,000	1,154	3,000	600	64,754
8	900 dia concrete pipes	3 tonne truck	m	1	120,000	120,000	1,500	10	5	15,000	3,000	6,000	1,200	130,200
9	1200 dia concrete pipes	3 tonne truck	m	1	180,000	180,000	1,500	10	2	15,000	7,500	9,000	1,800	198,300
10	600 dia armco pipes	3 tonne truck	m	1	90,000	90,000	1,500	23	80	34,500	431	4,500	450	95,381
11	900 dia armco pipes	3 tonne truck	m	1	140,000	140,000	1,500	23	50	34,500	690	7,000	700	148,390
12	1200 dia armco pipes	3 tonne truck	m	1	200,000	200,000	1,500	23	35	34,500	986	10,000	1,000	211,986
13	Signs	3 tonne truck	No.	1	140,000	140,000	1,500	23	20	34,500	1,725	7,000	0	148,725
14	Billboards	3 tonne truck	No.	1	150,000	150,000	1,500	23	20	34,500	1,725	7,500	0	159,225
15	Stones	3 tonne truck	m ³	1	10,000	10,000	1,500	5	2	7,500	3,750	500	50	14,300
16	Bricks	3 tonne truck	m ³	0.0056	50	8,929	1,500	10	2	15,000	7,500	446	8	16,883
17	Steel bars (6 mm)	3 tonne truck	m	12	4,000	333	1,500	23	10,000	34,500	3	17	2	355
18	Steel bars (8 mm)	3 tonne truck	m	12	6,000	500	1,500	23	6,000	34,500	6	25	3	533
19	Steel bars (10 mm)	3 tonne truck	m	12	9,500	792	1,500	23	3,800	34,500	9	40	4	844
20	Steel bars (16 mm)	3 tonne truck	m	12	18,000	1,500	1,500	23	1,500	34,500	23	75	8	1,606
21	Steel bars (20 mm)	3 tonne truck	m	12	27,000	2,250	1,500	23	950	34,500	36	113	11	2,410
22	River sand	3 tonne truck	m ³	1	3,500	3,500	1,500	5	2	7,500	3,750	175	175	7,600
23	Pit sand	3 tonne truck	m ³	1	3,500	3,500	1,500	5	2	7,500	3,750	175	175	7,600
24	2x1x0.5m gabions	3 tonne truck	No.	1	64,643	64,643	1,500	23	125	34,500	276	3,232	323	68,474
25	2x1x1m gabions	3 tonne truck	No.	1	87,715	87,715	1,500	23	100	34,500	345	4,386	439	92,884
26	3x2x0.23m gabions	3 tonne truck	No.	1	113,373	113,373	1,500	23	50	34,500	690	5,669	567	120,299
27	Firewood	3 tonne truck	m ³	1	13,300	13,300	1,500	2	2	3,000	1,500	665	67	15,532
28														
29														
30														

NOTE:

1. Another assumption is that one type of vehicle shall be used for transportation.
However, in reality, there will be different types of vehicles to transport different types of materials.
This is possible to determine to some degree of certainty, after thorough site investigations have been carried out.
2. Loading expenses can be calculated for each type of material.
They are not necessarily uniform at 5% of the basic cost.
3. Wastage percentage is an assessed value which will be different as circumstances vary.
4. Material costs include purchase, transportation to site, loading/offloading, preparation (if required, eg. planing of timber) and wastage during this process.

E. COMPANY COSTS (OVERHEADS), RISK AND PROFIT

1. COMPANY COSTS (OVERHEADS)

The company costs are the costs of running the company while the project is going on. Company costs include the following items:

- Staff salaries
- Property costs
- Company vehicles
- Audit fees & legal costs
- Interest on loans
- Stationery

a) Staff salaries

These cover all the costs of employing the company's full time staff including the contractor himself, his partners if any, site managers, foremen, secretaries, accounts staff, watchmen, drivers (of vehicles not included in the direct costs), etc.

