

資料-7 U E B作成の配電用資機材及び  
保守用車輛の仕様書



## BACKGROUND TO DISTRIBUTION MATERIALS AND VEHICLES

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### 1. PURPOSE OF REPORT:

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This report gives the background to the distribution materials and vehicles indicated in the appendix 1 together with the purpose of each item. It outlines the benefit to the public if these materials are obtained and their impact on the Kampala City Network improvement.

### 2. DESCRIPTION OF ITEMS:

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The description and specifications of the items are found in appendix 1. These materials are required for system maintenance.

### 3. BACKGROUND TO THE REQUIREMENTS OF THESE ITEMS:

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#### 3.1.1. TRANSFORMER FUSES:

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The breakdown of the city infrastructure for the last twenty years has resulted into the following;

1. The previously well treated trees and fences growing into bushes.
2. The springing up of very many unplanned houses and structures in the city and its suburbs.
3. Over crowded residential houses.
4. Reduction in the provision of alternative cheap source of energy (e.g. charcoal, wood etc) to electrical energy.
5. Uncontrolled city population growth.
6. Poor housing and bad house installations.

As a result of the above reasons, transformer faults due to trees on the over head lines and poor house installations have increased; Overloads of transformers in the city have also increased. This results, at times in overloading the lines and as a result the wires clash. These faults end up blowing the LV fuses and at times the HV fuses. When the store is short of LV fuses solid copper wires are used instead and this leads to the HV fuses blowing. The rate at which they blow is summarised in the fault log book at the district radio room. From this summary the indicated annual requirement shown is worked out. The actual requirements are above that indicated. The number indicated is true simply because the fuses are not available in store therefore fuses are used annually. The Board however, has introduced measures worked out through an emergency city planning which is intended to reduce faults resulting from the above above cases.

In spite of the plan HV and LV are still required due to time lag between planning and implementation.

The Board has lost a number of 83 distribution transformers as a result of lack of either LV and HV fuses in Kampala City alone.

#### 3.1.2. HOUSE HOLD AND SMALL SCALE INDUSTRY FUSES:

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The housing installation and standards of the small scale industry installations are still in many cases not satisfactory. However, the Ministry of Energy introduced a body authorising contractors for such installation but the control on their work is still not adequate. So in order for the Board to protect its installations these lines are required in big numbers.

3.2. H.V. CABLES  
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The Kampala city underground network was installed in the fifties and sixties. The load during those days was relatively small but now it has grown as shown by the load curve for Queensway (see the relevant report). On the other hand the cables have grown old, need constant repairing and at times changing them completely. The predominating size of cable for Kampala City is the 70 sq mm copper.

3.3. GASKETS:  
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Cork sheets in the different sizes are required for transformers and other equipment. Carrying out preventive maintenance of transformer, changing oil and stopping oil leakages, gaskets are required in large quantities for Kampala since the city has about one thousand transformers.

3.4. ROTTEN POLES:  
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The city network system is over thirty years old. Wooden poles usually have a life time of about twenty five years. There are a number of rotten poles in the Kampala city. There are gangs created to replace these rotten poles. These gangs require ropes for erection of new poles lifting transformers etc. Stay wires and all associated equipments like preformed pole top make off, preformed wrap guy grips, and turn buckles are replaced with replacing an old pole and at times new ones put up where it is felt necessary.

3.5. IMPROVEMENT OF CONSUMER SERVICE AND RELIABILITY  
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The rate at which the number of consumers to the grid is increasing has resulted in existing distribution transformers in the city getting over loaded. Additional new transformers are required. To meet this increasing demand. To solve this problem, a transformer of higher capacity is required or an additional substation has to be commissioned after establishing the area's load centres.

One reason accounting for most faulty transformers is lightening. faulting is lightening. The area of Kampala in the month of August alone has about eighteen thunder storm days. This clearly shows the high risk of transformers being lit by lightening. Lightening surge arresters if available reduce this risk and improve on the reliability of consumers. Hence the need for surge arrestors.

