REPÚBLICA POPULAR DE MOÇAMBIQUE

Gabinete do Secretário de Estado do Carvão e Hidrocarbonetos

CPRM · MT-GEIPOT · COBRAPI

Mucanha-Vuzi Coal Development Program

Chapter 9 – Study of Outflow Alternatives

Contract

Gabinete do Secretário de Estado do Carvão e Hidrocarbonetos
Companhia de Pesquisa de Recursos Minerais - CPRM

Financing

OPEC - Fund for International Development
Banco do Brasil SA

General Coordination and Execution

Companhia de Pesquisa de Recursos Minerais - CPRM

Subcontracted Agencies

Empresa Brasileira de Planejamento de Transportes - GEIPOT
Study of Outflow Alternatives
Companhia Brasileira de Projetos Industriais - COBRAPI
Study of Technical and Economic Feasibility

A P P E N D I X 9 . I I

I N D E X

APPENDIX 9.II-A

INVESTMENT COSTS

9.II-1 INVESTMENTS ON CIVIL WORKS

TABLE-9.II.1.1 - LOADING TERMINAL AT BOHOZI

ITEM	DISCRIMINATION	UNIT	QUANTITY	UNITARY PRICE	PRICES IN US$ 1,000 - JUL/82	
					PARTIAL	TOTAL
	CIVIL WORKS					
	1st and 2nd phases					
1.1	Mobilization.....				330	330
1.2	Berthing facilities.....					
	Floating pontoon for barges.....		1	1,920	1,920	
	Semi-floating bridge.....		3	135	405	
	Middle floating pontoon.....		3	165	495	2,820
1.3	Dredging.....	m^3	20,000	0,010	200	200
1.4	Earthfill for access bridge.....	m^3	140,000	0,006	840	
	Rockfill for access bridge.....	m^3	10,000	0,016	160	1,000
1.5	Foundations for belt conveyor systems	vb	-	-	400	400
1.6	Buildings,Water suply,sewage, road					
	access and civil works for electrical					
	installations.....	vb	-	-	300	300
	TOTAL				5,050	5,050
	3rd phase					
2.1	Mobilization.....				140	140

TABLE-9.II.1.1-LOADING TERMINAL AT BOHOZI

(Cont.)

ITEM	DISCRIMINATION	UNIT	QUANTITY	UNITARY PRICE	PRICES IN US$ 1,000 - JUL/82	
					PARTIAL	TOTAL
2.2	Second floating pontoon for barges		1	1,920	1,920	
2.3	Enlarging of electrical installation civil works.....	vb	-	-	100	
	TOTAL					2,160

TABLE-9.II.1.2- RESERVOIR TRANSPORTATION - PUSHER, BARGES AND NAVIGATION AIDS

ITEM	DISCRIMINATION	UNIT	QUANTITY	UNITARY PRICE	PRICES IN US$ 1,000 - JUL/82	
					PARTIAL	TOTAL
	1 st phase					
1.1	2000 HP pusher.....	-	2	3,000	6,000	
1.2	2200 tons barges.....	-	4	1,200	4,800	
1.3	Navigation aids	vb	-	-	1,500	
	TOTAL					12,300
	2 nd second phase					
2.1	2000 HP tons. pusher.....	-	2	3,000	6,000	
2.2	2000 tons.barges.....	-	8	1,200	9,600	
	TOTAL.....					15,600
	3rd phase					
3.1	2000 HP pusher.....	-	2	3,000	6,000	
3.2	2200 tons barge.....	-	8	1,200	9,600	
	TOTAL					15,600