These salaries are the full remuneration paid to these classes of workers.

b) Property costs

The expenses connected with renting or owning company offices (headquarters, **not** site office). This includes costs of renting, electricity, water, telephone, maintenance, etc.

c) Company vehicles

The expenses connected with hiring or owning vehicles other than those included in the direct costs of the job.

d) Audit fees & legal costs

These are expenses dealing with the hiring of professionals to audit the company and to advise the company on legal issues.

e) Interest on loans

A contractor is often forced to take out short-term high-interest loans to keep his/her cash flow positive at all times. These loans are necessary as no contractor can survive on a negative cash flow for long without having to stop operations and facing the resulting serious implications.

f) Stationery

The expenses associated with all the stationery used by the company.

Calculating the company costs

The company costs of a contractor must be covered by the money earned from the various contracts. Each contract will carry its proportion of the company costs. The bigger the contract (in terms of contract sum), the larger the proportion of the company costs it has to cover (although small, complicated and risky contracts are sometimes required to bear more than the standard percentage).

The following steps are to be followed in calculating the company costs for a particular contract:

- Estimate the annual company costs for the year in which the contract will run.
- Determine the total contract sum of the contracts that will be undertaken in the same year.
- Divide the total annual company cost in the ratio of contract sum of this contract to total contract sum of the rest of the contracts.
- Determine the total company costs to be born by this contract.
- Determine the total direct costs for this contract.
- Express the total company costs for this contract as a percentage of the total direct costs for this contract. This is the percentage that will be transferred to the overheads section in the unit rate analysis sheets.

For our example the calculation will be as follows:

Annual company costs

	Cost Items	Monthly cost	Annual cost
1	Staff salaries	4,500,000	54,000,000
2	Property	100,000	1,200,000
3	Vehicles	600,000	7,200,000
4	Audit fees & legal costs	30,000	360,000
5	Interest on loans	40,000	480,000
6	Stationery	40,000	480,000
	Total		63,720,000

Say this contract is worth 25% of all the entire contracts that will be running in the same year as this.

Then the total company costs for this contract shall be = 25% of 63,720,000 = **15,930,000**

The total direct costs for this project are = **68,011,454**

The factor for overheads = **0.23**

2. RISK

The risk involved in a contract includes;

- Theft
- Sudden increase of price on materials
- Delays due to bad weather
- Shortage of particular materials
- Labour disputes

Risk has to be judged; it cannot be calculated in the way quantities & costs are. However, the assessment of risk is not arbitrary, but it is based on well researched information on the prevailing local conditions.

There are two different ways of adding the risk allowance:

- It can be added to individual items in the bill. In this way it can be proportioned out according to the amount of risk connected with various bill items. For example, one can add 10% risk to excavation of foundations deeper than 1m and 5% to excavation of foundations less than 1m deep.
- It can be added as a percentage of the total direct cost, i.e. it can be exactly the same for all the bill items (as we have done in this worked example).

Generally, for labour-based roadworks, a maximum 5% risk is not unreasonable & this shall be used in our worked example.

For our example risk shall be 5%.

3. PROFIT

As with risk allowance, profit has to be judged or assessed rather than calculated. Increasing profit margins arbitrarily may lead to an increased risk of losing in the competition for the contract. The assessment of profit should be based on the judgement of the market and the status of the contractor's business.

The fewer the jobs are available on the market, the lower the profit margin should be, and the reverse is true. The healthier the state of the business is, the lower the acceptable profit margin and vice-versa.

In our example, we shall allow a profit margin of 10%.