3.6: VEHICLES:  
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The Kampala district office has a set up provided by the attached organisation chart. In order for the district to function properly it requires 22 4-wheel drives and 12 lorries. The current situation is as follows. The district manager has a vehicle which is in bad condition while his assistant has none. There are two district engineers (D.E) overhead and general. They have one vehicle and in poor condition. There are three section engineers each with an assistant. All of them have three 4 wheel drive which are in very very bad condition. The technical breakdown section has six faultsmen and would require 7 vehicles including their supervisor, three of which are down in the garage. Two are in good condition while one is in a poor shape and the other is in poor shape and the other is in reasonably satisfactory condition. In emergency breakdown section there should be two vehicles but one is in poor shape. The installation have one Suzuki which is not adequate for the volume of work. They require two more in order to cope up with the work load. The underground section has two vehicles currently and one has completely broken down. The overhead gang: The district has six gangs, which have had five lorries. Four of them are not moving. They would require an additional self loading lorry Meter reading: They require four vehicles. Currently they have two lorries and one landrover is in bad condition. The Commercial section has completely one. The Accounts have one vehicle but in poor condition. The sections having vehicles are indicated on the organisation chart. The work load at the district would necessitate new vehicles if rehabilitation is to be well completed in time.

4. BENEFIT TO THE PUBLIC:  
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4.1: Reliability:  
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With the provision of the distribution materials, the power reliability to the public will be very much improved. We expect to reduce the technical breakdown by 75% through changing of old poles and reduce the causes of transformer break down. Outage times will be very much reduced.

4.2: Economic benefits:  
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Many industries, like breweries were not producing enough products due to power failures, Uganda Waragi factory was losing a lot of money in unwanted end products after power breakdown. The cost incurred by buying standby/alternative supply due to excessive power failure frequency is enormous. With improved supply, there will be considerable reduction in consumers equipment which will get damaged and hence very few legal disputes.

4.3: Moral benefit:  
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The frequent power failures are very irritating to the public. They cause distress among the consumers. This is evidenced by the reports and comments published in local papers, but with improved services expected after the reception and implementation of these materials the distress, ill feeling and the irritation of the public will be minimised.

4.4: Environmental benefit:  
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If reliable power is made available to the Kampala residents the need for use of charcoal will be reduced hence reducing the environmental degradation caused by tree burning for producing charcoal.

Appendix 1

ITEM	DESCRIPTION	QUANTITY
* 1	JP FUSES 80A.....	10000
* 2	JP FUSES 160A.....	10000
* 3	JP FUSES 315A.....	10000
* 4	JP FUSES 400A.....	10000
* 5	HRC FUSES 60/80A.....	10000
* 6	INTERIOR CUT OUT 150A.....	500
* 7	INTERIOR CUT OUT 300A.....	500
* 8	60/80A SP HOUSE SERVICE CUT OUTS.....	5000
* 9	ELEMENTS SLOW BURNING 5A.....	500
* 10	ELEMENTS SLOW BURNING 15A.....	1200
* 11	ELEMENTS SLOW BURNING 25A.....	1200
* 12	70 SQ MM 11KV 3C PILC (OR XLPE) CU CABLE IN MTS .....	1000
13	CORK SHEET 1.2MX1.2MX3MM.....	100
14	CORK SHEET 1.2MX1.2MX6.4MM.....	100
15	CORK SHEET 1.2MX1.2MX1.6MM.....	100
16	MANILA ROPES 24 MM (88KG) IN COILS.....	10
17	MANILA ROPES 16 MM (42KG) IN COILS.....	10
18	MANILA ROPES 12 MM (23KG) IN COILS .....	10
19	PREFORMED PT MAKE OFF FOR 7/8 SWG STAY WIRE.....	1500
20	PREFORMED PT MAKE OFF FOR 7/12 SWG STAY WIRE.....	1500
21	PREFORMED WRAP GUY GRIPS FOR 7/8 SWG STAY WIRE.....	2500
22	PREFORMED WRAP GUY GRIPS FOR 7/12 SWG STAY WIRE.....	1000
23	TURN BUCKLES 10"X5/8" EYE EACH END.....	500
24	TURN BUCKLES 10"X3/4" EYE EACH END.....	500
* 25	SILCA GEL IN 25KG PACK.....	50
26	25 KVA SINGLE PHASE 11KV/LV.....	150
27	50 KVA THREE PHASE 11KV/LV.....	100
28	100 KVA THREE PHASE 11KV/LV.....	50
29	315 KVA THREE PHASE 33KV/LV.....	5
* 30	SURGE ARRESTORS 11KV.....	1200
* 31	SURGE ARRESTORS 33KV.....	900
32	AUTORECLOSURES 11KV.....	30