TABLE-9.II.1.3- UNLOADING TERMINAL AT NHANCAPIRIRÈ

ITEM	DISCRIMINATION	UNIT	QUANTITY	UNITARY PRICE	PRICES IN US$ 1,000 - JUL/82	
					PARTIAL	TOTAL
	Civil Works					
	1st and second phases					
1.1	Mobilization.....				663	663
1.2	Berthing facilities					
	Floating pontoon for barges.....		1	2,160	2,160	
	Semi-floating access bridge.....		3	135	405	
	Middle floating pontoon.....		3	105	495	3,060
1.3	Dredging.....	m^3	170,000	0,010	1,700	1,700
1.4	Access bridge earthfill.....	m^3	50,000	0,006	300	
	Access bridge rockfill.....	m^3	8,000	0,016	128	428
1.5	Foundations for belt conveyors.....	vb	-	-	500	500
1.6	Earth movement in stockyard.....	m^3	300,000	0,0023	690	690
					sewage road access	
1.7	Buildings, water supply					
	and civil works for electrical installations					
		vb	-	-	600	600
1.8	Transmission line in high tension	km	25	100	2,500	2,500
	Total.....					10,141

TABLE-9.II.1.3-UNLOADING TERMINAL AT NHANCAPIRIRE

(cont.)

ITEM	DISCRIMINATION	UNIT	QUANTITY	UNITARY PRICE	PRICES IN US$ 1,000 - JUL/82	
					PARTIAL	TOTAL
	3rd phase					
2.1	Mobilization.....	vb			160	
2.2	Second ploating pontoon for bridges.		1	2,160	2,160	
2.3	Enlarging of the civil works for electrical installations	vb	-	-	100	
	TOTAL.....					2,420

TABLE-9.II.1.4- RIVER LOADING TERMINAL AT TETE

ITEM	DISCRIMINATION	UNIT	QUANTITY	UNITARY PRICE	PRICES IN US$ 1,000 - JUL/82	
					PARTIAL	TOTAL
	CIVIL WORKS					
	1st phase					
1.1	Mobilization.....	vb	-	-	750	750
1.2	Berthing facilities					
	First berth for barges.....	vb	-	-	1,800	
	Access bridge.....				300	2,100
1.3	Earthfill-stockyard and bridge access	m^3	400,000	0.006	2,400	2,400
1.4	Rail connection.....	m	3,000	0.50	1,500	1,500
1.5	Equipments foundation.....	vb	-	-	1,500	1,500
1.6	Car reception hopper.....	vb	-	-	1,600	1,600
1.7	Buildings, water supply, sewage access road and civil works for electrical installations.	vb			500	500
1.8	Transmission line	km	10	0.1	1,000	1,000
	Total					11,350

TABLE-9.II.1.4- RIVER LOADING TERMINAL AT TETE

(cont.)

ITEM	DISCRIMINATION	UNIT	QUANTITY	UNITARY PRICE	PRICES IN US$ 1,000 - JUL/82	
					PARTIAL	TOTAL
	2nd. phase					
2.1	Mobilization.....	vb	-	-	260	
2.2	2nd berth for barges.....	vb	-	-	1,800	
2.3	Enlarging of earthfill for stockyard.....	m^3	150,000	0,006	900	
2.4	Enlarging of rail connection.....	m	1,000	0,50	500	
2.5	Equipments foundations.....	vb	-	-	300	
2.6	Expantion of civil works for electrical installations and draining system.....	vb	-	-	200	
	TOTAL					3,960
	3rd. phase					
3.1	Mobilization.....	vb	-	-	200	
3.2	3rd berth for barges.....	vb	-	-	1,800	
3.3	Enlarging of earthfill for stockyard.....	m^3	150,000	0,006	900	

TABLE- 9.II.1.4- RIVER LOADING TERMINAL AT TETE

(cont.)