F. INDICATIVE UNIT TASK RATES USING UNSKILLED LABOUR

	ACTIVITY	UNIT	TASK RATE (per wd)	Rate used in work ex.
1	Setting out of alignment including cross sections, etc.	m	100	100
2	Bush clearing including disposal of cuttings out of clearing width	m ² /wd	200 ~ 1000	300
3	Grubbing including disposal of grubbed materials out of clearing width	m ² /wd	150 ~ 300	250
4	Tree and stump removal (tree girth from 0.3 to 1.0 m - measured at 1 m above ground) including disposal of all vegetations out of clearing width	Nos.	2 ~ 5	3
5	Boulder removal including disposal out of clearing width	m ³ /wd	2 ~ 4	3
6	Excavation excluding gravel excavation	m ³ /wd	2.5 ~ 5.0	3
7	Slotting at specified intervals of 20 m	m ³ /wd	1.5 ~ 2.0	1.5
8	Ditching including throwing suitable material to the center of road	m ³ /wd	2.5 ~ 3.5	2.5
9	Sloping and Backsloping including throwing suitable material to the center of road for camber formation	m ³ /wd	3.0 ~ 4.0	3.5
10	Camber formation in formation activity to required camber slope	m ² /wd	180	180
11	Gravel excavation including stockpiling on the side of the pit	m ³ /wd	2.5 ~ 3.5	2.5
12	Loading	m ³ /wd	6 ~ 9	8
13	Unloading	m ³ /wd	12 ~ 16	16
14	Spreading	m ³ /wd	6 ~ 9	8
15	Combined unloading and spreading	m ³ /wd	4 ~ 6	5
16	Camber formation in gravelling activity to required camber slope	m ² /wd	140	140
17	Watering by using watering cans and buckets for hauling	m ³ /wd	4 ~ 6	5
18	Watering by water bowser with a water pump	trips	5 ~ 15	10
19	Compaction by hand rammers	m ² /wd	9	9
20	Compaction by roller (1 operator per roller required)	m ² /rollerday	700	700
21	Scour check construction (excluding collection of stone, sticks)	Nos./wd	4 ~ 8	5
22	Stone collection within 200 m radius	m ³ /wd	2 ~ 3	2
23	Stick collection within 200 m radius	Nos./wd	80 ~ 100	80
24	Installation of culverts (including excavation of trench and backfilling but excluding outlet drain, head walls and wing walls) - 600 mm pipe - 900 mm pipe - 1200 mm pipe	m/wd	1.0 ~ 1.2 0.7 ~ 0.9 0.4 ~ 0.6	1 0.8 0.4
25	Concrete works including mixing, hauling, placing and curing	m ³ /wd	0.5 ~ 1.0	0.8
26	Wet stone masonry works including stone and mortar preparation but excluding stone collection	m ³ /wd	0.7	0.7
27	Dry stone masonry works including preparation of stone but excluding stone collection	m ³ /wd	2.5	2.5
28	Brick/Concrete block masonry works including mortar preparation	m ³ /wd	1.0	1.0
29	Wet stone pitching including stone and mortar preparation but excluding stone collection	m ² /wd	4 ~ 8	5
30	Dry stone pitching including preparation of stone but excluding stone collection	m ² /wd	9	9
31	Gabion works including assembling of baskets and placing rock fill but excluding stone collection	m ³ /wd	2.5	2.5

The contractor may decide to use the realistic task rates within the range based on actual site condition.

G. INDICATIVE PRODUCTIVITY RATES OF OTHER EQUIPMENT USED IN LABOUR-BASED WORKS

HAULING OF MATERIAL

Wheelbarrow Haulage		Wheelbarrow haulage productivity by					
		Good route		Fair route		Poor route	
		No. of Trips	Volume (m ³)	No. of Trips	Volume (m ³)	No. of Trips	Volume (m ³)
Recommended productivity rate	Haul distance						
	0~20 m	190	7.6	170	6.8	130	5.2
	20~40 m	170	6.8	150	6.0	120	4.8
	40~60 m	150	6.0	135	5.4	100	4.0
	60~80 m	130	5.2	115	4.6	90	3.6
	80~100 m	110	4.4	100	4.0	75	3.0
	100~120 m	90	3.6	80	3.2	60	2.4
120~150 m	65	2.6	55	2.2	45	1.8	

Estimated volume of wheelbarrow is 40 litres/trip

Typical haulage rates for manually loaded tractor/trailers		Equipment haulage productivity by two trailers per tractor combination per day					
		Good route		Fair route		Poor route	
		No. of trips	Volume (m ³)	No. of trips	Volume (m ³)	No. of trips	Volume (m ³)
Recommended productivity rate	Haul distance						
	0.0 ~ 0.5 km	37	111	34	102	30	90
	0.6 ~ 1.0 km	30	90	26	78	21	63
	1.1 ~ 1.5 km	25	75	21	63	16	48
	1.6 ~ 2.0 km	21	63	18	54	13	39
	2.1 ~ 2.5 km	18	54	15	45	11	33
	2.6 ~ 3.0 km	16	48	13	39	10	30
	3.1 ~ 3.5 km	15	45	12	36	8	24
	3.6 ~ 4.0 km	13	39	10	30	7	21
	4.1 ~ 4.5 km	12	36	10	30	7	21
4.6 ~ 5.0 km	11	33	9	27	6	18	

While one trailer is being used for hauling the material to site, the second trailer should be left at the quarry to be loaded.