THESE ITEMS WERE LEFT OUT BUT ALSO EQUALLY REQUIRED.

ITEM	DESCRIPTION	QUANTITY
33	JP FUSES 100A.....	10000
34	JP FUSES 200A.....	10000
35	JP FUSES 250A.....	10000

VEHICLES REQUIRED.

ITEM	DESCRIPTION	QUANTITY
36	4 x 4 wheel drive .....	8
37	Self loading lorries.....	1
38	Street lighting lorry.....	1
39	Lorries.....	7
40	Spares for item 36, 37, 38 & 39 as one lot.....	1

SPECIFICATIONS OF SYSTEM MATERIALS

Item 1,2,3 & 4

J.P. Fuses.

- a) 80 amps
- b) 160 amps
- c) 200 amps
- d) 315 amps
- e) 400 amps

Item 5

HRC Fuses 60/80A. to be used with Item 8.

Item 6

150 Amp four pole interior cutouts (interior only) each comprising a three phase assemblies one neutral connector block, 3 moulded fuse carriers with phase deviding barriers (one similar to Lucy type MJW 3) would be preferred.

Item 7

300 Amp four pole interior cutouts (interior only) each comprising a three phase assemblies one neutral connector block, 3 moulded fuse carriers with phase deviding barriers.

Item 8

80A single pole fully insulated house service cut out complete with fuse holders, fuses and neutral block suitable for house service fuse link to BS 1361.

Item 9,10,11

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|------------------|-----------------|
| HV Fuse elements | Rating 5 Amps.  |
| HV Fuse elements | Rating 15 Amps. |
| HV Fuse elements | Rating 25 Amps. |
- Slow burning fuse element intended for use with drop out fuse isolator below:

Isolator 11 KV drop out expulsion fuse with size 2 insulator (R 70) complete with expulsion fuse tubes ,fittings and conductor clamps(including LEL pull down fuse isolators converted to drop out).The isolators to be designed for and supplied with 18"(455mm) tubes.

Item 12

HV (11kV ) 3 core PILC (or XLPE) Cu 70mmsq cable

Item 13

Cork Sheet 1.2M x 1.2M x 3MM  
Suitable for making gaskets.

Item 14

Cork Sheet 1.2M x 1.2M x 6.4MM  
Suitable for making gaskets.

Item 15

Cork Sheet 1.2M x 1.2M x 1.6MM  
Suitable for making gaskets.

PAGE 2

Items 16,17,& 18

a) Manilla rope 24mm diameter,three strand plain laid grade 2 to BS 2052/1977 with red and blue mark yarn interwoven with minimum breaking load of 4500 kg in coils of 88Kg.

b) Manilla rope 16mm diameter,three strand plain laid grade 2 to BS 2052/1977 with red and blue mark yarn interwoven with minimum breaking load of 3500 kg in coils of 42Kg.

c) Manilla rope 12mm diameter,three strand plain laid grade 2 to BS 2052/1977 with red and blue mark yarn interwoven with minimum breaking load of 2500 kg in coils of 23Kg.

Item 19

Preformed Pole top Make Off For stay wire 7/8 swg.

Item 20

Preformed Pole top Make Off For stay wire 7/12 swg.

Item 21

Preformed wrap Guy grips for 7/8 swg stay wire.

Item 22

Preformed wrap Guy grips for 7/12 swg s

Item 23

Turn Buckles 10"x 5/8" Eye each end.

Item 24

Turn Buckles 10"x 3/4" Eye each end.

Item 25

Silica Gel in 25Kg Pack.