ITEM	DISCRIMINATION	UNIT	QUANTITY	UNITARY PRICE	PRICES IN US$ 1,000 - JUL/82	
					PARTIAL	TOTAL
3.4	Equipments foundations.....	vb	-	-	300	
3.5	Enlarging of civil works for electrical installation and draining.....	vb	-	-	200	
	TOTAL					3,400

TABLE-9.II.1.5- RIVER TRANSPORTATION - PUSHERS, BARGES, NAVIGATION AIDS AND IMPROVEMENT OF WATER WAYS

ITEM	DISCRIMINATION	UNIT	QUANTITY	UNITARY PRICE	PRICES IN US$ 1,000 - JUL/82	
					PARTIAL	TOTAL
	1st phase					
1.1	2500 HP pusher.....	-	8	3,000	24,000	24,000
1.2	1500 ton barges.....	-	42	1,000	42,000	42,000
1.3	Protection works, straightening and improvements of water way					
1.3.1	Dredging.....	m^3	4,500,000	0,003	13,500	
1.3.2	Protection works a - jetties	mL	400,000	0,034	13,600	
	b - rockfill bridges	m^3	300,000	0,060	18,000	
1.3.3	Navigation aids.....	vb	-	-	3,000	
1.3.4	Support installations to navigation	vb	-	-	2,000	50,100
	TOTAL.....					116,100
	2nd phase					
1.1	2500 HP pusher.....	-	5	3,000	15,000	15,000
1.2	1500 ton barges.....	-	30	1,000	30,000	30,000
	TOTAL.....					45,000

TABLE 9.II.1.5 -RIVER TRANSPORTATION - PUSHER, BARGE NAVEGATION AIDS

(cont.)

ITEM	DISCRIMINATION	UNIT	QUANTITY	UNITARY PRICE	PRICES IN US$ 1,000 - JUL/32	
					PARTIAL	TOTAL
	3rd Phase					
1.1	2500 HP pusher.....	-	8	3,000	24,000	21,000
1.2	1500 tons barges.....	-	48	1,000	48,000	48,000
	Total.....					72,000

TABLE-9.II.1.6 - UNLOADING TERMINAL AT CHINDE

ITEM	DISCRIMINATION	UNIT	QUANTITY	UNITARY PRICE	PRICES IN US$ 1,000 - JUL/82	
					PARTIAL	TOTAL
	Civil works					
	1.st phase					
1.1	Mobilization				200	200
1.2	Berthing facilities - 1.st berth.....	vb	-	-	2,000	
	Access bridge.....	vb	-	-	300	2,300
1.3	Foundations for the belt conveyors system...	vb	-	-	100	100
1.4	Civil works for electricity and draining....	vb	-	-	100	100
	TOTAL					2,700
	2.nd phase					
2.1	Mobilization.....	vb	-	-	150	
2.2	2.nd barge berth.....	vb	-	-	2,000	
2.3	General support works.....	vb	-	-	100	
	TOTAL					2,250

TABLE- 9.II.1.6 - UNLOADING TERMINAL AT CHINDE

(cont.)

ITEM	DISCRIMINATION	UNIT	QUANTITY	UNITARY PRICE	PRICES IN US$ 1,000 - JUL/32	
					PARTIAL	TOTAL
	3rd. phase					
2.1	Mobilization.....	vb	-	-	150	
2.2	3rd. berth for barges.....	vb	-	-	2,000	
2.3	General support works.....	vb	-	-	100	
	TOTAL					2,250

TABLE- 9.II.1.7 - SEA TERMINAL AT CHINDE (LOADING)

ITEM	DISCRIMINATION	UNIT	QUANTITY	UNITARY PRICE	PRICES IN US$ 1,000 - JUL/82	
					PARTIAL	TOTAL
	CIVIL WORKS					
	1.st phase					
1.1	Mobilization.....	vb	-	-	11,000	11,000
1.2	Berthing facilities					
	Piers	m	270	55,0	14,850	
	Access bridge - a - jetties.....	m	16,000	7,5	120,000	
	b - rockfill bridges.....	m	75	17,5	1,320	
	Dolphins and walkways	vb	-	-	1,500	137,670
1.3	Earthfill of stockyard and access					
	bridge;earth	m^3	600,00	0,006	3,600	
	rock	m^3	100,000	0,016	1,600	5,200
1.4	Equipments foundation.....	vb	-	-	2,000	2,000
1.5	Building, water supply, sewage,access					
	road and civil works for electrical					
	installations	vb	-	-	4,000	4,000
1.6	High tension transmission line.....	km	90	0,100	9,000	9,000
	Total.....					168,810

TABLE-9.II.1.7 - SEA TERMINAL AT CHINDE (LOADING)

(cont.)