When the tractor returns with the empty trailer, the empty trailer will be unhooked and the filled trailer (i.e. trailer #2) that was left at the quarry earlier will be hooked and hauled to the site.

Typical haulage rates for manually loaded tractor/trailers		Equipment haulage productivity by one trailer per tractor combination per day					
		Good route		Fair route		Poor route	
		No. of trips	Volume (m ³)	No. of trips	Volume (m ³)	No. of trips	Volume (m ³)
Recommended productivity rate	Haul distance						
	0.0 ~ 0.5 km	25	75	23	69	21	63
	0.6 ~ 1.0 km	21	63	19	57	16	48
	1.1 ~ 1.5 km	18	54	16	48	13	39
	1.6 ~ 2.0 km	16	48	14	42	11	33
	2.1 ~ 2.5 km	15	45	12	36	10	30
	2.6 ~ 3.0 km	13	39	11	33	8	24
	3.1 ~ 3.5 km	12	36	10	30	7	21
	3.6 ~ 4.0 km	11	33	9	27	7	21
	4.1 ~ 4.5 km	10	30	8	24	6	18
4.6 ~ 5.0 km	10	30	8	24	6	18	

The trailer is full time hooked to the tractor.

Typical haulage rates for manually loaded trucks		Equipment haulage productivity by tipper/truck per day					
		Good route		Fair route		Poor route	
		No. of trips	Volume (m ³)	No. of trips	Volume (m ³)	No. of trips	Volume (m ³)
Recommended productivity rate	Haul distance						
	2 km	22	110	18	90	16	80
	2 ~ 4 km	19	95	15	75	12	60
	4 ~ 6 km	16	80	12	60	10	50
	6 ~ 8 km	11	55	8	40	7	35
8 ~ 10 km	8	40	6	30	5	25	

WATERING & COMPACTION

WATERING	Average productivity rates per day	
	Manual watering by labourers	Using Tractor towed or Motorized waterbowser
<i>Recommended task rate</i>	4 ~ 6 m³/wd	5 ~ 15 trips/bowserday

Manual watering involves watering using cans and hauling water from source within 150m. Productivity for bowser depends on distances and demand for watering.

COMPACTION	Average productivity rates per day	
	Manual compaction using hand rammers	Equipment compaction using pedestrain rollers
<i>Recommended task rate</i>	9 m²/wd	700 m²/roller day

Manual compaction with hand rammers is effective for side slopes and back filling of structure where rollers cannot be used.

Annex 2
Worked Examples for Unit Rate Analysis
including Instructions for Using URA Work Sheets, and
Sample Final Bill Of Quantity

USING THE UNIT RATE ANALYSIS SHEET

The unit rate analysis sheet for *each bill item* is as shown below:

Contract No:			Date:			
Bill 1: SITE PREPARATORY WORK		Item: 1.1 Construction of access roads to quarry site including maintenance throughout				
USING LABOUR		Unit	Product.	Daily Rate	Cost	Total Price
Labour:						
•						
•						
•						
•						
•						
•						
•						
•						
Equipment:						
•						
•						
•						
•						
•						
•						
•						
Material:		Unit	Quantity	Rate	Cost	
•						
•						
•						
•						
•						
•						
TOTAL DIRECT COST						
Indirect Cost:		(% of direct cost)			%	
• Overhead (excluding P&G)						
• Risk						
• Profit						
•						
TOTAL INDIRECT COST						
TOTAL ITEM 1.1		(LS)		USh		

SUMMARY OF THE UNIT RATE ANALYSIS (URA) PROCEDURE

The URA consists of individual work sheets for each BOQ work item. Use the following procedure to enter data into these sheets & calculate the unit rate for each work item included in the Contract:

