



# Cost Estimation Manual for Road Maintenance Works 2019



Popular Edition, 2019





# **Cost Estimation Manual** for Road Maintenance Works

**Popular Edition | 2019**

**COST ESTIMATION MANUAL  
FOR ROAD MAINTENANCE WORKS**

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Nairobi



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Kenya Roads Board – KRB  
National Construction Authority – NCA  
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Kenya Wildlife Services – KWS  
Kenya National Highways Authority – KeNHA  
Kenya Rural Roads Authority – KeRRA  
Kenya Urban Roads Authority – KURA  
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# Foreword

One of the initiatives contributing to the Vision 2030 is to contain rising costs in construction and maintenance of roads. The formulation of a framework for accurate cost estimation in the Road Sub-Sector and the development of the Cost Estimation Manual (CEM) for road maintenance works has been an important milestone towards standardizing the cost estimation for roadworks. The manual was first developed by Ministry of Transport, Infrastructure, Housing, Urban Development and Public Works (MoTIHUD & PW) with support from Japanese International Cooperation Agency (JICA) and officially published in November, 2011 and first revised in 2017.

The purpose of the CEM is to provide guidance and instruction to Road Agencies (RAs) for efficient and consistent development of project cost estimates for road maintenance works in a transparent and harmonized manner that can be interrogated by the Public and other relevant Government Agencies.

The manual forms a crucial part of developing a best practise standard for RAs to understand the pertinent issues in preparing accurate estimates for road maintenance projects. The CEM needs to be updated continuously to reflect changing work methodologies and fiscal conditions.

This manual will require biennial updates with interim revisions conducted depending on the nature of the changes under consideration. All updates related to project delivery can be accommodated as regularly as required.

The CEM was revised through a technical Sub-Working Group under MoTIHUD & PW with support from JICA. The COST Sub-Working Group consisted of KRB, KIHBT, KeNHA, KeRRA, KURA, KWS, NCA, PPRA, MTRD and Japanese experts who provided their valuable advice through a series of consultative meetings. Their contribution and dedication is recognized and acknowledged with appreciation. We are particularly grateful to the JICA Team for their assistance in reviewing the CEM and their assistance in capacity building for road maintenance and management.



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# Abbreviations and Acronyms

<b>AASHTO</b>	American Association of State Highway and Transportation Officials
<b>AC</b>	Asphalt Concrete
<b>CBR</b>	California Bearing Ratio
<b>JICA</b>	Japan International Cooperation Agency
<b>KeNHA</b>	Kenya National Highways Authority
<b>KeRRA</b>	Kenya Rural Roads Authority
<b>KNBS</b>	Kenya National Bureau of Statistics
<b>KRB</b>	Kenya Roads Board
<b>KURA</b>	Kenya Urban Roads Authority
<b>KWS</b>	Kenya Wildlife Service
<b>M&amp;T</b>	Mechanical and Transport Department, Ministry of Transport, Infrastructure, Housing and Urban Development
<b>MDD</b>	Maximum Dry Density
<b>MoTIHUD &amp; PW</b>	Ministry of Transport, Infrastructure, Housing and Urban Development and Public Works
<b>PPRA</b>	Public Procurement Regulatory Authority
<b>PVC</b>	Polyvinyl Chloride
<b>RMS</b>	Road Management System
<b>VAT</b>	Value-added Tax





# Glossary of Terms

<b>Abutment</b>	Structure support to bridge deck and retains the road embankment.
<b>Adhesion</b>	Sticking quality, for example, holding aggregate to the binder in chip sealing.
<b>Aggregate</b>	Crushed local rock or stone.
<b>Apron</b>	Floor of concrete, masonry or stone at the inlet or outlet of a culvert or waterway to prevent scour.
<b>Asphalt Concrete</b>	Road construction material usually comprising a mixture of bitumen and aggregate, also known as hot-mix or hot-rolled asphalt.
<b>Base Course</b>	The main structural element of the pavement, between surface course and subbase.
<b>Benching</b>	A stepped platform cut in an embankment to prevent earth slipping. Can also be used as stepping to provide a level base for additional fill material.
<b>Berm</b>	A low ridge or bund of soil to collect or redirect surface water.
<b>Binder</b>	An adhesive material, usually bitumen or bitumen emulsion, used to seal the road surface, also providing a waterproof layer to receive and hold aggregate. The most common binders are bitumen based. A binder is also used to hold aggregate together in bituminous mixtures.
<b>Binder Course</b>	The layer forming part of the bituminous surfacing immediately below the wearing course.
<b>Bitumen</b>	Bitumen (called asphalt cement in the US) is a black to dark brown sticky material composed principally of high-molecular-weight hydrocarbons. Most bitumen is derived from the distillation of crude oil. Bitumen is a thermoplastic material that gradually liquefies when heated.
<b>Borrow Pit</b>	An excavation outside the road limits from which suitable material is obtained, usually for earthwork or regravelling operations.
<b>Box Culvert</b>	A culvert of rectangular cross-section, usually constructed in reinforced concrete.

<b>Bridge</b>	A structure with a span of 6 metres or more providing a means of transit above land and/or water or above an obstruction, whether natural or artificial.
<b>Camber (Cross Fall)</b>	The transverse slope applied to the carriageway on a section of straight alignment
<b>Causeway</b>	Low-level structure constructed across streams or rivers with openings to permit water to pass below road level.
<b>Carriageway</b>	The part of the road used by vehicular traffic.
<b>Catchment Area</b>	The area from which water runs off by gravity to a collecting point.
<b>Catchpit</b>	A covered, accessible chamber with a sump for collection of silt forming part of the drainage system and permitting inspection and maintenance of underground drainage pipes.
<b>Centre-line</b>	The middle of the carriageway, normally marked with a yellow dashed line on a paved road.
<b>Compaction</b>	Compacting embankment by roller to increase density of soil what composes embankment body. It causes to improve mechanical properties of soil.
<b>Cross-fall</b>	The transverse gradient or fall across a formation or pavement.
<b>Cross-section</b>	Section through the road construction at right angles to the centre-line.
<b>Crown</b>	The highest part of a cambered surface, usually on or near the centreline.
<b>Culvert</b>	A duct, usually rectangular or circular, for carrying surface water under the road.
<b>Cut (Cutting)</b>	Excavation in natural ground usually with graded slopes.
<b>Cut-off Drain</b>	A drain cut to intercept surface water flowing from adjacent land and to prevent it reaching a pavement or other prepared surface.
<b>Cut Slope</b>	A soil plane constructed at an angle to the horizontal.
<b>Cycleway</b>	The track which is mainly used for bicycle traffic. The track is separated with other parts of road by kerb stone or its similar structures.
<b>Ditch (Drain)</b>	A long narrow excavation designed or intended to collect and drain off surface water.

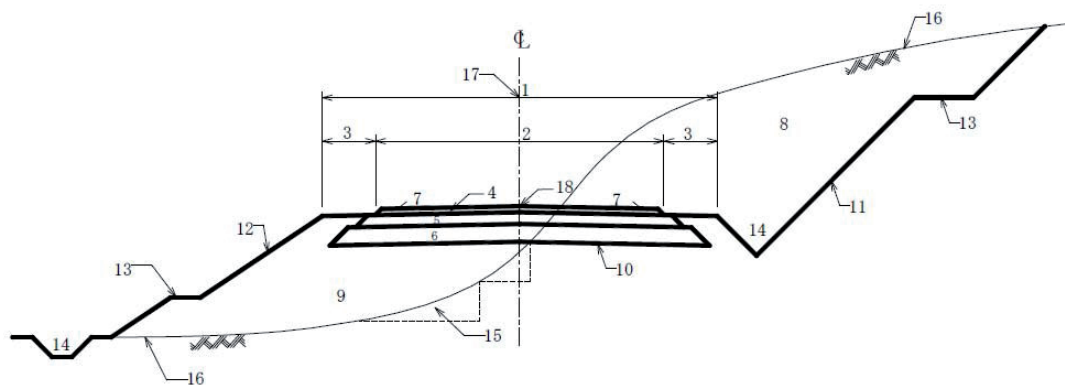
<b>Drainage</b>	The interception and removal of ground and surface water by artificial or natural means.
<b>Drainage Channel</b>	A waterway or gutter to carry away surface water.
<b>Drift or Ford</b>	A stream or river crossing at bed level over which the stream or river water can flow.
<b>Earthworks</b>	General term of construction works involving soil and rocks (e.g. excavation, loading, hauling, spreading and compaction).
<b>Embankment Slope</b>	An artificially constructed soil plane at an angle to the horizontal.
<b>Fill (Embankment)</b>	Earthworks constructed below the pavement raising the road above the surrounding natural ground level.
<b>Footbridge</b>	The overpass bridge crossing carriageway/railway to ensure the safety of pedestrian and smooth vehicle traffic.
<b>Footpath</b>	The track which is mainly used for pedestrian. The track is separated with other parts of road by kerb stone or its similar structures.
<b>Gabion</b>	The steel mesh cage filled with cobble stone or crushed stone. This is mainly used for revetment and foot protection.
<b>Gravel</b>	A non-cohesive, coarse granular material, resulting from natural disintegration of rock with or without finer material. In general, the particles are irregular or flaky. It is used as material of surface course and to correct loss of shape, ruts, potholes and erosion gullies.
<b>Guardrail</b>	A safety barrier on embankment or river crossing
<b>Gutter</b>	A shallow waterway provided at the edge of the road to carry surface water longitudinally.
<b>Headwalls</b>	The walls located on the top of outlet/inlet of culvert. The walls of inlet direct the flow into the culvert, while the walls of outlet provide a transition from the culvert to the outlet channel. Headwalls also protect the embankment from erosion by flood waters.
<b>Inlet</b>	The point at which surface water enters a pipe culvert or box culvert.
<b>Invert</b>	The lowest point of the internal cross section of a ditch or culvert.
<b>Lane</b>	The width of carriageway required to accommodate one line of traffic.

<b>Manhole</b>	Accessible chamber with a cover forming part of the drainage system and permitting inspection and maintenance of underground drainage pipes.
<b>Mitre Drain</b>	Short, open, skew ditches used to remove water from the roadside ditches or gutters. Use of this reduces the necessary size of the side ditches and minimizes the velocity of water and thereby the risk of erosion.
<b>Original Ground Level</b>	Line of natural ground.
<b>Outfall</b>	The point at which water discharges from a pipe or box culvert.
<b>Paved Road</b>	For the purpose of this manual a paved road is a road with a concrete surface, concrete block, bituminous surface or surface dressing.
<b>Pavement</b>	The road structure above the formation, designed to spread the loading over the base and subbase.
<b>Pipe Culvert</b>	A culvert of circular cross-section, usually constructed in pre-cast concrete.
<b>Premix</b>	Premix is a paving material manufactured by mixing aggregates, filler and bitumen. Most premix is mixed and placed hot. Premix is used in the construction of wearing course, binder courses and base courses.
<b>Prime Coat</b>	A coating of low viscosity binder applied to a surface of stabilised or naturally compacted soil before sealing or paving.
<b>Road Reserve (Right-of-way)</b>	The area within the road limits over which members of the public have the right to pass and re-pass.
<b>Road Furniture</b>	Road or street furniture e.g. traffic sign, traffic board, traffic signal, lane marking, guardrail, street light, etc.
<b>Roadway</b>	The portion of a road including shoulders for vehicular use.
<b>Scour Checks</b>	The structures to prevent scouring of drains. Simple scour checks may be constructed of wood pegs or stones. All scour checks should have an apron downstream built of stones or grass turves pinned to the ditch invert with wooden pegs.
<b>Shoulder</b>	Paved or unpaved part of the road next to the outer edge of the pavement. The shoulder provides side support for the pavement and allows vehicles to stop or pass in an emergency.