ITEM	DISCRIMINATION	UNIT	QUANTITY	UNITARY PRICE	PRICES IN US$ 1,000 - JUL/82	
					PARTIAL	TOTAL
	2nd STAGE					
2.1	Earthwork - Stockyard enlargement.....	m^3	200,000	0.006	1,200	
2.2	Equipment foundations.....	vb	-	-	500	
2.3	Enlargement of civil works electrical installations and drainage	vb	-	-	500	
	Total.....					2,200
	3rd STAGE					
3.1	Mobilization	vb	-	-	1,200	1,200
3.2	Docking pier - 2nd berth	m	270	50	13,500	
	- Dolphin and bridge...	vb			1,300	14,800
3.3	Earthwork - eulargement of stockyards....	m^3	200,000	0.006	1,200	1,200
3.4	Equipment foundations	vb	-	-	500	500
3.5	Enlargement of civil works,electrical installations and drainage	vb	-	-	500	500
	T o t a l.....					18,200

TABLE- 9.II.1.8 - SEA TERMINAL - BEIRA ESTUARY ALTERNATIVE

ITEM	DISCRIMINATION	UNIT	QUANTITY	UNITARY PRICE	PRICES IN US$ 1,000 - JUL/82	
					PARTIAL	TOTAL
	Civil works					
	1st stage					
1.1	Mobilization.....	vb	-	-	1,800	1,800
1.2	Docking installation					
	Docking pier.....	m	250	44.0	11,000	
	Access bridge (E-W).....	m	100	6,0	600	
	Access bridge (N-S).....	m	75	14,0	1,050	
	Dolphin and bridge.....	vb	-	-	1,200	13,850
1.3	Earthwork					
	Stockward and access bridge.....	m^3	600,000	0.006	3,600	3,600
1.4	Rail access (infrast. and superst.).....	m	3,000	0,50	1,500	1,500
1.5	Equipment foundation.....	vb	-	-	2,500	2,500
1.6	Wagon reception hopper.....	vb	-	-	1,600	1,600
1.7	Buildings, auxiliar installations, drainage, water, sewage, road access, civil works, electrical installations.....	vb			3,000	3,000
	TOTAL.....					27,850

TABLE-9.II.1.8 - SEA TERMINAL - BEIRA ESTUARY ALTERNATIVE

(cont.)

ITEM	DISCRIMINATION	UNIT	QUANTITY	UNITARY PRICE	PRICES IN US$ 1,000 - JUL/82	
					PARTIAL	TOTAL
	2nd. stage					
2.1	Earthwork - enlargement of stockyard.....	m^3	200,000	0,006	1,200	1,200
2.2	Rail access - enlargement.....	m	1,000	0,50	500	500
2.3	Equipment foundations.....	vb	-	-	500	500
2.4	Extention of civil works, electrical instal					
	lations and drainage.....	vb	-	-	500	500
	TOTAL.....					2,700
	3rd stage.					
3.1	Mobilization.....	vb	-	-	1,000	1,000
3.2	Docking pier - 2nd Berth.....	m	250	44	11,000	
	Dolphin and bridge.....	vb	-	-	600	11,600
3.3	Earthwork - enlargement of stockyard.....	m^3	200,000	0,006	1,200	1,200
3.4	Foundations for equipment.....	vb	-	-	500	500
3.5	Enlargement of civil works, electrical ins-					
	tallations and drainage.....	vb	-	-	500	500
	TOTAL.....					14,800