1. The first step is to compile the Basic Cost Data as thoroughly as possible. Note that the Basic Cost Data is the most important part of the entire costing exercise as the final contract sum is directly proportional to the accuracy of the Basic Cost Data. Hence, the Basic Cost Data compilation is, necessarily, the most difficult and time-consuming stage of the costing exercise.
2. Decide on the most appropriate choice of technology (using labour OR using equipment) for implementation of each BOQ work item. The appropriate choice can only be made if one has acquired sufficient knowledge of the prevailing conditions on site. Unfortunately, there is no short cut to arm oneself with this knowledge besides physically going to site to get the necessary data.
3. Decide what activities need to be carried out and what resources are required to implement the BOQ item taking into account the selected technology.
4. Based on your knowledge of the prevailing conditions on site, decide on the productivity rates to be applied on the labour & equipment activities, and estimate the quantities of materials to produce one unit of the bill item. Note that productivities of labour, in particular, may vary considerably depending on the prevailing site conditions, hence the importance of familiarizing oneself with the local conditions.
5. The final stage in this process is to transfer the relevant data from the Basic Cost Data and calculate the unit rates for each item.

For each BOQ work item, work out the unit rates following the corresponding URA sheet. The format of the URA sheet is shown above. The URA sheet is basically divided into 2 sections namely the Direct Costs and the Indirect Costs.

DIRECT COST

*The direct cost as calculated in the URA sheet is the **NET UNIT RATE**. The net unit rates are used to calculate the total direct costs of the job in order that total overhead costs can be expressed as a % of these direct costs. This percentage is then applied back onto all work items as the overheads on each item.*

INDIRECT COSTS

*The indirect costs include overheads, risk and profit. The sum total of direct & indirect costs is the the **Gross Unit Rate**, which appears at the bottom of the URA sheet as the Total item. The gross unit rate is the final unit rate that is transferred to the BOQ to calculate the Contract Sum.*

The Unit Rate Analysis sheet in detail

1. Labour

(a) For items with specific units other than lump sum or daywork items

- Under the **column labour**, the labour inputs are listed together with the activities that the different labour will be performing in brackets e.g.

labourer (mixing mortar)
mason (constructing wall)

- Under the **column unit**, the unit of the bill item is inserted as it appears in the Bill of Quantities.
- Under the **column productivity**, the inverse of the task rate is inserted. Note that the task rate must be expressed in the same unit as appears in the unit column.

$$\text{Productivity} = 1/\text{task rate}$$

- Under the **column daily rate**, the daily rate of the labour involved is transferred from the Basic Cost Data and inserted here.
- Under the **column cost**, the product of productivity and daily rate is inserted i.e.

$$\text{Cost} = (\text{productivity}) \times (\text{daily rate})$$

- Under the **column total price**, the sum of the individual costs under the cost column is inserted.

$$\text{Total Price} = \text{S(costs)} = \text{Labour cost per unit item}$$

(b) For Lump Sum items

Note that for lump sum items, a reasonable estimate of the quantity of work must be made in order to calculate a credible lump sum.

- Under the **column labour**, the labour inputs are listed together with the activities that the different labour will be performing in brackets e.g.

labourer (mixing mortar)
mason (constructing wall)

- Under the **column unit**, the unit of the bill item is inserted as it appears in the Bill of Quantities (LS).
- Under the **column productivity**, the estimated quantity divided by the task rate is inserted. Note that the task rate must be expressed in the same unit as the estimated quantity. It is possible to express the quantity in different units for the various activities in the bill item as long as for each activity, the unit of quantity & applied task rate is the same. This is so because here we are simply calculating the total number of worker days (wd) required for each activity

$$\text{Productivity} = \text{Total item Quantity} / \text{task rate}$$

- Under the **column daily rate**, the daily rate of the labour involved is transferred from the Basic Cost Data and inserted here.

- Under the **column cost**, the product of productivity and daily rate is inserted i.e.

$$\text{Cost} = (\text{productivity}) \times (\text{daily rate})$$

- Under the **column total price**, the sum of the individual costs under the cost column is inserted.

$$\text{Total Price} = \sum(\text{costs}) = \text{Total labour cost for the item}$$

(c) For daywork items

Note that for dayworks, an agreed set of resources (by Engineer & Contractor) is applied to constitute a daywork. The resources are the labour, equipment and materials.