To be used in transformer breather to eliminate moisture in the in coming air.

Item 26,27 & 28.

TRANSFORMERS

315KVA

200KVA

100KVA

50KVA

50 Hz, for pole mounting. vector group DYn 11 with off load tap changing Must have open bushings on both HV and LV sides ,completely filled with oil complying to BS 171/78 or IEC76. The voltage ratio is 11000/433 vol Tap change range from -5% to +5% in 2.5% increments.

Transformer 25 KVA....Single Phase.... 50 Hz, for pole mounting. With o Must have open bushings on both HV and LV sides ,completely filled with oil complying to BS 171/78 or IEC76.

Item 29

TRANSFORMERS

315KVA

As for items 35, 36 & 37 except for 33KV/lv.



Item 30

Surge arrester xca (Asea):

Rated at 10 KV, with nominal discharge current of 10KA, complete with mounting brackets suitable for Transformer mounting.

Surge arrester XBD 12 (Asea):

Rated at 10 KV, with nominal discharge current of 10KA, complete with mounting brackets suitable for Transformer mounting.

Item 31

Surge diverter type XBD 36 (ASEA) rated 36KV with normal discharge current of 10 KA complete with brackets suitable for mounting on distribution transformers.

Item 32

11kV, ESR 400Amps 6kA 3 phase Autoreclosure each with "ON BOARD" microprocessor and spare card SF6 insulated unit, nominal system voltage rms 14.4 kV similar to those supplied by Reyrolle Switch Gear, protection O/L plug setting 25-225 % in 25 % increment, E/F setting 1-9% in increment of one 1% time delay 0.25-60, sec. The unit should be filled with SF6 gas and carry line terminating clamp with single pole mounting brackets CT ratio 300/150/5A.

Item 33, 34 & 35.

As Item 1, 2, 3 & 4 except the ratings.

## V E H I C L E S

Item 36.

4 Wheel Drive General purpose vehicle. .e.g. Pajero, Land Cruiser etc. Spare parts as recommended by manufacturers upto 10% of ex-factory price for the vehicles.

*OR*  
Vehicles hard top cab 110" long wheel base with driving dampers diesel/petrol engine water cooled RHD with hard top body. Spare parts as recommended by manufacturers upto 10% of ex-factory price for land rovers.

Item 37.

Self Loading lorry 8-10 Ton

Self Loading with hydraulic lift capable of lifting loads of loads 3 tonne maximum.

Item 38.

Street Lighting Vehicles.

Intended for street lighting repairs capable of lifting a person to height of 25 feet - 35 feet. Spare parts as recommended by manufacturers up to 10 1/2% of ex factory price for lorries.

Item 39.

Lorries 7 to 9 tons with winches load capacity 70-100KW, support body of 4.5 M3 capacity. Diesel engine water cooled RHD. Spare parts as recommended by manufacturers up to 10 1/2% of ex factory price for 3 lorries.

Item 40

Spares for item 36, 37, 38 & 39. A - 57



資料一 8 カントリーデータ



## 1. 基礎指標

① ウガンダ共和国 首都カンパラ市

② 国土・人口 面積：197,000 km<sup>2</sup>  
人口：17,214,000人（1990年政府推計）  
人口密度：87人/km<sup>2</sup>（同上）  
人口増加率：2.7%/年（1980年国勢調査）

③ 政 体 政党は解散され国民抵抗会議（NRC）が支配をつづける。  
（1962年10月9日イギリス連邦内の連邦王国として独立）  
元首：ヨウェリ・ムセベニ大統領（1986年就任）