TABLE 9.II.1.9 - SEA TERMINAL - BEIRA ESTUARY ALTERNATIVE

ITEM	DISCRIMINATION	UNIT	QUANTITY	UNITARY PRICE	PRICES IN US$ 1,000 - JUL/82	
					PARTIAL	TOTAL
	Dredging, signalling and buoys					
	1.st stage					
1.1	Mobilization and drag transportation.....	mos	2	1,000	2,000	
1.2	Dredging.....	m^3	27,000,000	0.0015	40,500	
1.3	Signalling and buoys.....	vb	-	-	1,500	44,000
	2.nd stage					
2.1	Dredging.....	m^3	15,000,000	0.0015	22,500	22,500
	3.rd stage					
3.1	Dredging.....	m^3	17,000,000	0.0015	25,500	25,500
	There are not other mobilization because it is assumed that the drags are keeped at the port for channel maintenance					

TABLE-9.II.1.10 - SEA TERMINAL - NACALA ALTERNATIVE

ITEM	DISCRIMINATION	UNIT	QUANTITY	UNITARY PRICE	PRICES IN US$ 1,000 - JUL/82	
					PARTIAL	TOTAL
	Civil works					
	1st stage					
1.1	Mobilization	vb			2,100	2,100
1.2	Docking installations					
	Docking pier	m	270	40.0	10,800	
	Access bridge- a)jetties	m	400	5.5	2,200	
	b) rockfill bridges	m	75	12.0	900	
	Dolphin and walkway	vb			1,100	15,000
1.3	Earthwork for stockyard regularization and access to bridge - earth	m^3	600,000	0.006	3,600	
	- rock	m^3	100,000	0.0016	1,600	5,200
1.4	Rail access	m	3,000	0.50	1,500	1,500
1.5	Equipment foundations	vb	-	-	2,000	2,000
1.6	Wagon reception hopper	vb	-	-	1,600	1,600
1.7	Buildings, auxiliary installations, drainage, water, sewage, road access, civil works, electrical installations	vb	-	-	3,500	3,500

TABLE- 9.II.1.10- SEA TERMINAL - NACALA ALTERNATIVE

(cont.)

ITEM	DISCRIMINATION	UNIT	QUANTITY	UNITARY PRICE	PRICES IN US$ 1,000 - JUL/82	
					PARTIAL	TOTAL
1.8	High tension transmission line.....	km	15		1,500	1,500
	TOTAL.....					32,400
	2.nd stage					
2.1	Earthwork - enlargement of stockyard.....	m^3	200,000	0.006	1,200	1,200
2.2	Rail access - enlargement.....	m	1,000	0.50	500	500
2.3	Equipment foundations.....	vb	-	-	500	500
2.4	Civil work enlargement, electrical installations and drainage.....	vb	-	-	500	500
	TOTAL.....					2,700
	3.rd stage					
3.1	Mobilization.....	vb	-	-	1,000	1,000
3.2	Docking pier 2.nd berth.....	m	270	40.0	10,800	
	Dolphin and sidewalk.....	vb	-	-	1,100	11,900
3.3	Earthwork - enlargement of stockyard.....	m^3	200,000	0.006	1,200	1,200

TABLE-9.II.1.10 - SEA TERMINAL - NACALA ALTERNATIVE

(cont.)

ITEM	DISCRIMINATION	UNIT	QUANTITY	UNITARY PRICE	PRICES IN US$ 1,000 - JUL/82	
					PARTIAL	TOTAL
3.4	Equipment foundations.....	vb	-	-	500	500
3.5	Civil works enlargement, electrical installations, drainage.....	vb	-	-	500	500
	TOTAL.....					15,100

9.II-2 INVESTMENT ON EQUIPMENTS

TABLE-9.II.2.1 - LOAD LAKE TERMINAL IN BOHOZI

ITEM	DISCRIMINATION	UNIT	QUANTITY	UNITARY PRICE	PRICES IN US$ 1,000 - JUL/82	
					PARTIAL	TOTAL
	EQUIPMENTS					
	1st and 2nd phase					
	Belt conveyor 36" - 205m			198		
	Belt onveyor 54" - 2.250 m			3,150		
	Transfer tower			270		
	Barge loader			1,020		
	Auxiliares equipments			68		
	Mobiles equipments.....			129		
	Electricals equipments.....			490		
	Total of equipments				5,325	
	Transport				530	
	Erection				1,060	
	TOTAL					6,915

TABLE - 9.II.2.1-LOAD LAKE TERMINAL IN BOHOZI

(cont.)