- Under the **column labour**, the labour inputs are listed together with the activities that the different labour will be performing in brackets e.g.

labourer (mixing mortar)
mason (constructing wall)

- Under the **column unit**, the unit of the bill item is inserted as it appears in the Bill of Quantities (Dw).
- Under the **column productivity**, the number of the various classes of labourers performing the activities on a daywork shall be inserted.

$$\text{Productivity} = \text{Number of labourers performing the activity}$$

- Under the **column daily rate**, the daily rate of the labour involved is transferred from the Basic Cost Data and inserted here.
- Under the **column cost**, the product of productivity and daily rate is inserted i.e.

$$\text{Cost} = (\text{productivity}) \times (\text{daily rate})$$

- Under the **column total price**, the sum of the individual costs under the cost column is inserted.

$$\text{Total Price} = \sum(\text{costs}) = \text{Total labour cost for the daywork}$$

2. Equipment

(a) For items with specific units other than lump sum or daywork items

- Under the **column equipment**, the equipment inputs are listed together with the activities that the different equipment will be performing in brackets e.g.

Concrete mixer (mixing concrete)
Water bowser (Hauling water)

- Under the **column unit**, the unit of the bill item is inserted as it appears in the Bill of Quantities.
- Under the **column productivity**, the inverse of the machine task rate is inserted.
Note that the task rate must be expressed in the same unit that appears in the unit column.
The machine task rate is simply the quantity that the machine can achieve in a day.

$$\text{Productivity} = 1/\text{machine task rate}$$

- Under the **column daily rate**, the daily rate of the equipment involved is transferred from the Basic Cost Data and inserted here.
- Under the **column cost**, the product of productivity and daily rate is inserted i.e.

$$\text{Cost} = (\text{productivity}) \times (\text{daily rate})$$

- Under the **column total price**, the sum of the individual costs under the cost column is inserted.

$$\text{Total Price} = \sum(\text{costs}) = \text{Equipment cost per unit item}$$

(b) For lump sum items

Note that for lump sum items, a reasonable estimate of the quantity of work must be made in order to calculate a credible lump sum.

- Under the **column equipment**, the equipment inputs are listed together with the activities that the different equipment will be performing in brackets e.g.

Concrete mixer (mixing concrete)
Water bowser (Hauling water)

- Under the **column unit**, the unit of the bill item is inserted as it appears in the Bill of Quantities (LS).
- Under the **column productivity**, the estimated quantity divided by the machine task rate is inserted. Note that the task rate must be expressed in the same unit as the estimated quantity. It is possible to express the quantity in different units for the various activities in the bill item as long as for each activity, the unit of quantity & applied task rate is the same. This is so because here we are simply calculating the total number of machine days required for each activity.

$$\text{Productivity} = \text{Total item Quantity} / \text{machine task rate}$$

- Under the **column daily rate**, the daily rate of the equipment involved is transferred from the Basic Cost Data and inserted here.

- Under the **column cost**, the product of productivity and daily rate is inserted i.e.

$$\text{Cost} = (\text{productivity}) \times (\text{daily rate})$$

- Under the **column total price**, the sum of the individual costs under the cost column is inserted.

$$\text{Total Price} = \sum(\text{costs}) = \text{Total equipment cost for item}$$

(c) For daywork items

Note that for dayworks, an agreed (by Engineer & Contractor) set of resources is applied to constitute a daywork. The resources are the labour, equipment and materials.

- Under the **column equipment**, the equipment inputs are listed together with the activities that the different equipment will be performing in brackets e.g.

Concrete mixer (mixing concrete)

Water bowser (Hauling water)

- Under the **column unit**, the unit of the bill item is inserted as it appears in the Bill of Quantities (Dw)
- Under the **column productivity**, the number of the various equipment performing the activities on a daywork shall be inserted.

$$\text{Productivity} = \text{No. of machines performing the activity}$$

- Under the **column daily rate**, the daily rate of the equipment involved is transferred from the Basic Cost Data and inserted here.
- Under the **column cost**, the product of productivity and daily rate is inserted i.e.

$$\text{Cost} = (\text{productivity}) \times (\text{daily rate})$$

- Under the **column total price**, the sum of the individual costs under the cost column is inserted.

$$\text{Total Price} = \sum(\text{costs}) = \text{Total equipment cost for the daywork}$$

3. Materials

The materials section for all units uses the same concept. What is entered here reflects the materials required to achieve one unit of the bill item. In the case of lump sum items, it is the materials requirements for the entire bill item (in total). For dayworks items, it is the estimated materials requirements for each daywork.