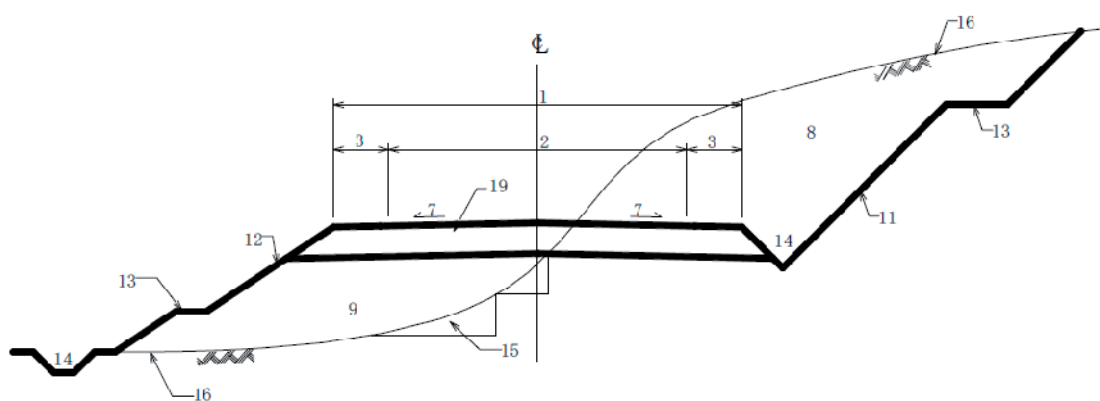
<b>Side Drain</b>	Drain beyond the shoulders, parallel to the centerline, to take the run-off from the road surface.
<b>Slope</b>	A natural or artificially constructed soil plane at an angle to the horizontal.
<b>Sub-base</b>	The layer of material between the base course and the subgrade.
<b>Subgrade</b>	Upper layer of the soil that supports the pavement
<b>Superelevation</b>	The raising of the outside level of the road on curves to reduce the effect of centrifugal forces and improve road- holding qualities.
<b>Surfacing</b>	Top layer of the pavement. Consists of wearing course, and sometimes a base course or binder course.
<b>Surface Dressing</b>	A sprayed or hand applied film of bitumen followed by the application of a layer of stone chippings, which is then rolled.
<b>Tack Coat</b>	Asphalt material to bond lower layer (asphalt material or cement) and upper layer (asphalt mixture). It is sprayed on surface of lower layer.
<b>Traffic Lane</b>	The portion of the carriageway defined by road marking for the movement of a single line of vehicles.
<b>Transverse Joint</b>	Joint at right angles to the road centerline.
<b>Transverse Joint Taper</b>	Slope or ramp of asphalt mix at the end of a freshly laid asphalt course.
<b>Unpaved Road</b>	For the purpose of this manual an unpaved road is a road with a gravel or earth surface
<b>Wearing Course</b>	The part of the road surface in contact with traffic wheels.
<b>Wing-wall</b>	Retaining wall at a bridge abutment to retain and protect the embankment fill behind the abutment.

## Cross Section

The typical cross sections of paved, unpaved and urban roads are as follows;



**Paved Road**



**Unpaved Road**

- |                        |                    |                |              |                          |              |
|------------------------|--------------------|----------------|--------------|--------------------------|--------------|
| 1. Roadway             | 2. Carriageway     | 3. Shoulder    | 4. Surfacing | 5. Base                  | 6. Subbase   |
| 7. Camber (Cross Fall) | 8. Cut             | 9. Embankment  | 10. Subgrade | 11. Cut Slope            |              |
| 12. Embankment Slope   | 13. Berm           | 14. Side Ditch | 15. Benching | 16. Natural Ground Level |              |
| 17. Centre-line        | 18. Marking        | 19. Grave      | 20. Footpath | 21. Road Reserve         | 22. Pavement |
| 23. Side Ditch         | 24. Boundary Stone |                |              |                          |              |



# I. Introduction

The Medium Term Plan (MTP) III comprises of various sectors; key among them is the Infrastructure sector which is one of the foundations of Kenya's economic transformation. This sector is expected to provide cost effective world-class infrastructural facilities and services for the 21st century. One of the key outlines is the routine and timely maintenance of roads as well as the expansion of roads program.

One of the important initiatives towards developing a framework for accurate cost estimation in the Road Sector is the cost estimation manual for road maintenance works which was developed by the Ministry of Transport, Infrastructure, Housing, Urban Development and Public Works (MoTIHUD & PW) with support from Japanese International Cooperation Agency (JICA) and officially published in November, 2011. The CEM for performance based contracts was thereafter developed in 2015.

## I.1. Purpose of the Manual

This manual gives instructions for estimating the cost of road maintenance works, by considering all inputs. This is to provide a standardized procedure of pricing road activities in Kenya, to ensure uniformity in public and private procurement practice.

The manual forms a crucial part of developing a best practice standard for RAs to understand the pertinent issues in preparing cost-effective estimates for road maintenance projects. The cost estimation manual need to be updated continuously as per changing work methodologies and fiscal conditions.

## I.2. Application of the Manual

This manual is to be applied in the preparation of Engineer's Estimate for tender documentation by procurement entities and provides a benchmark for evaluation of bidding prices.

The manual shall also be used for the formulation of annual work plans by the roads agencies and as an auditing tool for ongoing road works.

It can also be used as a reference for bidders to prepare their bidding documents while considering their unique cost settings.



## 2. Contents of the Manual

### 2.1 Work items and coding

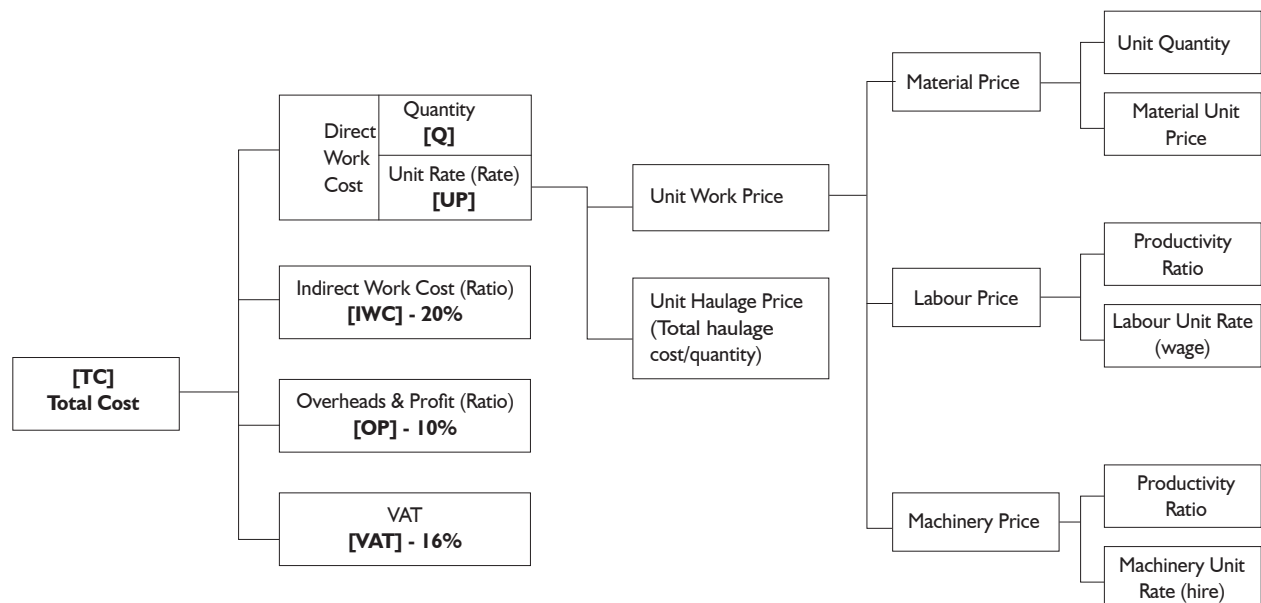
Work items covered in this manual are shown in Appendix I. These are the common types of works which are widely implemented in road maintenance works in Kenya.

The coding for each work item is derived from the Road Management System (RMS), and categorized in accordance with the Standard Specifications for Road and Bridge Construction (1986).

### 2.2 Cost configuration

Road works consist of various work items that are aggregated into a work package. The total cost of any work package is structured in the formula shown in Figure I below.

**Figure I: Cost Configuration**



$$TC = \sum (Q \times UP) \times (1 + IWC) \times (1 + OP) \times (1 + VAT)$$

Direct work cost is the accumulation of all necessary input costs for the execution of each work item. This is the product of the quantity by its Unit Rate, while unit haulage price is considered separately. The combination of unit work price (a pure work price assuming that all the resources are on site) and unit haulage prices constitute the Unit Rate. This takes care of the transportation costs of work items.

Indirect work cost is costs related to management and administration. It is given by the ratio of direct work cost.

Overheads and profits are given by the ratio of direct and indirect work costs.

Value-added tax (VAT) is a percentage determined by taxation regulations.

## 2.3 Price list and source

Material, labour and machinery Unit Rates used for cost estimation by procurement entities are basically derived from official price indices given by government entities. They are open for public and based on nation-wide market surveys. Hence, they can be assumed to be the average prices in Kenya.

- Material Price: Material Price List from Kenya National Bureau of Statistics (KNBS)
- Labour Price: The Regulation of Wages (General) (Amendment) Order, The Labour Institution Act, Ministry of Labour.
- Machinery Price; Equipment Hire Rate List from Mechanical and Transport Department, Ministry of Transport, Infrastructure, Housing and Urban Development.

Labour price is provided by two areas; big cities (Nairobi, Mombasa and Kisumu) and all others. Material and Machinery prices are fixed across country.

The official prices are revised periodically. The prices may be updated in an ad-hoc basis when substantial change takes place during the fiscal year (e.g. case of high inflation or embargo).

When some material and machinery prices are not covered in the official price indices, average market prices acquired from survey by the manual administrator or provisional prices by referring to similar items are used. Those prices should be revised immediately once the official prices are available.

All prices are also coded based on RMS coding system. The prices of material, labour and machinery used in the manual with their sources are shown in the Appendix 2-1 & 2-2: Price List (Labour, Machinery, Material), Nairobi, Mombasa, Kisumu & All Other Areas respectively.

### 2.3.1 Methodology

#### 2.3.1.1 Selection of the Survey Area

The survey area was decided collectively by Engineers from KRB and JICA Road Maintenance Experts. The chosen area (Nairobi) was selected based on the CEM 2011.

<b>COSTES 2011 Target areas</b>	<b>Surveyed Area</b>
Nairobi, Mombasa, Kisumu	Nairobi, Kisumu
All other areas	To use a factor from the comparison of survey conducted in 2017 and 2019 in Nairobi

### 2.3.1.2 Survey Methods

#### Refer to Data

Type	Source of Data
Material	KNBS price list

#### Refer to Law

Type	Source of Data
Labour	Ministry of Labour i.e. SPECIAL ISSUE 14 <sup>th</sup> July, 2017, Kenya Gazette Supplement No. 52, LEGAL NOTICE No. 111

#### Market Survey

Type	Type of supplier
Labour	Contractors
Material	Hardware shops,
Equipment	Mechanical and Technical Department, Ministry of Transport Infrastructure Housing and Development, Contractors

### 2.3.1.3 Unit Rate Analysis

#### Labour

The contractors were selected based on works they have done with the road agencies.

The Unit Rate selected in this item was the one set in labour law under the special issue, 14<sup>th</sup> July, 2017 as stated in Sub Clause 2.2 above.

Priority	Survey Method	Target Trade
1.	Law	Building and Construction
2.	Contractor	Road Construction

#### Material

The selection of suppliers in this category was done in random i.e. availability of the material. It was done through the internet, contractors and Road Agency recommendations.

The procedure to determine the Unit Rate went as follows:

1. The price from the market survey was considered first.
2. The prices in the market survey were collected from a maximum of five and minimum of three suppliers. Then, the prices from the suppliers were averaged to give us one price from the market.  
Prices which were too low and too high were not considered in the average.
3. If the item was not available in the market, its price was picked from the previous 2017 price list.

Priority	Survey Method
1.	Market Survey
2.	Kenya National Bureau of Statistics(KNBS)
3.	Road Authority i.e. KURA

## Equipment

The suppliers for hiring equipment were also done in random; either through the internet or recommendations from the team leaders.

The prices were compared between the two sources of data but prices from M&T Department, MoTIHUD & PW were prioritised.

Priority	Survey Method
1.	Mechanical and Technology Department, MoTIHUD & PW
2.	Market Survey

## 2.4 Haulage cost

Site location is a major parameter to determine the Unit Rate so that haulage cost to transport material or equipment should be carefully estimated. In this manual, haulage cost is calculated by the Table 3.

The calculated total haulage cost is divided by given quantity of the work item and added to unit work price to make a Unit Rate of the work.

If a different quotation for haulage is available, it may be used regardless of the aforementioned equation.

**Table 3 Estimation of Haulage Price**

Type of Vehicle:	(specify)
Vehicle price per hour (or dry hire rate) =A	Ksh/hr
Fuel price per hour $B=C/D \times E$	Ksh/hr
Fuel cost per litter=C	Ksh/litre
Fuel consumption rate=D	km/litre
Average speed during transport=E	km/hr
Driver wage per hour $F=G/8\text{hr}$	Ksh/hr
Wage per day =G	Ksh/day
Turnboy wage per hour $H=I/8\text{hr}$	Ksh/hr Wage
per day =I	Ksh/day
<b>Total price per hour of transport <math>J=A+B+F+H</math></b>	Ksh/hr
<b>Distance of transport (one way) =K</b>	km
<b>Frequency of transport (no. of round trip) =L</b>	times
Distance of transport (by round trip) $M=2 \times K$	km
Total Distance of transport $N=L \times M$	km
<b>Total time of Transport <math>O=N/E</math></b>	hr
<b>Total Haulage Price <math>P=J \times O</math></b>	Ksh

## 2.5 Unit quantity and productivity

Unit quantity of material (the amount of material used per unit of work), labour productivity (the number of people worked per unit of work), and machinery productivity (the number hours/days of machinery operation needed per unit of work) are determined with the following references;

- Ministry of Transport and Communications, Standard Specification for Road and Bridge Construction, 1986.
- Standard drawings.
- Average productivity rates from site surveys and the engineers' past experiences with input from JICA.



## 2.6 Indirect work costs

Indirect work costs include the following items;

- Human Resource Management costs (e.g. recruiting, staff welfare, transportation, insurance, uniforms).
- Site staff allowances.
- Management cost (e.g. site office maintenance, office equipment, communication, transportation).
- Safety measures.
- Social charges (e.g. Local taxes and public charges, welfare).