ITEM	DISCRIMINATION	UNIT	QUANTITY	UNITARY PRICE	PRICES IN US$ 1,000 - JUL/82	
					PARTIAL	TOTAL
	3rd phase					
	Belt conveyor 36" - 305m.....			294		
	Transfer tower			330		
	Barge loader.....			1,020		
	Electricals equipments.....			165		
	Total of equipments				1,809	
	Transport				180	
	Erection				360	
	TOTAL					2,349

TABLE-9.II.2.2- UNLOAD LAKE TERMINAL OF NHANCAPIRIRE

ITEM	DISCRIMINATION	UNIT	QUANTITY	UNITARY PRICE	PRICES IN US$ 1,000 - JUL/82	
					PARTIAL	TOTAL
	EQUIPMENTS					
	1st and 2nd PHASE					
	Belt conveyor 42" - 1.585m.....			1,780		
	Transfer tower.....			400		
	Barge loader.....			3,700		
	Stacker (2).....			2,280		
	Auxiliaries equipments.....			47		
	Mobiles equipments.....			1,159		
	Electricals equipments.....			1,405		
	Total of equipments.....				10,771	
	Transport.....				1,100	
	Erection.....				2,200	
	Total.....					14,071

TABLE-9.II.2.2 - UNLOAD LAKE TERMINAL OF NHANCAPIRIRE

(cont.)

ITEM	DISCRIMINATION	UNIT	QUANTITY	UNITARY PRICE	PRICES IN US$ 1,000 - JUL/82	
					PARTIAL	TOTAL
	3rd phase					
	Belt conveyor - 42" - 1.685 m			1,890		
	Transfer tower			320		
	Barge loader			3,700		
	Auxiliaries equipments			47		
	Electricals equipments			600		
	Total of equipments				6,557	
	Transport				660	
	Erection				1,320	
	TOTAL					8,537

TABLE-9.II.2.3 - RIVER TERMINAL IN TETE

ITEM	DISCRIMINATION	UNIT	QUANTITY	UNITARY PRICE	PRICES IN US$ 1,000 - JUL/82	
					PARTIAL	TOTAL
	Equipments					
	1.st phase					
	Belt conveyor - 36" - 400 m.....			381		
	Belt conveyor - 60" - 2445 m.....			3,717		
	Transfer tower.....			290		
	Belt feeder.....			270		
	Stacker.....			2,900		
	Barge loader.....			1,020		
	Auxiliaries equipments.....			116		
	Mobiles equipments.....			1,343		
	Electricals equipments.....			1,500		
	Total of equipments.....				11,265	
	Transport.....				1,150	
	Erection.....				2,300	
	TOTAL.....				14,717	

TABLE-9.II.2.3 - RIVER TERMINAL IN TETE

(cont.)

ITEM	DISCRIMINATION	UNIT	QUANTITY	UNITARY PRICE	PRICES IN US$ 1,000 - JUL/82	
					PARTIAL	TOTAL
	2nd phase					
	Belt conveyor - 36" - 500m.....			477		
	Barges loader.....			1,020		
	Reclaimers (2).....			8,000		
	Electrical equipments.....			950		
	Total of equipments.....				10,447	
	Transport.....				1,050	
	Assemble.....				2,100	
	TOTAL.....					13,597
	3rd phase					
	Belt conveyors - 36" - 600m.....			573		
	Belt conveyors - 60" - 740m.....			1,125		
	Barges loader			1,020		
	Stacker.....			2,900		
	Electrical equipments.....			600		
	Total of equipments.....				6,218	
	Transport.....				650	
	Erection.....				1,300	
	TOTAL.....					8,168