④ 宗 教 国民の60%以上がキリスト教徒、約5%がイスラム教徒、残りは伝統的諸信仰。

⑤ 言 語 スワヒリ語、英語が公用語。主要部族語はパガンダ、ランゴ、カラモジョ、ルグバラ語。

⑥ 民 族 バンツール族、ナイロティック族、ナイロ・ハミティ族の他、少数の白人、インド人がいる。

⑦ 教 育 学齡児の就学率は54%（1980年）とされている。

⑧ 通 貨 1ドル=522 シリング（1990年2月現在）

⑨ 地理・国土 雨季は3～5月（大雨期）と9～11月（小雨期）の2回ある。雨季には激しい雷鳴がとどろく。

⑩ 地 勢 「ウ」国は、東アフリカの赤道直下に位置する内陸国で、インド洋から約800 km離れている。東はケニア、南はタンザニア及びルワンダ、西はザイール、そして北はスーダンの5ヶ国と国境を接している。同国は、世界第3位の広さを持つヴィクトリア湖を有する。ヴィクトリア湖の水面を除いた国土の84%は、標高900～1,500 mの高原で、中心地へ向ったゆるやかな下方向への傾斜はキョガ湖を形成している。

標高900m未満の地域が西部アフリカ地溝帯の東側にあり、国土の9%を占める。

緯度・経度 南緯 2 度～北緯 4 度，東経 28 度～35 度

国名の由来 4 つあった古王国のうち 14 世紀に設立した最も古いブンヨロと、その後のアンコレ、トロをも凌ぐ広い地域を支配したブガンダ古王国の名による。「ブ」とか「バ」はバンツ語で複数を示す接頭語で、国民の多くは「ユガンダ」と発音している。

## 2. 社会・経済指標

- ① 国内総生産 (GDP) 約 8 億 3, 800 万ドル  
(1989 年度, MPED BACKGROUND TO THE BUDGET 1990-1991, 為替レートは 1 ドル=370 シリングとした)
- ② 一人当りの GNP 約 356 フル (1987 年時点 (財) 国際協力推進協会 APIC 1989 MAY)
- ③ 産業構成 主要産業は農業であり、コーヒー、綿花、茶を生産している。また若干の銅を産出する。

各産業分野別の GDP 割合 (1989 年度)

産業分野	GDP に対する割合 (%)
農業・水産業	50.4
政府	13.9
商業	8.4
サービス業	6.4
運輸・通信	3.6
製造業	3.5
その他	13.8
(計)	(100)

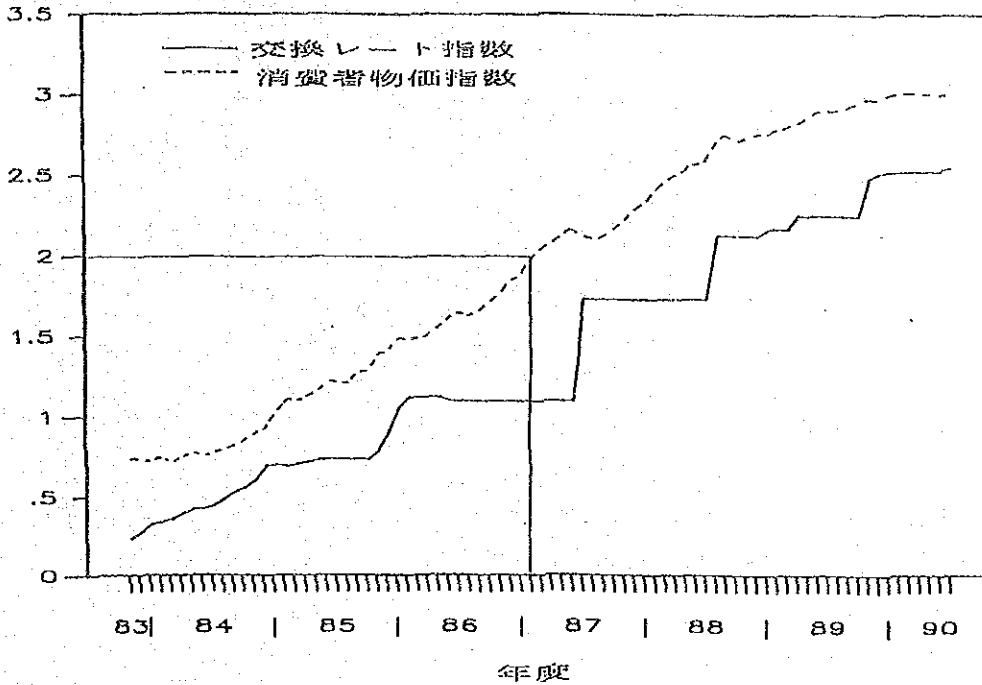
(出所: APIC 1989 MAY)