Since the precise estimation of the above is difficult, the costs are provided as a ratio of the total direct work cost.

## 2.7 Overheads and Profit

Overheads and Profit include the following items;

- Head office staff salaries and allowances.
- Head office management costs (e.g. office maintenance, office equipments, communication, transportation).
- Corporate Social charges (e.g. insurance, tax and public charges, welfare).
- Research and Development.
- Advertisement and publicity.
- Depreciation costs for fixed assets.
- Profit margin (bonuses, dividends to shareholders, internal reserves).

Since the precise estimation of the above is difficult, the costs are provided as a ratio of summation of direct work cost and indirect work cost.

## 2.8. Revision Highlights

### 2011

1. Developed and published using Japanese productivity rates for labour, machinery and materials multiplied by a factor.
2. Unit rates for only two regions i.e. Nairobi, Mombasa and Kisumu as one region and All other areas as the other.
3. Unit Rates obtained from Kenyan market.

### 2017

1. Update of Unit Rate for Nairobi, Mombasa and Kisumu and All other areas.
2. Update of quantities for the following work items:
  - ♦ Gabion Installation
  - ♦ Pothole Repair
3. Miscellaneous cost adjusted as follows:
  - ♦ 20% for Concrete works, Structural Works and complicated street furniture works reduced to 10%
  - ♦ 10% for Clearing, cleaning, earthwork, base and surfacing works, simple street furniture works reduced to 5%

### 2019

1. Update of Unit Rates for Nairobi, Mombasa and Kisumu.
2. Update of unit rate calculation tables for the following;
  - ♦ Labour based works: Ditch Cleaning(Manual) and culvert cleaning.
  - ♦ On-carriageway works: Pothole repair, headwall repair, regravelling and road marking.
  - ♦ Cement/ lime mixing.
3. Addition of Guardrail Repair.
4. Indirect cost reduced from 30% to 20%.

### 3. Unit Rates List

					Nairobi, Kisumu, Mombasa		All Other Areas	
4. Site Clearance and Topsoil Stripping					KShs		KShs	
No	Work Category	Code	Work Item Name	Unit	Unit Rate	Unit Rate (indirect cost, overhead/profit included)	Unit Rate	Unit Rate (indirect cost, overhead/profit included)
1	Bush Clearing	04.50.001	Mechanical mowing	m <sup>2</sup>	4.2	5.5	4.2	5.5
2		04.50.002	Grass cutting (manual)	m <sup>2</sup>	3.1	4.1	2.8	3.7
3		04.50.003	Heavy bush clearing	m <sup>2</sup>	14.5	19.1	13.4	17.7
4		04.50.004	Light bush clearing	m <sup>2</sup>	8.0	10.6	7.4	9.8
5		04.50.005	Pruning of tree branches	m <sup>2</sup>	87	115	80	106
6		04.50.006	Tree cutting and stump removal (200-450 mm)	No	178	235	164	216
7		04.50.007	Tree cutting and stump removal (> 450 mm)	No	1,601	2,113	1,478	1,951
8	Site Clearing and Backfill	04.50.008	Clearing obstructions (mechanical)	m <sup>2</sup>	38	50	37	49
9		04.50.008a	Clearing obstructions (manual)	m <sup>3</sup>	214	283	197	260
10		04.50.009	Stripping and grubbing (mechanical)	m <sup>2</sup>	103	136	103	136
11		04.50.009a	Stripping and grubbing (manual)	m <sup>2</sup>	145	191	134	177
12		04.60.001	Clearing trees, hedges, bushes, vegetation and deleterious materials (mechanical)	m <sup>2</sup>	83	110	83	110
13		04.60.001a	Clearing trees, hedges, bushes, vegetation and deleterious materials (manual)	m <sup>2</sup>	67	88	62	82
14	Concrete Demolition	04.50.010	Excavate remove & disposal of concrete structures	m <sup>3</sup>	494	652	493	651
15	Top Soil Stripping	04.80.002	Removal of overburden	m <sup>3</sup>	275	363	275	363
16	Pipe Culvert Removal	04.60.005	Removal of cracked small pipe culverts below 600mm	m	326	430	326	430
17		04.60.005a	Removal of cracked large pipe culverts above 600mm	m	491	648	490	647

					Nairobi, Kisumu, Mombasa		All Other Areas	
5. Earth Works					KShs		KShs	
No	Work Category	Code	Work Item Name	Unit	Unit Rate	Unit Rate (indirect cost, overhead/profit included)	Unit Rate	Unit Rate (indirect cost, overhead/profit included)
18	Material Filling	05.50.006	Fill in soft material and compact	m <sup>3</sup>	402	531	387	511
19		05.50.006a	Fill in soft material and compact (soil purchased)	m <sup>3</sup>	701	925	686	906
20		05.50.007	Fill in hard material and compact	m <sup>3</sup>	477	630	461	609
21		05.50.007a	Fill in hard material and compact (soil purchased)	m <sup>3</sup>	923	1,218	907	1,197
22	Material Cutting	05.50.008	Cut to spoil in soft	m <sup>3</sup>	409	540	379	500
23		05.50.008a	Cut to spoil in soft (mechanical)	m <sup>3</sup>	198	261	197	260
24		05.50.009	Cut to spoil in hard	m <sup>3</sup>	801	1,057	739	975
25		05.50.009a	Cut to spoil in hard (mechanical)	m <sup>3</sup>	395	521	394	520
26	Rock filling	05.50.012	Rock fill to swamp	m <sup>3</sup>	2,428	3,205	2,386	3,150
27		05.50.125	Rock fill to embankment construction	m <sup>3</sup>	2,672	3,527	2,633	3,476
28	Planting	05.50.014	Grassing	m <sup>2</sup>	223	294	213	281
29	Compaction	05.60.012	Compaction of subgrade in cut	m <sup>2</sup>	31	41	28	37
30		05.60.014	Compaction of subgrade in fill	m <sup>3</sup>	1,286	1,698	1,286	1,698
31		05.60.016	Compaction of original ground level	m <sup>2</sup>	42	55	42	55
31a		05.60.016a	Compaction of the 300 mm below formation level in cutting to 100% MDD (AASHTO T99)	m <sup>3</sup>	1,424	1,880	1,407	1,857

					Nairobi, Kisumu, Mombasa		All Other Areas	
7. Excavation and Filling for Structure					KShs		KShs	
No	Work Category	Code	Work Item Name	Unit	Unit Rate	Unit Rate (indirect cost, overhead/profit included)	Unit Rate	Unit Rate (indirect cost, overhead/profit included)
32	Material	07.50.001	Excavate for structure in soft material (manual)	m <sup>3</sup>	409	540	379	500
33	Excavation for Structures	07.50.001a	Excavate for structure in soft material (mechanical)	m <sup>3</sup>	198	261	197	260
34		07.50.002	Excavate for structure in hard material (manual)	m <sup>3</sup>	801	1,057	739	975
35		07.50.002a	Excavate for structure in hard material (mechanical)	m <sup>3</sup>	395	521	394	520
36	Gabion	07.70.004	Gabion Installation	m <sup>2</sup>	577	762	575	759
37		07.70.005	Rock fill to Gabions	m <sup>3</sup>	1,528	2,017	1,504	1,985
38	Stone Pitching	07.70.001	Stone pitching	m <sup>2</sup>	1,267	1,672	1,233	1,628

					Nairobi, Kisumu, Mombasa		All Other Areas	
8. Culverts and Drainage Works					KShs		KShs	
No	Work Category	Code	Work Item Name	Unit	Unit Rate	Unit Rate (indirect cost, overhead/profit included)	Unit Rate	Unit Rate (indirect cost, overhead/profit included)
39	Ditch Cleaning	08.50.002a	Ditch cleaning - mechanical	m	27	36	27	36
40		08.50.002	Ditch cleaning - manual	m	14.2	19.0	13.3	17.6
41	Culvert Cleaning	08.60.002	Small culvert cleaning-partially blocked - below 450mm	m	345	455	317	418
42		08.60.003	Medium culvert cleaning-partially blocked- 600mm	m	263	347	242	319
43		08.60.004	Large culvert cleaning-partially blocked-900 mm and above	m	182	240	167	220
44		08.50.025	Manhole cleaning	No	610	805	565	746
45		08.50.016	Gulley pot cleaning	No	119	157	110	145
46		08.50.009	Covered (slotted) lined drain cleaning	m	72	95	66	87
47		08.50.005a	Ditch/mitre drain excavation in soft (mechanical)	m <sup>3</sup>	250	330	249	329
48		08.50.005	Ditch/mitre drain excavation in soft (manual)	m <sup>3</sup>	237	313	219	289
49		08.50.005b	Ditch/mitre drain excavation in hard (mechanical)	m <sup>3</sup>	405	535	403	532
50		08.50.005c	Ditch/mitre drain excavation in hard (manual)	m <sup>3</sup>	1,227	1,620	1,144	1,510
51	Pipe Culvert Installation	08.60.021	Culvert installation-300mm with surround	m	5,572	7,355	5,007	6,609
52		08.60.020	Culvert installation-300mm without surround	m	2,025	2,673	1,529	2,018
53		08.60.023	Culvert installation-450mm with surround	m	7,937	10,477	7,799	10,295
54		08.60.022	Culvert installation-450mm without surround	m	3,004	3,965	2,969	3,919
55		08.60.025	Culvert installation-600mm with surround	m	12,215	16,124	11,598	15,309
56		08.60.024	Culvert installation-600mm without surround	m	4,169	5,503	3,748	4,947
57		08.60.027	Culvert installation-900mm with surround	m	19,158	25,289	17,630	23,272
58		08.60.026	Culvert installation-900mm without surround	m	6,150	8,118	4,958	6,545
59		08.60.028	Culvert installation-1200mm with surround	m	32,305	42,643	29,811	39,351
60		08.60.029	Culvert installation-1200mm without surround	m	12,102	15,975	10,173	13,428
61		08.60.030	Excavate in soft material for culverts	m <sup>3</sup>	237	313	219	289
62		08.60.031	Excavate in hard material for culverts	m <sup>3</sup>	1,227	1,620	1,144	1,510

No	Work Category	Code	Work Item Name	Unit	Nairobi, Kisumu, Mombasa		All Other Areas	
					Unit Rate	Unit Rate (indirect cost, overhead/profit included)	Unit Rate	Unit Rate (indirect cost, overhead/profit included)
63	Headwall Construction	08.60.019	Headwall construction for 450mm pipe culvert	No	25,633	33,836	25,351	33,463
64		08.60.019a	Headwall construction for 600mm pipe culvert	No	29,998	39,597	29,670	39,165
65		08.60.019b	Headwall construction for 900mm pipe culvert	No	39,311	51,891	38,887	51,331
66		08.60.019c	Headwall construction for 1200mm pipe culvert	No	53,004	69,965	52,470	69,261
67	Manhole installation	08.50.024	Manhole construction less than 1m	No	27,862	36,778	27,706	36,572
68		08.50.024a	Manhole construction more than 1m	No	46,945	61,967	46,603	61,516
69	Gulley Pot installation	08.50.015	Gulley pot construction	No	10,507	13,869	10,492	13,849
70	Drain Lining	08.50.032	Lay drain lining with concrete	m <sup>2</sup>	1,582	2,088	1,554	2,051
71		08.50.022a	Laying of dressed stones	m <sup>2</sup>	1,432	1,890	1,389	1,833
72		08.50.022	Laying of side slabs	m <sup>2</sup>	2,177	2,874	1,882	2,484
73		08.70.036	Laying of 300mm invert block drain	m	1,365	1,802	1,432	1,890
74		08.70.037	Laying of 750mm invert block drain	m	3,355	4,429	3,390	4,475

					Nairobi, Kisumu, Mombasa		All Other Areas	
9. Passage of Traffic					KShs		KShs	
No	Work Category	Code	Work Item Name	Unit	Unit Rate	Unit Rate (indirect cost, overhead/profit included)	Unit Rate	Unit Rate (indirect cost, overhead/profit included)
75	Traffic Control	09.50.004	Traffic Control	Day	1,559	2,058	1,442	1,903
76		09.50.005	Watchman	No	1,498	1,977	1,380	1,822
77		09.50.006	Watering	m <sup>2</sup>	10	13	10	13

					Nairobi, Kisumu, Mombasa		All Other Areas	
10. Grading and Graveling Works					KShs		KShs	
No	Work Category	Code	Work Item Name	Unit	Unit Rate	Unit Rate (indirect cost, overhead/profit included)	Unit Rate	Unit Rate (indirect cost, overhead/profit included)
78	Grading	10.50.001	Heavy grading without watering or compaction	m <sup>2</sup>	5.2	6.9	5.2	6.9
79		10.50.002	Heavy grading with watering and compaction	m <sup>2</sup>	9.3	12.3	9.3	12.3
80		10.50.003	Light grading	m <sup>2</sup>	4.2	5.5	4.2	5.5
81		10.50.004	Reshaping	m <sup>2</sup>	12.0	15.8	11.1	14.7
82		10.50.005	Dragging	m <sup>2</sup>	12.0	15.8	11.1	14.7
83	Graveling	10.60.001	Regraveling	m <sup>3</sup>	1,451	1,915	818	1,080
84		10.60.001a	Regraveling without watering	m <sup>3</sup>	1,439	1,900	803	1,060