TABLE-9.II.2.4 - RIVER TERMINAL OF CHINDE (RECEPTION BY BARGE)

ITEM	DISCRIMINATION	UNIT	QUANTITY	UNITARY PRICE	PRICES IN US$ 1,000 - JUL/82	
					PARTIAL	TOTAL
	Equipments - 1st phase					
	Belt feeder.....			270		
	Belt conveyor - 42" - 100			112		
	Belt conveyor - 60" - 18670m.....			25,845		
	Belt conveyor - 70" - 1570m.....			2,865		
	Transfer tower.....			720		
	Slewing stacker.....			2,900		
	Unloader barge.....			3,700		
	Shiploader.....			4,200		
	Auxiliaries equipments.....			198		
	Mobile equipments.....			1,343		
	Sampling station.....			232		
	Electrical equipments.....			6,400		
	Total of equipments.....				48,965	
	Transport.....				4,900	
	Erection.....				9,800	
	TOTAL.....					63,665

TABLE-9.II.2.4-RIVER TERMINAL IN CHINDE (RECEIVING BY BARGES)

(cont.)

ITEM	DISCRIMINATION	UNIT	QUANTITY	UNITARY PRICE	PRICES IN US$ 1,000 - JUL/82	
					PARTIAL	TOTAL
	2nd PHASE					
	Bucket wheel reclaimer.....			10,700		
	Belt conveyor 42" - 200m.....			224		
	Unloader Barge.....			3,700		
	Eletrical equipments.....			1,460		
	Total of equipments.....				16,084	
	Transport.....				1,610	
	Erection.....				3,220	
	Total.....					20,914
	3rd PHASE					
	Belt conveyor 42" - 300m.....			112		
	Belt conveyor - 60" - 16.600m.....			22,802		
	Belt conveyor - 72" - 1.140m.....			2,080		
	Slewing stacker.....			2,900		
	Transfer tower.....			220		
	Unloader Barges.....			3,700		
	Shiploader.....			4,200		
	Electrical equipments.....			3,914		

Cont.

TABLE-9.II.2.4 - RIVER TERMINAL IN CHINDE (RECEIVING BY BARGE)

(cont.)

ITEM	DISCRIMINATION	UNIT	QUANTITY	UNITARY PRICE	PRICES IN US$ 1,000 - JUL/82	
					PARTIAL	TOTAL
	Total of equipments.....				39,928	
	Transport.....				4,000	
	Erection.....				8,000	
	TOTAL.....				51,928	

TABLE-9.II.2.5 - MARINE TERMINAL - BEIRA ESTUARY ALTERNATIVE

(Cont.)

ITEM	DISCRIMINATION	UNIT	QUANTITY	UNITARY PRICE	PRICES IN US$ 1,000 - JUL/82	
					PARTIAL	TOTAL
	Equipments - 1.st phase					
	Belt feeder			270		
	Belt conveyor - 60" - 7.530 m			11,447		
	Transfer tower			720		
	Slewing stacker			2,250		
	Auxiliaries equipments			176		
	Mobile equipments			1,821		
	Sampling station			232		
	Ship loader			4,400		
	Electrical equipments			3,200		
	Total of equipments				24,516	
	Transport				2,450	
	Erection				4,900	
	TOTAL					31,866
	Equipments - 2.nd phase					
	Bucket wheel reclaimer			10,700		
	Electrical equipments			1,100		
	Total of equipments				11,800	
	Transport				1,200	
	Erection				2,400	
	TOTAL					15,300

TABLE-9.II.2.5 - MARINE TERMINAL - BEIRA ESTUARY ALTERNATIVE

(cont.)