④ 交換レートと消費者物価指数

交換レートと消費者物価指数 , 1983 - 1990

1987年1月の消費者物価指数を基準とした

交換レート・消費者物価指数（対数表示）



(出所: MPED, BACKGROUND TO THE BUDGET 1990-1991)

⑤ 財政収支

(単位: 10億シリング)

項目		1983年	1984年	1985年	1986年
経常	歳入	93	162	285	553
	歳出	70	157	352	566
投資		13	35	121	484
総合収支		△ 18	△ 70	△ 137	△ 424
調達	国内	23	54	94	406
	国外	3	10	43	18

(出所: APIC 1989 MAY)

### 3. その他

#### ① 国内の休日

(1990年)

Ney Years Day	-- 1月1日
NRM Victory	-- 1月26日
Good Friday	-- 3月29日
Easter Sunday	-- 3月31日
Easter Monday	-- 4月1日
Labour Day	-- 5月1日
Hero's Day	-- 6月9日
Independence Day	-- 10月9日
Christmas Day	-- 12月25日
Boxing Day	-- 12月26日

#### ② オフィスタイム

8:30~16:45

昼食 12:45~14:00

土・日曜は休日



資料－９ 「ウ」国負担工事費の内訳



## 「ウ」国負担工事費の内訳

「ウ」国側負担工事費の内訳は、以下のとおりである。

### 1. 第1期工事

#### 1-1 クイーンズウェイ変電所地内の既設所内用変圧器及び母線の撤去移設費

(1) 電工	4名×10日×3.9 US\$/日=	156 US\$
(2) 人夫	2名×10日×2.3 US\$/日=	46 US\$
(3) 撤去用重機 (50ton クレーン)	1台×5日×800 US\$/日=	4,000 US\$
	(小計)	4,202 US\$

#### 1-2 建設用地の整地工事費

(1) 掘削工事		
クイーンズウェイ変電所分 (16W×20.2L×0.2H)	64m <sup>3</sup> ×2.5 US\$/m <sup>3</sup> =	160 US\$
モーター・マート開閉所分 (10W×13L×0.2H)	26m <sup>3</sup> ×2.5 US\$/m <sup>3</sup> =	65 US\$
(2) 盛土工事		
クイーンズウェイ変電所分 (18W×22L×1.7H)	673m <sup>3</sup> ×2.42US\$/m <sup>3</sup> =	1,628 US\$
モーター・マート開閉所分 (10W×13L×0.2H)	26m <sup>3</sup> ×2.42US\$/m <sup>3</sup> =	62 US\$
(3) 整地・転圧工事		
クイーンズウェイ変電所分 (16W×20.2L)	450m <sup>2</sup> ×0.65US\$/d×5層=	1,462 US\$
モーター・マート開閉所分 (10W×13L)	130m <sup>2</sup> ×0.65US\$/d=	84 US\$
	(小計)	3,461 US\$

#### 1-3 既設送電線・配電線との接続工事費

(1) 33kV送電線分 電工	6ヶ所×2名×3日×3.9 US\$/日=	140 US\$
(2) 11kV配電線分 電工	16ヶ所×2名×2日×3.9 US\$/日=	249 US\$
(3) 共通 人夫	4名×10日×2.3 US\$/日=	92 US\$
	(小計)	481 US\$

#### 1-4 既設変圧器と既設33kV送電線間の仮設ケーブルによる切廻し工事費

(1) 電工	12ヶ所×2名×3日×3.9 US\$/日=	280 US\$
(2) 人夫	4名×10日×2.3 US\$/日=	92 US\$
	(小計)	372 US\$

#### 1-5 OJT受講訓練要員費

(1) 電工	10名×1ヶ月×78 US\$/月=	780 US\$
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[第1期工事 合計 9,296 US\$]

### 2. 第2期工事（「ウ」国側負担工事なし）

JICA