- Under the **column material**, the material inputs to achieve the work on the bill item are listed.

e.g.

Cement

Sand

- Under the **column unit**, the unit in which the material is normally purchased is inserted. Of course, it is possible that each of the listed materials may have different units.
- Under the **column quantity**, the estimated quantity of each material to produce one unit of the bill item is inserted.

Quantity = quantity to produce one unit of the bill item

- Under the **column rate**, the rate of each type of material involved is transferred from the Basic Cost Data and inserted here.
- Under the **column cost**, the product of quantity and rate is inserted i.e.

Cost = (quantity) x (rate)

- Under the **column total price**, the sum of the individual costs under the cost column is inserted.

Total Price = S(costs) = Material cost per unit item

4. Indirect costs

- The calculation of the overhead costs has been done in the Basic Cost Data. The percentage is simply transferred from the Basic Cost Data (after the total direct costs have been calculated from the URA sheets for all the bill items). The percentage is applied to the total direct costs in the URA sheet and expressed as an amount in the total price column against the overheads.
- The risk percentage is applied to the total direct costs in the URA sheet and expressed as an amount in the total price column against the risk. This percentage is as assessed in the Basic Cost Data.
- The profit percentage is applied to the total direct costs in the URA sheet and expressed as an amount in the total price column against the profit. This percentage is as assessed in the Basic Cost Data.

5. Total Item

- This is the total unit rate for the item which is the sum of the direct costs and the indirect costs.

6. Important points to note about the computerised URA

- The spreadsheets for Build up of prices, URA and BOQ are all interlinked. This means that updating the the build up of prices automatically updates the rates in the URA. Updating the URA automatically updates the BOQ for direct costs as well as the final BOQ. The only entries to be entered manually on the BOQ are the quantities for each item.

(Note that there are 2 BOQs included in the spreadsheets. One is the BOQ using net unit rates to give the total direct costs required in the calculation of company costs or overheads. The second BOQ using the gross unit rates is the final product of the costing exercise.)

You only need enter the quantities into the main BOQ (i.e. the one using the gross unit rates) and the quantities in the net unit rate BOQ will be automatically entered.

Note that some of the equipment (dozers, front end loaders, etc.) and some of the materials (explosives, cordex, etc.) have not been included in the Build up of prices spreadsheets. Therefore, the rates of these items have to be manually entered in the URA sheets.

Similarly, most of the rates for items appearing in the Preliminaries & General are not included in the Build up of prices template and have to be manually entered into the URA sheets.

- In the URA sheets, the bill items marked FC (Free choice) each have two sheets; one with the heading USING LABOUR and the other with the heading USING EQUIPMENT. By default, the rate which is linked to the BOQ is the one from the sheet USING LABOUR. If the preferred method is using equipment, then the rate from the sheet USING EQUIPMENT can be linked to the BOQ instead.
- Cost columns in the URA sheets will only show a figure if values are entered in BOTH the productivity column and the daily rate column (under labour & equipment) OR both the quantity and rate column (under materials). If it so happens that some of the activities appearing in a particular URA sheet are not required, then simply do not enter anything in the productivity column for that activity. e.g. in the case of bill item 2.2 the activity of cutting grass is rarely necessary and, therefore, the productivity value can be cleared to exclude the cost of that activity in the unit rate.
- For the URA sheets with the heading USING LABOUR, the default haulage equipment is tractor and trailer, and tractor and towed water bowser. The default roller is the pedestrian roller.
- Conversely, for the URA sheets with the heading USING EQUIPMENT, the default haulage equipment is the tipper truck, and the motorised water bowser. The default roller is the sit-on pneumatic roller.
- However, it is possible to choose the labour method and still utilise a tipper truck and/or a motorised bowser. The information can be changed on the URA sheets to reflect this if it happens to be the case in a particular project.