					Nairobi, Kisumu, Mombasa		All Other Areas	
11. Paved Roads - Shoulder Maintenance and Repairs					KShs		KShs	
No	Work Category	Code	Work Item Name	Unit	Unit Rate	Unit Rate (indirect cost, overhead/profit included)	Unit Rate	Unit Rate (indirect cost, overhead/profit included)
85	Shoulder Rebuilding	11.50.001	Shoulder grading	m <sup>2</sup>	27	36	26	34
86		11.50.002	Shoulder repairing	m <sup>2</sup>	27	36	26	34
87	Shoulder Graveling	11.50.003	Shoulder graveling with natural gravel	m <sup>3</sup>	1,468	1,938	1,465	1,934
88		11.50.003a	Shoulder graveling with quarry waste	m <sup>3</sup>	512	676	509	672

					Nairobi, Kisumu, Mombasa		All Other Areas	
12. Natural Material Base and Sub-base					KShs		KShs	
No	Work Category	Code	Work Item Name	Unit	Unit Rate	Unit Rate (indirect cost, overhead/profit included)	Unit Rate	Unit Rate (indirect cost, overhead/profit included)
89	Pavement Removal	12.70.001	Scarify existing pavement to form sub-base	m <sup>3</sup>	793	1,047	788	1,040
90	Sub-base / Base Rebuilding	12.50.001	Hand-packed stone paving	m <sup>3</sup>	4,439	5,859	4,421	5,836
91		12.50.002	Provide, place and compact quarry waste	m <sup>3</sup>	3,103	4,096	3,046	4,021
92		12.50.003	Provide, place, spread and compact natural gravel	m <sup>3</sup>	1,465	1,934	1,462	1,930

					Nairobi, Kisumu, Mombasa		All Other Areas	
13. Graded Crushed Stone Base and Sub-base					KShs		KShs	
No	Work Category	Code	Work Item Name	Unit	Unit Rate	Unit Rate (indirect cost, overhead/profit included)	Unit Rate	Unit Rate (indirect cost, overhead/profit included)
93	Graded Crushed Stone	13.50.001	Graded Crushed Stone for subbase	m <sup>3</sup>	2,255	2,977	2,457	3,243
94		13.60.001	Graded Crushed Stone for base	m <sup>3</sup>	2,255	2,977	2,457	3,243

					Nairobi, Kisumu, Mombasa		All Other Areas	
14. Cement and Lime Treated Subgrade, Sub-base and Base					KShs		KShs	
No	Work Category	Code	Work Item Name	Unit	Unit Rate	Unit Rate (indirect cost, overhead/profit included)	Unit Rate	Unit Rate (indirect cost, overhead/profit included)
95	Cement/Lime Stabilization	14.50.001	Cement stabilization	m <sup>3</sup>	3,267	4,312	3,222	4,253
96		14.50.002	Lime stabilization	m <sup>3</sup>	1,881	2,483	1,929	2,546
97		14.50.003	Cement/lime mixing	m <sup>3</sup>	73	96	73	96
98		14.50.004	Curing and protection of treated layers	m <sup>2</sup>	17.4	23.0	16.8	22.2

					Nairobi, Kisumu, Mombasa		All Other Areas	
15. Bituminous Surface Treatment & Surface Dressing					KShs		KShs	
No	Work Category	Code	Work Item Name	Unit	Unit Rate	Unit Rate (indirect cost, overhead/profit included)	Unit Rate	Unit Rate (indirect cost, overhead/profit included)
99	Prime Coat	15.50.002	Prime Coat (MC-30 cutback bitumen)	litre	153	202	166	219
100	Tack Coat	15.50.003	Tack Coat (grade bitumen cutback)	litre	169	223	182	240
101		15.50.003a	Tack Coat (bitumen emulsion)	litre	156	206	169	223

102	Surface Dressing	15.70.001	Seal coat	litre	234	309	253	334
103		15.60.002	Provide and roll 3/6 mm precoated chipping	m <sup>3</sup>	16,494	21,772	16,644	21,970
104		15.60.003	Provide and roll 6/10 mm precoated chipping	m <sup>3</sup>	16,494	21,772	16,644	21,970
105		15.60.004	Provide and roll 10/14 mm precoated chipping	m <sup>3</sup>	16,494	21,772	16,644	21,970
106		15.60.005	Provide and roll 14/20 mm precoated chipping	m <sup>3</sup>	16,494	21,772	16,644	21,970

					Nairobi, Kisumu, Mombasa		All Other Areas	
16. Bituminous Mixes					KShs		KShs	
No	Work Category	Code	Work Item Name	Unit	Unit Rate	Unit Rate (indirect cost, overhead/profit included)	Unit Rate	Unit Rate (indirect cost, overhead/profit included)
107a	Pavement Repairing	16.50.001a	Pothole Cutting and Cleaning	m <sup>3</sup>	1,104	1,457	1,358	1,793
107		16.50.001	Pothole patching - hot mix	m <sup>3</sup>	27,270	35,996	33,315	43,976
108		16.50.002	Pothole patching - cold mix	m <sup>3</sup>	84,572	111,635	101,882	134,484
109		16.50.004	Crack sealing	m	156	206	154	203
110		16.60.001	Asphalt concrete for surfacing - hot mix.	m <sup>3</sup>	27,837	36,745	29,887	39,451
111		16.70.001	Base repair - Dense Bitumen Macadam (DBM)	m <sup>3</sup>	27,837	36,745	32,629	43,070
112	Milling and Paving	16.80.010	Milling the existing bituminous layer to spoil	m <sup>3</sup>	2,623	3,462	2,611	3,447
113		16.80.015	Milling the existing bituminous layer for reuse	m <sup>3</sup>	12,267	16,192	12,412	16,384

					Nairobi, Kisumu, Mombasa		All Other Areas	
17. Concrete Works					KShs		KShs	
No	Work Category	Code	Work Item Name	Unit	Unit Rate	Unit Rate (indirect cost, overhead/profit included)	Unit Rate	Unit Rate (indirect cost, overhead/profit included)
114	Concrete Work	17.60.001	Concrete work (class 15/20)	m <sup>3</sup>	10,529	13,898	10,148	13,395
115		17.60.002	Concrete work (class 20/20)	m <sup>3</sup>	11,577	15,282	11,294	14,908
116		17.60.002a	Concrete work (class 25/20)	m <sup>3</sup>	12,842	16,951	12,620	16,658
117	Formwork	17.60.003	Vertical formwork class F2 finish	m <sup>2</sup>	1,533	2,024	1,527	2,016
118		17.60.004	Horizontal formwork class F2 finish	m <sup>2</sup>	1,464	1,932	1,461	1,929
119	Reinforcement	17.80.004	Reinforcement work (below 16mm)	ton	110,622	146,021	110,268	145,554
120		17.80.005	Reinforcement work (above 16mm)	ton	116,956	154,382	116,602	153,915

					Nairobi, Kisumu, Mombasa		All Other Areas	
20. Road Furniture Repair and Maintenance					KShs		KShs	
No	Work Category	Code	Work Item Name	Unit	Unit Rate	Unit Rate (indirect cost, overhead/profit included)	Unit Rate	Unit Rate (indirect cost, overhead/profit included)
121	Boundary posts	20.50.001	Road reserve boundary posts	No	2,325	3,069	2,286	3,018
122		20.50.004	Edge marker posts	No	2,383	3,146	2,109	2,784



					Nairobi, Kisumu, Mombasa		All Other Areas	
20. Road Furniture Repair and Maintenance					KShs		Kshs	
123	Road Marking	20.50.007	Roads markings - white paint	m <sup>2</sup>	1,211	1,599	1,287	1,691
124		20.70.011	Road markings - white thermoplastic material	m <sup>2</sup>	2,290	3,023	2,506	3,308
124a		20.70.011a	Road markings on surface dressed pavement- white thermoplastic material	m <sup>2</sup>	2,548	3,363	2,783	3,674
125		20.50.006	Road markings - yellow paint	m <sup>2</sup>	1,211	1,599	1,319	1,741
126		20.70.010	Road markings - yellow thermoplastic material	m <sup>2</sup>	2,290	3,023	2,506	3,308
126a		20.70.010a	Road markings on surface dressed pavement- yellow thermoplastic material	m <sup>2</sup>	2,548	3,363	2,783	3,674
127		20.50.107	Road marking black paint	m <sup>2</sup>	1,018	1,344	969	1,279
128	Road Sign Erection	20.70.002	Warning signs	No	13,423	17,718	14,149	18,677
129		20.70.005	Priority, prohibitory or mandatory signs	No	13,423	17,718	14,148	18,675
130		20.70.004	Standard informatory signs	No	12,377	16,338	11,307	14,925
131		20.70.006	Non-standard informatory signs	No	35,038	46,250	31,693	41,835
132	Kerb Installation	20.50.012	Kerbs	m	1,555	2,053	1,421	1,876
133	Kilometre marker post Installation	20.50.013	Kilometre marker posts	No	6,300	8,316	6,222	8,213
134	Bollard Installation	20.50.017	Concrete bollards	No	2,654	3,503	2,603	3,436
135		20.50.021	Steel bollards	No	1,875	2,475	1,807	2,385
136	Reflective Stud Installation	20.50.019	Reflective studs	No	718	948	1,026	1,354
137	Micro tunneling	20.60.002	Micro tunneling for a 150mm diameter PVC (polyvinyl chloride) duct	m	60,551	79,927	62,657	82,707
138		20.60.002a	Horizontal drilling	m	35,427	46,764	35,176	46,432
139	Street light Installation	20.60.017	Street lighting pole (7.6m)	No	54,730	72,244	57,075	75,339
140		20.60.018	Street lighting pole (10m)	No	66,863	88,259	63,283	83,534
141		20.60.016	Street lighting control panel	No	54,673	72,168	50,277	66,366
142		20.60.315	Electric cable	m	720	950	884	1,167
143	Guardrail Repair	20.70.023a	Guardrail Repair Level 1	piece	4,549	6,005	3,952	5,217
144		20.70.023b	Guardrail Repair Level 2	piece	5,156	6,805	5,068	6,690
145		20.70.023c	Guardrail Repair Level 3	piece	21,086	27,834	21,121	27,879



# **APPENDICES**



# Appendix I: Work Items and Coding

## 4. Site Clearance and Topsoil Stripping

No	Work Category	Code	Work Item Name	Unit	Description
1	Bush Clearing	04.50.001	Mechanical mowing	m <sup>2</sup>	Cut grass by machine along the side of the road or on slopes.
2		04.50.002	Grass cutting (manual)	m <sup>2</sup>	Cut grass manually along the side of the road or on slopes.
3		04.50.003	Heavy bush clearing	m <sup>2</sup>	Cut, remove and dispose bushes along the side of the road, slopes or alongside ditches.
4		04.50.004	Light bush clearing	m <sup>2</sup>	Cut grass by hand from shoulders, slopes, inlet ditches, and side ditches including back slopes, turnouts and culvert outlet.
5		04.50.005	Pruning of tree branches	m <sup>2</sup>	Cut, remove and dispose branches of trees along the side of the road, slopes or alongside ditches.
6		04.50.006	Tree cutting and stump removal (200 -450 mm)	No	Cut, remove and dispose whole trees of 200 - 450mm in girth including their stumps along the side of the road, slopes or alongside ditches.
7		04.50.007	Tree cutting and stump removal (>450 mm)	No	Cut, remove and dispose whole trees of above 450mm in girth including their stumps along the side of the road, slopes or alongside ditches.
8	Site Clearing and Backfill	04.50.008	Clearing obstructions (mechanical)	m <sup>2</sup>	Mechanically clear any obstruction including boulders and debris out of road reserve.
9		04.50.008a	Clearing obstructions (manual)	m <sup>3</sup>	Manually clear any obstruction including boulders and debris out of road reserve.
10		04.50.009	Stripping and grubbing (mechanical)	m <sup>2</sup>	Clear site on road reserve mechanically by stripping and grubbing roots.
11		04.50.009a	Stripping and grubbing (manual)	m <sup>2</sup>	Clear site on road reserve manually by stripping and grubbing roots.
12		04.50.001	Clearing trees, hedges, bushes, vegetation and deleterious materials (mechanical)	m <sup>2</sup>	Clear site on road reserve mechanically by removal of trees, hedges, bushes, vegetation and other deleterious materials.
13		04.50.001a	Clearing trees, hedges, bushes, vegetation and deleterious materials (manual)	m <sup>2</sup>	Clear site on road reserve manually by removal of trees, hedges, bushes, vegetation and other deleterious materials.
14	Concrete Demolition	04.50.010	Excavate remove & disposal of concrete structures	m <sup>3</sup>	Demolish reinforced or mass concrete structures and cart to spoil or stockpile for re-use.
15	Top Soil Stripping	04.80.002	Removal of overburden	m <sup>3</sup>	Remove topsoil to a maximum depth of 200mm.
16	Pipe Culvert Removal	04.60.005	Removal of cracked small pipe culverts below 600mm	m	Excavate, remove and dispose cracked pipe culverts below 600mm in diameter.
17		04.60.005a	Removal of cracked large pipe culverts above 600mm	m	Excavate, remove and dispose cracked pipe culverts above 600mm in diameter.

## 5. Earth Works

No	Work Category	Code	Work Item Name	Unit	Description
18	Material Filling	05.50.006	Fill in soft material and compact	m <sup>3</sup>	Provide, place and compact soft patching material to surface defects or gravel road. It is assumed that soil to be filled is on the site or provided from cut area.
19		05.50.006a	Fill in soft material and compact (soil purchased)	m <sup>3</sup>	Provide, place and compact soft purchased patching material to surface defects or gravel road.
20		05.50.007	Fill in hard material and compact	m <sup>3</sup>	Provide, place and compact hard patching material to surface defects or gravel road. It is assumed that soil to be filled is on the site or provided from cut area.
21		05.50.007a	Fill in hard material and compact (soil purchased)	m <sup>3</sup>	Provide, place and compact hard purchased patching material to surface defects or gravel road.
22	Material Cutting	05.50.008	Cut to spoil in soft	m <sup>3</sup>	Cut manually soft material to spoil
23		07.50.008a	Cut to spoil in soft (mechanical)	m <sup>3</sup>	Cut mechanically soft material to spoil
24		05.50.009	Cut to spoil in hard	m <sup>3</sup>	Cut manually hard material to spoil
25		07.50.009a	Cut to spoil in hard (mechanical)	m <sup>3</sup>	Cut mechanically hard material to spoil

No	Work Category	Code	Work Item Name	Unit	Description
26	Rock filling	05.50.012	Rock fill to swamp	m <sup>3</sup>	Manually provide and place rock fill to swamp
27		05.50.125	Rock fill to embankment construction	m <sup>3</sup>	Manually provide and place rock fill to construct embankment.
28	Planting	05.50.014	Grassing	m <sup>2</sup>	Plant grass on the slope and inverts of ditches to reduce scour effects, or on slopes to reduce soil erosion and to improve stability.
29	Pipe Culvert Replacement	05.60.012	Compaction of subgrade in cut	m <sup>2</sup>	Trim and compact.
30		05.60.014	Compaction of subgrade in fill	m <sup>3</sup>	Compaction of subgrade in fill.
31		05.60.016	Compaction of original ground level	m <sup>3</sup>	Compact the top 150 mm layer of existing ground below fills and cuts to 95% MDD (AASHTO T99)
31a		05.60.016a	Compaction of the 300 mm below formation level in cutting to 100% MDD (AASHTO T99)	m <sup>3</sup>	Compaction of the top 300mm below formation level in cuts and fills (subgrade) to 100% MDD

## 7. Excavation and Filling for Structure

No	Work Category	Code	Work Item Name	Unit	Description
32	Material Excavation for Structures	07.50.001	Excavate for structure in soft material (manual)	m <sup>3</sup>	Excavate manually soft material for structures.
33		07.50.001a	Excavate for structure in soft material (mechanical)	m <sup>3</sup>	Excavate mechanically soft material for structures.
34		07.50.002	Excavate for structure in hard material (manual)	m <sup>3</sup>	Excavate manually in hard material for structures.
35		07.50.002a	Excavate for structure in hard material (mechanical)	m <sup>3</sup>	Excavate mechanically in hard material for structures.
36	Gabion	07.70.004	Gabion Installation	m <sup>2</sup>	Provide and place Macaferri or equivalent gabion boxes (2m * 1m * 1m).
37		07.70.005	Rock fill to Gabions	m <sup>3</sup>	Provide and place rock fill to gabions.
38	Stone Pitching	07.70.001	Stone pitching	m <sup>2</sup>	Provide stone pitching including grouting of ratio 1:4 cement to mortar.

## 8. Culverts and Drainage Works

No	Work Category	Code	Work Item Name	Unit	Description
39	Ditch Cleaning	08.50.002a	Ditch cleaning - mechanical	m	Mechanically desilt, grade to shape inlets outfalls, side drains to free flow conditions
40		08.50.002	Ditch cleaning - manual	m	Manually desilt, grade to shape inlets outfalls, side drains to free flow conditions.
41	Culvert Cleaning	08.60.002	Small culvert cleaning-partially blocked-below 450mm	m	Clean culverts of below 450mm in diameter to free flow conditions
42		08.60.003	Medium culvert cleaning-partially blocked-600mm	m	Clean culverts of 600mm in diameter to free flow conditions
43		08.60.004	Large culvert cleaning-partially blocked-900 mm and above	m	Clean culverts of 900mm and above in diameter to free flow conditions
44		08.50.025	Manhole cleaning	No	Remove all silt and debris and wash out manhole to free flow conditions.
45		08.50.016	Gulley pot cleaning	No	Clean siltation and debris from gulley pot to good impoundment conditions.
46		08.50.009	Covered (slotted) lined drain cleaning	m	Remove all silt and debris and wash out covered lined drain to free flow conditions
47		08.50.005a	Ditch/mitre drain excavation in soft (mechanical)	m <sup>3</sup>	Excavate mechanically for inlet, outfall, mitre and catchwater drains in soft material
48		08.50.005	Ditch/mitre drain excavation in soft (manual)	m <sup>3</sup>	Excavate manually for inlet, outfall, mitre and catchwater drains in soft material
49		08.50.005b	Ditch/mitre drain excavation in hard (mechanical)	m <sup>3</sup>	Excavate mechanically in hard material for inlet, outfall, mitre and catchwater drains.
50		08.50.005c	Ditch/mitre drain excavation in hard (manual)	m <sup>3</sup>	Excavate manually in hard material for inlet, outfall, mitre and catchwater drains

No	Work Category	Code	Work Item Name	Unit	Description
51	Pipe Culvert Installation	08.60.021	Culvert installation-300mm with surround	m	Provide, lay and joint pipe culvert of 300mm in diameter with surround
52		08.60.020	Culvert installation-300mm without surround	m	Provide, lay and joint unhounched pipe culvert of 300mm in diameter without surround
53		08.60.023	Culvert installation-450mm with surround	m	Provide, lay and joint pipe culvert of 450mm in diameter with surround.
54		08.60.022	Culvert installation-450mm without surround	m	Provide, lay and joint pipe culvert of 450mm in diameter without surround.
55		08.60.025	Culvert installation-600mm with surround	m	Provide, lay and joint pipe culvert of 600mm in diameter with surround
56		08.60.024	Culvert installation-600mm without surround	m	Provide, lay and joint pipe culvert of 600mm in diameter without surround
57		08.60.027	Culvert installation-900mm with surround	m	Provide, lay and joint pipe culvert of 900mm in diameter with surround.
58		08.60.026	Culvert installation-900mm without surround	m	Provide, lay and joint pipe culvert of 900mm in diameter without surround
59		08.60.028	Culvert installation-1200mm with surround	m	Provide, lay and joint pipe culvert of 1200mm in diameter with surround
60		08.60.029	Culvert installation-1200mm without surround	m	Provide, lay and joint culvert of 1200mm in diameter without surround
61		08.60.030	Excavate in soft material for culverts	m <sup>3</sup>	Excavation manually in soft material for culvert in any size.
62		08.60.031	Excavate in hard material for culverts	m <sup>3</sup>	Excavation manually in hard material for culvert in any size.
63	Headwall Construction	08.60.019	Headwall construction for 450mm pipe culvert	No	Reconstruct or repair damaged headwall (wingwall and apron) for 450mm pipe culvert to prevent the collapse and the potential slippage of the material and pavement above the culvert.
64		08.60.019a	Headwall construction for 600mm pipe culvert	No	Reconstruct or repair damaged headwall (wingwall and apron) for 600mm pipe culvert to prevent the collapse and the potential slip of the material and pavement above the culvert.
65		08.60.019b	Headwall construction for 900mm pipe culvert	No	Reconstruct or repair damaged headwall (wingwall and apron) for 900mm pipe culvert to prevent the collapse and the potential slip of the material and pavement above the culvert.
66		08.60.019c	Headwall construction for 1200mm pipe culvert	No	Reconstruct or repair damaged headwall (wingwall and apron) for 1200mm pipe culvert to prevent the collapse and the potential slip of the material and pavement above the culvert.
67	Manhole installation	08.50.024	Manhole construction less than 1m	No	Install new small manhole of less than 1m in depth (900-1200mm in inner diameter)
68		08.50.024a	Manhole construction more than 1m	No	Install new large manhole of more than 1m in depth (900-1200mm in inner diameter)
69	Gulley Pot installation	08.50.015	Gulley pot construction	No	Provide and place gulley pots including grating (H=900mm) for inlet structures as directed by the Engineer.
70	Drain Lining	08.50.032	Lay drain lining with concrete	m <sup>2</sup>	Place concrete lining to the slopes and invert of the ditch to prevent the scour.
71		08.50.022a	Laying of dressed stones	m <sup>2</sup>	Place dressed stone lining to the slopes and invert of the ditch to prevent the scour.
72		08.50.022	Laying of side slabs	m <sup>2</sup>	Place side slab lining to the slopes and invert of the ditch to prevent the scour.
73		08.70.036	Laying of 300mm invert block drain	m	Provide, lay and joint invert block drain of 300mm in diameter
74		08.70.037	Laying of 750mm invert block drain	m	Provide, lay and joint invert block drain of 750mm in width

## 9. Passage of Traffic

No	Work Category	Code	Work Item Name	Unit	Description
75	Traffic Control	09.50.004	Traffic Control	Day	Place warning signs, barriers and cones around the working lane on the carriageway and guide the passage of traffic through the works
76		09.50.005	Watchman	No	Provide watchman for all round surveillance.
77		09.50.006	Watering	m <sup>2</sup>	Sprinkle water to control dust for passage of traffic through the works or compaction at earth works

## 10. Grading and Graveling Works

No	Work Category	Code	Work Item Name	Unit	Description
78	Grading	10.50.001	Heavy grading without watering or compaction	m <sup>2</sup>	Trim with Motor Grader or heavy towed grader existing carriageway surface to camber, including slopes and ditches without providing watering and compaction
79		10.50.002	Heavy grading with watering and compaction	m <sup>2</sup>	Trim with Motor Grader or heavy towed grader existing carriageway surface to camber, including slopes and ditches providing watering and compaction
80		10.50.003	Light grading	m <sup>2</sup>	Trim with motor grader existing carriageway to camber, including slopes and ditches.
81		10.50.004	Reshaping	m <sup>2</sup>	Restore manually the camber on earth or gravel roads by re-turning material from road sides and shoulder toward road centre.
82		10.50.005	Dragging	m <sup>2</sup>	Remove manually loose material from the surface to delay the formation of corrugations
83	Graveling	10.60.001	Regraveling	m <sup>3</sup>	Prepare for road formation and provide, place spread, shape and compact with watering gravel of not less than CBR 20%
84		10.60.001a	Regraveling without watering	m <sup>3</sup>	Prepare for road formation and provide, place spread, shape and compact without watering gravel of not less than CBR 20%

## 11. Paved Roads - Shoulder Maintenance and Repairs

No	Work Category	Code	Work Item Name	Unit	Description
85	Shoulder Rebuilding	11.50.001	Shoulder grading	m <sup>2</sup>	Prepare surface of existing shoulders, accesses and bus bays, including benching where necessary, water process and compact
86		11.50.002	Shoulder repairing	m <sup>2</sup>	Prepare surface of existing shoulders, accesses and bus bays, water process and compact
87	Shoulder Graveling	11.50.003	Shoulder graveling with natural gravel	m <sup>3</sup>	Provide, place, spread, shape and compact 150mm of natural gravel of CBR 30% to shoulders, accesses and bus bays
88		11.50.003a	Shoulder graveling with quarry waste	m <sup>3</sup>	Provide, place and compact quarry waste material to shoulders, accesses and bus bays

## 12. Natural Material Base and Subbase

No	Work Category	Code	Work Item Name	Unit	Description
89	Pavement Removal	12.70.001	Scarify existing pavement to form subbase	m <sup>3</sup>	Break or scarify mechanically the existing pavement layer, and compact.
90	Subbase/Base Rebuilding	12.50.001	Handpacked stone paving	m <sup>3</sup>	Provide, lay, and compact hand packed stone material including filling of voids with stone dust
91		12.50.002	Provide, place and compact quarry waste	m <sup>3</sup>	Provide, spread, shape and compact approved quarry waste of CBR 30% and above for 5cm in thickness.
92		12.50.003	Provide, place, spread and compact natural gravel	m <sup>3</sup>	Provide, spread, shape and compact approved natural gravel of CBR 30% and above for 15cm in thickness.

## 13. Graded Crushed Stone Base and Subbase

No	Work Category	Code	Work Item Name	Unit	Description
93	Graded Crushed Stone	13.50.001	Graded Crushed Stone for subbase	m <sup>3</sup>	Provide, place and spread approved graded crushed stone for subbase.
94		13.60.001	Graded Crushed Stone for base	m <sup>3</sup>	Provide, place and spread approved graded crushed stone for base.



## 14. Cement and Lime Treated Subgrade, Subbase and Base

No	Work Category	Code	Work Item Name	Unit	Description
95	Cement/Lime Stabilization	14.50.001	Cement stabilization	m <sup>3</sup>	Provide, spread cement on natural gravel or graded crushed stone
96		14.50.002	Lime stabilization	m <sup>3</sup>	Provide, spread lime on natural gravel or graded crushed stone
97		14.50.003	Cement/lime mixing	m <sup>3</sup>	Mixing in cement/lime into natural gravel or graded crushed stone
98		14.50.004	Curing and protection of treated layers	m <sup>2</sup>	Cure and protect layers treated with cement or lime stabilizers

## 15. Bituminous Surface Treatment & Surface Dressing

No	Work Category	Code	Work Item Name	Unit	Description
99	Prime Coat	15.50.002	Prime Coat (MC-30 cutback bitumen)	litre	Prepare surface of carriageway, bus bays and repair areas, provide and spray MC-30 cutback bitumen at a rate of 0.8-1.2 litre/m <sup>2</sup> as prime coat
100	Tack Coat	15.50.003	Tack Coat (grade bitumen cutback)	litre	Prepare surface of carriageway and bus bays, provide and spray 80/100 penetration grade bitumen cut back using 5-15% kerosene as tack coat for asphalt concrete wearing course at a spray rate of 0.5-0.7 litre/m <sup>2</sup>
101		15.50.003a	Tack Coat (bitumen emulsion)	litre	Prepare surface of repair areas provide and spray K1-60 bitumen emulsion as tack coat or seal to repair areas at a spray rate of 0.8-1.0 litre/m <sup>2</sup>
102	Surface Dressing	15.70.001	Seal coat	litre	Cover a large worn surface area with aggregate distributed over spread bitumen to seal cracks and to recover adequate surface texture
103		15.60.002	Provide and roll 3/6 mm precoated chipping	m <sup>3</sup>	Treat worn surface with graded aggregates of 3 to 6mm precoated with bitumen to recover adequate surface texture
104		15.60.003	Provide and roll 6/10 mm precoated chipping	m <sup>3</sup>	Treat worn surface with graded aggregates of 6 to 10mm precoated with bitumen to recover adequate surface texture
105		15.60.004	Provide and roll 10/14 mm precoated chipping	m <sup>3</sup>	Treat worn surface with graded aggregates of 10 to 14mm precoated with bitumen to recover adequate surface texture
106		15.60.005	Provide and roll 14/20 mm precoated chipping	m <sup>3</sup>	Treat worn surface with graded aggregates of 14 to 20mm precoated with bitumen to recover adequate surface texture

## 16. Bituminous Mixes

No	Work Category	Code	Work Item Name	Unit	Description
107a	Pavement Repairing	16.50.001a	Pothole Cutting and Cleaning	m <sup>3</sup>	Trim, cut and clean failed bituminous surface
107		16.50.001	Pothole patching - hot mix	m <sup>3</sup>	Provide, place and compact asphaltic concrete to repair areas and for regulation to carriageway
108		16.50.002	Pothole patching - cold mix	m <sup>3</sup>	Repair defects on bituminous surface by cold bituminous mixture
109		16.50.004	Crack sealing	m	Repair transverse or longitudinal cracking on surface dressed or asphalt concrete
110		16.60.001	Asphalt concrete for surfacing - hot mix.	m <sup>3</sup>	Overlay or continuously repave surface by hot bituminous mixture
111		16.70.001	Base repair - Dense Bitumen Macadam (DBM)	m <sup>3</sup>	Place dense bitumen macadam for base material and roll
112	Milling and Paving	16.80.010	Milling the existing bituminous layer to spoil	m <sup>3</sup>	Mill mechanically the existing bituminous layer to spoil
113		16.80.015	Milling the existing bituminous layer for reuse	m <sup>3</sup>	Mill mechanically the existing bituminous layer and stockpile for reuse or recycle

## 17. Concrete Works

No	Work Category	Code	Work Item Name	Unit	Description
114	Concrete Work	17.60.001	Concrete work (class 15/20)	m <sup>3</sup>	Provide, place and compact class 15/20 concrete mixture for blinding.
115		17.60.002	Concrete work (class 20/20)	m <sup>3</sup>	Provide, place and compact class 20/20 concrete mixture.
116		17.60.002a	Concrete work (class 25/20)	m <sup>3</sup>	Provide, place and compact class 25/20 concrete mixture.
117	Formwork	17.60.003	Vertical formwork class F2 finish	m <sup>2</sup>	Provide and erect formwork of class F2 finish to the vertical direction
118		17.60.004	Horizontal formwork class F2 finish	m <sup>2</sup>	Provide and erect formwork of class F2 finish to the horizontal direction
119	Reinforcement	17.80.004	Reinforcement work (below 16mm)	ton	Provide, cut bend and fix into position high yield reinforcement bar below 16mm
120		17.80.005	Reinforcement work (above 16mm)	ton	Provide, cut bend and fix into position high yield reinforcement bar above 16mm

## 20. Road Furniture Repair and Maintenance

No	Work Category	Code	Work Item Name	Unit	Description
121	Boundary posts	20.50.001	Road reserve boundary posts	No	Provide and erect road reserve boundary posts (size 1.2 x 0.2 x 0.2)
122		20.50.004	Edge marker posts	No	Provide and erect edge marker posts
123	Road Marking	20.50.007	Road markings - white paint	m <sup>2</sup>	Provide reflectorized white paint for road markings (w = 10cm)
124		20.70.011	Road markings - white thermoplastic material	m <sup>2</sup>	Renew faded or missing white road markings (w = 10cm) with thermoplastic material
124a		20.70.011a	Road markings on surface dressed pavement- white thermoplastic material	m <sup>2</sup>	Renew faded or missing white road markings on surface dressed pavement (w = 10cm) with thermoplastic material
125		20.50.006	Road markings - yellow paint	m <sup>2</sup>	Provide reflectorized yellow paint for road markings (w = 10cm)
126		20.70.010	Road markings - yellow thermoplastic material	m <sup>2</sup>	Upgrade faded or missing yellow road markings (w = 10cm) with thermoplastic material
126a		20.70.010a	Road markings on surface dressed pavement- yellow thermoplastic material	m <sup>2</sup>	Renew faded or missing yellow road markings on surface dressed pavement (w = 10cm) with thermoplastic material
127		20.50.107	Road marking black paint	m <sup>2</sup>	Provide reflectorized black paint for road markings (w = 10cm)
128	Road Sign Erection	20.70.002	Warning signs	No	Provide and erect priority, prohibitory or mandatory signs
129		20.70.005	Priority, prohibitory or mandatory signs	No	Priority, prohibitory or mandatory signs
130		20.70.004	Standard informative signs	No	Provide and erect informative signs
131		20.70.006	Non-standard informative signs	No	Provide and erect non-standard warning signs
132	Kerb Installation	20.50.012	Kerbs	m	Provide lay and joint concrete class 20/20 kerbs in support to carriageway, bus bays and junctions
133	Kilometre marker post Installation	20.50.013	Kilometre marker posts	No	Kilometre marker post Installation.
134	Bollard Installation	20.50.017	Concrete bollards	No	Concrete bollard Installation (diameter 0.2m, length 0.9m, embedded depth 0.45m)
135		20.50.021	Steel bollards	No	Place and provide gauge 16 steel pipe Bollards of diameter 150 mm and 1.05m above the ground embedded to a depth of 0.45m at place
136	Reflective Stud Installation	20.50.019	Reflective studs	No	Install reflective studs along the centre line
137	Microtunneling	20.60.002	Microtunneling for a 150mm diameter PVC (polyvinyl chloride) duct	m	Conduct microtunneling with a 150mm dia PVC duct (under silt or sand condition)
138		20.60.002a	Horizontal drilling	m	Conduct horizontal drilling for 150mm hole in diameter (under gravel condition)

No	Work Category	Code	Work Item Name	Unit	Description
139	Street light Installation	20.60.017	Street lighting pole (7.6m)	No	Provide and install 7.6m street lighting pole including cables accessories and lamp.
140		20.60.018	Street lighting pole (10m)	No	Provide and install 10.0m street lighting pole including cables accessories and lamp.
141		20.60.016	Street lighting control panel	No	Provide and install 10.0m street lighting pole including cables accessories and lamp.
142		20.60.315	Electric cable	m	Provide and install supply cables between the street lighting poles.
143	Guardrail Repair	20.70.023a	Guardrail Repair Level 1	piece (4m)	Removal of damaged guardrail and replacement with straightened beam
144		20.70.023b	Guardrail Repair Level 2	piece (4m)	Removal of damaged guardrail, replacement with a straightened beam and realignment of posts
145		20.70.023c	Guardrail Repair Level 3	piece (4m)	Complete removal of damaged guardrail beam and installation with new beam, posts and spacers



# Appendix 2-1:

## Price List Labour, Machinery, Material (Nairobi, Mombasa, Kisumu)

No	Item	Code	Name	Type	Unit	Unit Rate 2019	Source 2019
1	Labour (Nairobi, Mombasa, Kisumu)	22.50.001	Support Staff		Person Day	622	Min. Wages Order, 2017
		22.50.002	Unskilled labour		Person Day	622	Min. Wages Order, 2017
		22.50.005	Artisans G2		Person Day	1,162	Min. Wages Order, 2017
		22.50.007	Skilled Labour: Overseer		Person Day	1,404	Min. Wages Order, 2017
		22.50.101	Skilled Labour: Operator		Person Day	1,404	Min. Wages Order, 2017
2	Machinery	22.61.101	Truck Flat bed : 2.5 - 5 Tonnes		Hour	1,480	MTD Hire Rate
		22.61.102	Truck with crane	4t	Hour	3,375	2019 Feb. Market Price
		22.62.015	Water Tanker : 6000 - 8000 Lt.		Hour	1,780	MTD Hire Rate
		22.63.012	Motor Grader (e.g. CAT 112F): 100 - 130 HP		Hour	5,820	MTD Hire Rate
		22.63.101	Bulldozer	BD65EX	Hour	9,500	MTD Hire Rate
		22.63.102	Excavator	130-150hp	Hour	6,530	MTD Hire Rate
		22.63.103	Backhoe loader	130-150hp	Hour	5,600	MTD Hire Rate
		22.64.001	Pedestrian Roller : 700 - 1000 Kg.		Hour	1,150	MTD Hire Rate
		22.64.005	Pneumatic Roller: 10T, 130HP		Hour	3,650	MTD Hire Rate
		22.64.004	Single drum steel Vibrator roller: 9-10T, 130 HP		Hour	4,840	MTD Hire Rate
		22.65.008	Road Marking Machine		Hour	570	MTD Hire Rate
		22.65.101	Melting pod (for paint)	200 - 350kg	Hour	2,000	2019 Feb. Market Price
		22.67.001	Grass cutter	150cm, 35hp	Hour	120	MTD Hire Rate
		22.67.004	Bitumen Sprayer H/Operated	200L	Hour	410	MTD Hire Rate
		22.67.005	Vibrator P/Tamper		Hour	400	MTD Hire Rate
		22.67.101	Milling machine	197hp	Hour	1,800	2017 RA Price
		22.67.102	Resurface machine	120hp	Hour	30,000	2017 April Market Price
		22.67.103	Road heater	63hp	Hour	25,000	2017 RA Price
		22.67.104	Asphalt finisher	37H	Hour	6,250	2019 Feb. Market Price
		22.67.105	Power suction car	4t	Hour	6,250	2019 May Market Price
		22.67.106	Muddy water processing machine		Day	48,000	2019 Feb. Market Price
		22.67.107	Boring machine	81kw	Day	42,667	2019 Feb. Market Price
		22.67.108	Air compressor	150CFM, 4250LPM	Day	8,000	2019 Feb. Market Price
		22.67.109	Asphalt/Bitumen cutter		Hour	625	2019 Feb. Market Price
		22.67.110	Chip spreader		Hour	5,820	MTD Hire Rate
3	Material	22.69.009	Fine aggregates(sand)		m <sup>3</sup>	1,837	2019 Feb. Market Price
		22.70.001	Fine aggregates(stone dust)		m <sup>3</sup>	1,667	2019 Feb. Market Price
		22.70.002	Graded aggregates (ballast)		m <sup>3</sup>	1,438	2019 Feb. Market Price
		22.70.003	Water		m <sup>3</sup>	313	2019 Feb. N.C.W.S.S.
		22.70.004	Cement (ordinary portland)		Kg	11	2019 Feb. Market Price
		22.70.006	Hydrated lime		Kg	8.0	2019 Feb. Market Price
		22.71.012	Square twisted bars 16mm		t	87,241	2019 Feb. Market Price
		22.72.001	Precast concrete culvert - 450mm		m	2,221	2019 Feb. Market Price
		22.72.002	Precast concrete culvert - 600mm		m	3,162	2019 Feb. Market Price
		22.72.003	Precast concrete culvert - 900mm		m	4,734	2019 Feb. Market Price
		22.72.004	Precast concrete culvert - 1200mm		m	9,889	2019 Feb. Market Price

No	Item	Code	Name	Type	Unit	Unit Rate 2019	Source 2019
3	Material	22.72.016	Coarse aggregates(chippings) - 3/6mm		m <sup>3</sup>	9,000	RA 2019 Price
		22.72.017	Coarse aggregates(chippings) - 6/10mm		m <sup>3</sup>	9,000	RA 2019 Price
		22.72.018	Coarse aggregates(chippings) - 10/14mm		m <sup>3</sup>	9,000	RA 2019 Price
		22.72.019	Coarse aggregates(chippings) - 14/20mm		m <sup>3</sup>	9,000	RA 2019 Price
		22.72.020	Stone dust		m <sup>3</sup>	858	2019 Feb. Market Price
		22.72.021	Gravel material (murrum)		m <sup>3</sup>	1,000	2019 RA Price
		22.72.022	Hardcore		m <sup>3</sup>	1,380	2019 Feb. Market Price
		22.72.023	Crusher run material (Graded crushed stone)		m <sup>3</sup>	1,627	2019 Feb. Market Price
		22.72.024	Quarry waste material		m <sup>3</sup>	228	2019 Feb. Market Price
		22.72.101	Precast concrete culvert - 300mm		m	1,394	2019 Feb. Market Price
		22.72.102	Stone		m <sup>3</sup>	850	2019 Feb. Market Price
		22.72.103	Gully pot with grating		Set	16,170	-
		22.72.104	Invert block drain	600*330*355	No.	495	2019 Feb. Market Price
		22.72.105	Invert block drain	600*760*190	No.	1,412	2019 Feb. Market Price
		22.72.106	Side Slab concrete block	3'*9'*24"	No.	179	2019 Feb. Market Price
		22.72.107	Manhole cover slab	1220*150	No.	5,000	2019 RA Price
		22.72.108	Soil (soft)		m <sup>3</sup>	238	2019 Feb. Market Price
		22.72.109	Soil (hard)		m <sup>3</sup>	354	2019 Feb. Market Price
		22.73.002	Premix - AC Type I (cold)		m <sup>3</sup>	70,400	2019 Feb. Market Price
		22.73.003	Premix - AC Type I (hot)		m <sup>3</sup>	21,000	2019 RA Price
		22.73.004	Dense Bitumen Macadam		m <sup>3</sup>	21,000	2019 RA Price
		22.73.006	Bituminous sealant (K-160)		m <sup>3</sup>	90,000	2019 Feb. Market Price
		22.73.012	MC 30 Bitumen		litre	112	2019 Feb. Market Price
		22.73.013	80/100 Pen grade bitumen		litre	74	2019 Feb. Market Price
		22.74.002	Fuel	Diesel	litre	96.0	2019 Feb. ERC Nbi. Pump Price
		22.77.001	Mesh wire 8' x 4' gauge 18		m <sup>2</sup>	585	2019 Feb. Market Price
		22.77.101	Gabion mesh	2m*1m = 2m2	No.	4,930	2019 Feb. Market Price
		22.77.102	Gabion Mattress	10mm	m <sup>2</sup>	2,653	2019 Feb. Market Price
		22.77.103	Flat metal plate	1/16-1/18	m <sup>2</sup>	637	2019 Feb. Market Price
		22.77.104	Steel pipe	2inch	m	579	2019 Feb. Market Price
		22.77.105	Bolts with nuts	8cm	Set	84	2019 Feb. Market Price
		22.77.106	Brackets		No	258	2019 Feb. Market Price
		22.77.107	Steel angle	125*5mm	kg	236	2019 Feb. Market Price
		22.77.108	Steel plate	450*3mm	kg	89	2019 Feb. Market Price
		22.77.109	Steel bollard	SGP 5B. 125A	kg	100	2019 Feb. Market Price
		22.77.110	Mesh wire	A142	m <sup>2</sup>	283	2019 RA Price
		22.77.111	Cast iron manhole cover	600*450 heavy duty with frame	No.	18,500	2017 April Market Price
		22.78.101	Cypress	for fixed deck	m <sup>3</sup>	35,520	2019 Feb. Market Price
		22.78.102	Wooden formwork panel		m <sup>2</sup>	1,057	2019 Feb. Market Price
		22.79.003	Road making paint yellow		litre	947	2019 Feb. Market Price
		22.79.004	Road making paint white		litre	909	2019 Feb. Market Price
		22.79.005	Thermoplastic paint yellow	premixed with primer and glass beads	Kg	320	2019 Feb. Market Price
		22.79.006	Thermoplastic paint white	premixed with primer and glass beads	Kg	320	2019 Feb. Market Price
		22.79.012	Reflective 'cat' eyes		No	636	2019 Feb. Market Price
		22.79.013	Reflective mark posts	White PVC post 1400	No.	2,017	2017 April Market Price

No	Item	Code	Name	Type	Unit	Unit Rate 2019	Source 2019
3	Material	22.79.101	Road making paint black		litre	685	2019 Feb. Market Price
		22.79.104	Reflective paint		litre	775	2017 April Market Price
		22.79.105	White paint		litre	491	2019 Feb. Market Price
		22.79.106	Black paint		litre	491	2019 Feb. Market Price
		22.79.107	Road Kerb	12.25*24.5	No.	441	2019 Feb. Market Price
		22.79.108	Road channel	9.8*12.25	No.	201	2019 Feb. Market Price
		22.79.109	Duct Pipe (PVC 150)		m	79	2019 Feb. Market Price
		22.79.110	Equipment for lead pipe jacking	196kN	Day	30,000	2017 RA Price
		22.79.111	Equipment for lead pipe jacking (fixing part)		Day	1,250	2017 RA Price
		22.79.112	Equipment for lead pipe jacking (moving part)		m	100	2017 RA Price
		22.79.113	Equipment for Underground pipe jacking	196kN	Day	17,500	2019 Feb. Market Price
		22.79.114	Equipment for Underground pipe jacking (fixing part)		Day	11,500	2019 Feb. Market Price
		22.79.115	Equipment for Underground pipe jacking (moving part)		m	8,250	2019 Feb. Market Price
		22.79.116	Water stopper		No.	2,100	2019 Feb. Market Price
		22.79.117	Concrete anchor		No.	253	2019 Feb. Market Price
		22.79.118	Water stop cement		Kg	156	2019 Feb. Market Price
		22.79.119	Aggregation(jacking)		kg	9	2019 Feb. Market Price
		22.79.120	Aggregation(washing)		kg	9	2019 Feb. Market Price
		22.79.121	Shank-rod	90mm	No.	266,000	2019 Feb. Market Price
		22.79.122	Driving-adapter		No.	1,420	2019 Feb. Market Price
		22.79.123	drilling-pipe		No.	46,200	2019 Feb. Market Price
		22.79.124	Ring-bit		No.	91,000	2019 Feb. Market Price
		22.79.125	Water-swivel		No.	85,000	2019 Feb. Market Price
		22.79.126	Cutter-set		No.	41,300	2019 Feb. Market Price
		22.79.127	Core-tube		No.	41,700	2019 Feb. Market Price
		22.79.128	Magnifying-bit		No.	452,000	2019 Feb. Market Price
		22.79.129	Earth bar	10*1500mm	No.	474	2019 Feb. Market Price
		22.79.130	Lighting pole	7.6m	No.	23,250	2019 Feb. Market Price
		22.79.131	Lighting pole	10.0m	No.	29,500	2019 Feb. Market Price
		22.79.132	Cable	for light	m	23	2019 Feb. Market Price
		22.79.133	Accessories	for light	Set	2,975	2019 Feb. Market Price
		22.79.134	Lamp		No.	11,563	2019 Feb. Market Price
		22.79.135	Control panel		No.	14,500	2019 Feb. Market Price
		22.79.136	Cable	for control panel	m	529	2019 Feb. Market Price
		22.79.137	Accessories	for control panel	Set	31,767	2019 Feb. Market Price
		22.79.138	Meter		No.	800	2019 Feb. Market Price
		22.79.139	Grass		m <sup>2</sup>	23	2019 Feb. Market Price
		22.79.140	Red soil		m <sup>3</sup>	994	2019 Feb. Market Price
		22.79.141	Manure		m <sup>3</sup>	1,570	2019 Feb. Market Price
		22.79.142	Warning triangular sign	600mm	No.	7,083	2019 Feb. Market Price
		22.79.143	Priority triangular sign	600mm	No.	7,083	2019 Feb. Market Price
		22.79.144	Standard informatory sign		No.	6,132	2019 Feb. Market Price
		22.79.145	Non-standard informatory sign	less than 1m <sup>2</sup>	No.	26,733	2019 Feb. Market Price
		22.79.150	Guardrail Beam	4m	No.	10,170	2019 Feb. Market Price
		22.79.151	Guardrail Post	140 mm dia, 6 gauge	m	109	2019 Feb. Market Price
		22.79.152	Bolts with nuts and washers (short)		No.	73	2019 Feb. Market Price
		22.79.153	Bolts with nuts and washers (long)		No.	275	2019 Feb. Market Price
		22.79.154	Fuel	Petrol	litre	100	2019 Feb. ERC Nbi. Pump Price

No	Item	Code	Name	Type	Unit	Unit Rate 2019	Source 2019
3	Material	22.79.155	Pick up truck		day	7,000	MTD Hire Rate
		22.79.156	Truck	2 ton	day	7,000	MTD Hire Rate
		22.79.157	Thinner		litre	318	2019 Feb. Market Price
		22.79.158	Cement (OPC)		kg	20	2019 RA Price
		22.79.159	Pulveriser		Hour	6,250	2019 RA Price (Assumed same as Paver)
		22.79.160	Hessian cloth		m <sup>2</sup>	30.00	2019 RA Price
		22.79.161	K-160		litre	100	2019 RA Price
		22.79.162	Reflecting Glass Beads		kg	115	2019 Market Price
		22.79.163	Electricity		Kw/h	15	2019 Market Price
		22.79.164	Beam Straightener		Hour	10,000	2019 Quotation Price



## Appendix 2-2: Price List Labour, Machinery, Material (All Other Areas)

No	Item	Code	Name	Type	Unit	Unit Rate 2019	Source 2019
1	Labour (All other areas)	22.50.001	Support Staff		Person Day	571	Min. Wages Order, 2017
		22.50.002	Unskilled labour		Person Day	571	Min. Wages Order, 2017
		22.50.005	Artisans G2		Person Day	1,177	Min. Wages Order, 2017
		22.50.007	Skilled Labour: Overseer		Person Day	1,321	Min. Wages Order, 2017
		22.50.101	Skilled Labour: Operator		Person Day	1,321	Min. Wages Order, 2017
2	Machinery	22.61.101	Truck Flat bed : 2.5 - 5 Tonnes		Hour	1,480	MTD Hire Rate
		22.61.102	Truck with crane	4t	Hour	3,183	Conversion Factor of Nairobi Region Market Survey
		22.62.015	Water Tanker : 6000 - 8000 Lt.		Hour	1,780	MTD Hire Rate
		22.63.012	Motor Grader (e.g. CAT 112F): 100 - 130 HP		Hour	5,820	MTD Hire Rate
		22.63.101	Bulldozer	BD65EX	Hour	9,500	MTD Hire Rate
		22.63.102	Excavator	130-150hp	Hour	6,530	MTD Hire Rate
		22.63.103	Backhoe loader	130-150hp	Hour	5,600	MTD Hire Rate
		22.64.001	Pedestrian Roller : 700 - 1000 Kg.		Hour	1,150	MTD Hire Rate
		22.64.005	Pneumatic Roller: 10T, 130HP		Hour	3,650	MTD Hire Rate
		22.64.004	Single drum steel Vibrator roller: 9-10T, 130 HP		Hour	4,840	MTD Hire Rate
		22.65.008	Road Marking Machine		Hour	570	MTD Hire Rate
		22.65.101	Melting pod (for paint)	200 - 350kg	Hour	2,400	2019 Feb. Market Price
		22.67.001	Grass cutter	150cm, 35hp	Hour	120	MTD Hire Rate
		22.67.004	Bitumen Sprayer H/Operated	200L	Hour	410	MTD Hire Rate
		22.67.005	Vibrator P/Tamper		Hour	400	MTD Hire Rate
		22.67.101	Milling machine	197hp	Hour	1,800	2017 RA Price
		22.67.102	Resurface machine	120hp	Hour	43,333	2017 April Market Price
		22.67.103	Road heater	63hp	Hour	25,000	2017 RA Price
		22.67.104	Asphalt finisher	37H	Hour	6,111	Conversion Factor of Nairobi Region Market Survey
		22.67.105	Power suction car	4t	Hour	6,250	Conversion Factor of Nairobi Region Market Survey
		22.67.106	Muddy water processing machine		Day	57,600	Conversion Factor of Nairobi Region Market Survey
		22.67.107	Boring machine	81kw	Day	42,667	Conversion Factor of Nairobi Region Market Survey
		22.67.108	Air compressor	150CFM, 4250LPM	Day	8,000	Conversion Factor of Nairobi Region Market Survey
		22.67.109	Asphalt/Bitumen cutter		Hour	959	Conversion Factor of Nairobi Region Market Survey
		22.67.110	Chip spreader		Hour	5,820	MTD Hire Rate
3	Material	22.69.009	Fine aggregates(sand)		m <sup>3</sup>	1,500	Conversion Factor of Nairobi Region Market Survey
		22.70.001	Fine aggregates(stone dust)		m <sup>3</sup>	1,667	Conversion Factor of Nairobi Region Market Survey
		22.70.002	Graded aggregates (ballast)		m <sup>3</sup>	1,206	Conversion Factor of Nairobi Region Market Survey
		22.70.003	water		m <sup>3</sup>	313	Conversion Factor of Nairobi Region Market Survey
		22.70.004	Cement (ordinary portland)		Kg	12	Conversion Factor of Nairobi Region Market Survey

No	Item	Code	Name	Type	Unit	Unit Rate 2019	Source 2019
3	Material	22.70.006	Hydrated lime		Kg	9	Conversion Factor of Nairobi Region Market Survey
		22.71.012	Square twisted bars 16mm		t	87,241	Conversion Factor of Nairobi Region Market Survey
		22.72.001	Precast concrete culvert - 450mm		m	2,208	Conversion Factor of Nairobi Region Market Survey
		22.72.002	Precast concrete culvert - 600mm		m	2,800	Conversion Factor of Nairobi Region Market Survey
		22.72.003	Precast concrete culvert - 900mm		m	3,681	Conversion Factor of Nairobi Region Market Survey
		22.72.004	Precast concrete culvert - 1200mm		m	8,175	Conversion Factor of Nairobi Region Market Survey
		22.72.016	Coarse aggregates(chippings) - 3/6mm		m <sup>3</sup>	9,000	2019 RA Price
		22.72.017	Coarse aggregates(chippings) - 6/10mm		m <sup>3</sup>	9,000	2019 RA Price
		22.72.018	Coarse aggregates(chippings) - 10/14mm		m <sup>3</sup>	9,000	2019 RA Price
		22.72.019	Coarse aggregates(chippings) - 14/20mm		m <sup>3</sup>	9,000	2019 RA Price
		22.72.020	Stone dust		m <sup>3</sup>	858	Conversion Factor of Nairobi Region Market Survey
		22.72.021	Gravel material (murrum)		m <sup>3</sup>	1,000	Conversion Factor of Nairobi Region Market Survey
		22.72.022	Hardcore		m <sup>3</sup>	1,380	Conversion Factor of Nairobi Region Market Survey
		22.72.023	Crusher run material (Graded crushed stone)		m <sup>3</sup>	1,789	Conversion Factor of Nairobi Region Market Survey
		22.72.024	Quarry waste material		m <sup>3</sup>	228	Conversion Factor of Nairobi Region Market Survey
		22.72.101	Precast concrete culvert - 300mm		m	959	Conversion Factor of Nairobi Region Market Survey
		22.72.102	Stone		m <sup>3</sup>	850	Conversion Factor of Nairobi Region Market Survey
		22.72.103	Gully pot with grating		Set	10,385.50	Conversion Factor of Nairobi Region Market Survey
		22.72.104	Invert block drain	600*330*355	No.	534	Conversion Factor of Nairobi Region Market Survey
		22.72.105	Invert block drain	600*760*190	No.	1,438	Conversion Factor of Nairobi Region Market Survey
		22.72.106	Side Slab concrete block	3''*9''*24''	No.	146	Conversion Factor of Nairobi Region Market Survey
		22.72.107	Manhole cover slab	1220*150	No.	5,108	Conversion Factor of Nairobi Region Market Survey
		22.72.108	Soil (soft)		m <sup>3</sup>	238	Conversion Factor of Nairobi Region Market Survey
		22.72.109	Soil (hard)		m <sup>3</sup>	354	Conversion Factor of Nairobi Region Market Survey
		22.73.002	Premix - AC Type I (cold)		m <sup>3</sup>	81,947	Conversion Factor of Nairobi Region Market Survey
		22.73.003	Premix - AC Type I (hot)		m <sup>3</sup>	22,582	Conversion Factor of Nairobi Region Market Survey
		22.73.004	Dense Bitumen Macadam		m <sup>3</sup>	24,956	Conversion Factor of Nairobi Region Market Survey
		22.73.006	Bituminous sealant (K-160)		m <sup>3</sup>	98,940	Conversion Factor of Nairobi Region Market Survey
		22.73.012	MC 30 Bitumen		litre	123	Conversion Factor of Nairobi Region Market Survey
		22.73.013	80/100 Pen grade bitumen		litre	81	Conversion Factor of Nairobi Region Market Survey
		22.74.002	Fuel	Diesel	litre	96	Conversion Factor of Nairobi Region Market Survey

No	Item	Code	Name	Type	Unit	Unit Rate 2019	Source 2019
3	Material	22.77.001	Mesh wire 8' x 4' gauge 18		m <sup>2</sup>	587	Conversion Factor of Nairobi Region Market Survey
		22.77.101	Gabion mesh	2m*1m = 2m2	No.	4,930	Conversion Factor of Nairobi Region Market Survey
		22.77.102	Gabion Mattress	10mm	m <sup>2</sup>	2,653	Conversion Factor of Nairobi Region Market Survey
		22.77.103	Flat metal plate	1/16-1/18	m <sup>2</sup>	701	Conversion Factor of Nairobi Region Market Survey
		22.77.104	Steel pipe	2inch	m	579	Conversion Factor of Nairobi Region Market Survey
		22.77.105	Bolts with nuts	8cm	Set	123	Conversion Factor of Nairobi Region Market Survey
		22.77.106	Brackets		No	156	Conversion Factor of Nairobi Region Market Survey
		22.77.107	Steel angle	125*5mm	kg	236	Conversion Factor of Nairobi Region Market Survey
		22.77.108	Steel plate	450*3mm	kg	89	Conversion Factor of Nairobi Region Market Survey
		22.77.109	Steel bollard	SGP. 5B. 125A	kg	100	Conversion Factor of Nairobi Region Market Survey
		22.77.110	Mesh wire	A142	m <sup>2</sup>	331	Conversion Factor of Nairobi Region Market Survey
		22.77.111	Cast iron manhole cover	600*450 heavy duty with frame	No.	22,062	2017 April market price
		22.78.101	Cypress	for fixed deck	m <sup>3</sup>	35,520	Conversion Factor of Nairobi Region Market Survey
		22.78.102	Wooden formwork panel		m <sup>2</sup>	1,057	2019 Nairobi market Price
		22.79.003	Road making paint yellow		litre	1,042	Conversion Factor of Nairobi Region Market Survey
		22.79.004	Road making paint white		litre	1,000	Conversion Factor of Nairobi Region Market Survey
		22.79.005	Thermoplastic paint yellow	premixed with primer and glass beads	Kg	351	Conversion Factor of Nairobi Region Market Survey
		22.79.006	Thermoplastic paint white	premixed with primer and glass beads	Kg	351	Conversion Factor of Nairobi Region Market Survey
		22.79.012	Reflective 'cat' eyes		No	933	Conversion Factor of Nairobi Region Market Survey
		22.79.013	Reflective mark posts	White PVC post 1400	No.	1,767	2017 April Market Price
		22.79.101	Road making paint black		litre	643	Conversion Factor of Nairobi Region Market Survey
		22.79.104	Reflective paint		litre	853	2017 Nairobi market price including a factor of 10% for transport
		22.79.105	White paint		litre	491	Conversion Factor of Nairobi Region Market Survey
		22.79.106	Black paint		litre	491	Conversion Factor of Nairobi Region Market Survey
		22.79.107	Road Kerb	12.25*24.5	No.	371	Conversion Factor of Nairobi Region Market Survey
		22.79.108	Road channel	9.8*12.25	No.	180	Conversion Factor of Nairobi Region Market Survey
		22.79.109	Duct Pipe (PVC150)		m	67	Conversion Factor of Nairobi Region Market Survey
		22.79.110	Equipment for lead pipe jacking	196kN	Day	30,000	2017 RA Price

No	Item	Code	Name	Type	Unit	Unit Rate 2019	Source 2019
3	Material	22.79.111	Equipment for lead pipe jacking (fixing part)		Day	1,250	2017 RA Price
		22.79.112	Equipment for lead pipe jacking (moving part)		m	100	2017 RA Price
		22.79.113	Equipment for Underground pipe jacking	196kN	Day	17,500	Conversion Factor of Nairobi Region Market Survey
		22.79.114	Equipment for Underground pipe jacking (fixing part)		Day	11,500	Conversion Factor of Nairobi Region Market Survey
		22.79.115	Equipment for Underground pipe jacking (moving part)		m	8,250	Conversion Factor of Nairobi Region Market Survey
		22.79.116	Water stopper		No.	1,470	Conversion Factor of Nairobi Region Market Survey
		22.79.117	Concrete anchor		No.	253	Conversion Factor of Nairobi Region Market Survey
		22.79.118	Water stop cement		Kg	133	Conversion Factor of Nairobi Region Market Survey
		22.79.119	Aggregation(jacking)		kg	9	Conversion Factor of Nairobi Region Market Survey
		22.79.120	Aggregation(washing)		kg	9	Conversion Factor of Nairobi Region Market Survey
		22.79.121	Shank-rod	90mm	No.	266,000	Conversion Factor of Nairobi Region Market Survey
		22.79.122	Driving-adapter		No.	1,420	Conversion Factor of Nairobi Region Market Survey
		22.79.123	drilling-pipe		No.	46,200	Conversion Factor of Nairobi Region Market Survey
		22.79.124	Ring-bit		No.	91,000	Conversion Factor of Nairobi Region Market Survey
		22.79.125	Water-swivel		No.	85,000	Conversion Factor of Nairobi Region Market Survey
		22.79.126	Cutter-set		No.	41,300	Conversion Factor of Nairobi Region Market Survey
		22.79.127	Core-tube		No.	41,700	Conversion Factor of Nairobi Region Market Survey
		22.79.128	Magnifying-bit		No.	452,000	Conversion Factor of Nairobi Region Market Survey
		22.79.129	Earth bar	10*1500mm	No.	252	Conversion Factor of Nairobi Region Market Survey
		22.79.130	Lighting pole	7.6m	No.	27,098	Conversion Factor of Nairobi Region Market Survey
		22.79.131	Lighting pole	10.0m	No.	28,080	Conversion Factor of Nairobi Region Market Survey
		22.79.132	Cable	for light	m	23	Conversion Factor of Nairobi Region Market Survey
		22.79.133	Accessories	for light	Set	3,332	Conversion Factor of Nairobi Region Market Survey
		22.79.134	Lamp		No.	10,053	Conversion Factor of Nairobi Region Market Survey
		22.79.135	Control panel		No.	10,782	Conversion Factor of Nairobi Region Market Survey
		22.79.136	Cable	for control panel	m	663	Conversion Factor of Nairobi Region Market Survey
		22.79.137	Accessories	for control panel	Set	31,365	Conversion Factor of Nairobi Region Market Survey
		22.79.138	Meter		No.	800	Conversion Factor of Nairobi Region Market Survey
		22.79.139	Grass		m <sup>2</sup>	22	Conversion Factor of Nairobi Region Market Survey

No	Item	Code	Name	Type	Unit	Unit Rate 2019	Source 2019
3	Material	22.79.140	Red soil		m <sup>3</sup>	696	Conversion Factor of Nairobi Region Market Survey
		22.79.141	Manure		m <sup>3</sup>	2,336	Conversion Factor of Nairobi Region Market Survey
		22.79.142	Warning triangular sign	600mm	No.	7,969	Conversion Factor of Nairobi Region Market Survey
		22.79.143	Priority triangular sign	600mm	No.	7,968	Conversion Factor of Nairobi Region Market Survey
		22.79.144	Standard informatory sign		No.	5,386	Conversion Factor of Nairobi Region Market Survey
		22.79.145	Non-standard informatory sign	less than 1m2	No.	23,918	Conversion Factor of Nairobi Region Market Survey
		22.79.150	Guardrail Beam	4m	No.	10,170	2019 Feb. Market Price
		22.79.151	Guardrail Post	140 mm dia, 6 gauge	m	109	2019 Feb. Market Price
		22.79.152	Bolts with nuts and washers (short)		No.	73	2019 Feb. Market Price
		22.79.153	Bolts with nuts and washers (long)		No.	275	2019 Feb. Market Price
		22.79.154	Fuel	Petrol	litre	100	2019 Feb. ERC Pump Price
		22.79.155	Pick up truck		day	7,000	MTD Hire Rate
		22.79.156	Truck	2 ton	day	7,000	MTD Hire Rate
		22.79.157	Thinner		litre	318	2019 Feb. Market Price
		22.79.158	Cement (OPC)		kg	20	2019 RA Price
		22.79.159	Pulveriser		Hour	6,250	2019 RA Price (Assumed same as Paver)
		22.79.160	Hessian cloth		m <sup>2</sup>	30.00	2019 RA Price
		22.79.161	K-160		litre	100	2019 RA Price
		22.79.162	Reflecting Glass Beads		kg	115	2019 Market Price
		22.79.163	Electricity		Kw/h	15	2019 Market Price
		22.79.164	Beam Straightener		Hour	10,000	2019 Quotation Price





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