ITEM	DISCRIMINATION	UNIT	QUANTITY	UNITARY PRICE	PRICES IN US$ 1,000 - JUL/82	
					PARTIAL	TOTAL
	Equipments - 3rd phase :					
	Belt conveyor - 60" - 4.765 m			7,244		
	Slewing stacker			2,250		
	Transfer tower.....			220		
	Shiploader.....			4,400		
	Auxiliaries equipments			51		
	Steel platform.....			478		
	Electrical equipments.....			1,500		
	Total of equipments				16,143	
	Transport.....				1,600	
	Erection.....				3,200	
	Total.....					20,943

TABLE 9.II.2.6 - MARINE TERMINAL - NACALA ALTERNATIVE

ITEM	DISCRIMINATION	UNIT	QUANTITY	UNITARY PRICE	PRICES IN US$ 1,000 - JUL/82	
					PARTIAL	TOTAL
	EQUIPMENTS - 1st PHASE					
	Belt feeder.....			270		
	Belt conveyor - 60" - 5.600m.....			8,513		
	Transfer tower.....			560		
	Slewing stacker.....			2,250		
	Shiploader.....			4,200		
	Steel Platform.....			478		
	Sampling station.....			232		
	Auxiliaries equipments.....			176		
	Mobile equipments.....			1,343		
	Electrical equipments.....			2,600		
	Total of equipments.....				20,622	
	Transport.....				2,000	
	Erection.....				4,000	
	Total.....					26,622
	Equipments - 2nd PHASE					
	Bucket wheel reclaimers (2).....			10,700		
	Electrical equipments.....			1,100	-	
	Total of equipments				11,800	
	Transport.....				1,200	
	Erection.....				2,400	
	TOTAL.....					15,400

TABLE 9.II.2.6 - MARINE TERMINAL - NACALA ALTERNATIVE

(cont.)

ITEM	DISCRIMINATION	UNIT	QUANTITY	UNITARY PRICE	PRICES IN US$ 1,000 - JUL/82	
					PARTIAL	TOTAL
	Equipments - 3rd phase					
	Belt conveyor - 60" - 3.395 m			5,161		
	Slewing stacker			2,250		
	Transfer tower			160		
	Shiploader			4,200		
	Auxiliaries equipments			51		
	Steel platform			478		
	Electrical equipments			1,000		
	Total of equipments				13,300	
	Transport				1,330	
	Erection				2,660	
	TOTAL				17,290	

9.II-3 - COST ESTIMATIONS

INFRASTRUCTURE AND SUPERSTRUCTURE INVESTMENTS

COST ESTIMATIONS

TABLE-9.II.3.1 - SECTION: Cambulatsisse-Mucanha/Vuzi (northern) (1)

LENGTH: 364 Km

ITEMS OF SERVICES	UN.	QUANTITATIVES	UNIT COSTS (US$ JUL 82)	TOTAL COSTS (US$ JUL 82)
1 - EARTHWORK				
Earth moving	m^3	12,918,680	1.94	25,062,239.20
Rock moving	m^3	3,515,030	18.89	66,398,916.70
Soil compactation	m^3	10,502,430	1.67	17,539,058.10
2 - DRAINAGE AND CURRENT CONSTRUCTION WORK	-	-	-	43,600,000.00
3 - SPECIAL CONSTRUCTION WORK	m	4,000	10,000.00	40,000,000.00
4 - LINE SUPERSTRUCTURE				
Subballast	m^3	440,440	6.76	2,977,374.40
Track laying	Km	364	196,380.00	71,482,320.00
Crossing loops	un	18	370,000.00	6,600,000.00
5 - SYSTEM				
Signalling				
- Crossing loops	un	15	32,000.00	480,000.00
- Shunting yard	un	6	72,400.00	434,400.00
Telecommunications	Km	364	13,735.00	4,999,540.00
6 - COMPLEMENTARY WORK	-	-	-	21,800,000.00
TOTAL				301,433,848.40

(1) common to alternatives 1.1, 2.3, 2.4, 3.2

TABLE-9.II.3.2 - SECTION: Moatize-Nhancapirire (Southern) (2)

LENGTH: 151 km

ITEMS OF SERVICES	UN.	QUANTITATIVES	UNIT COSTS (US$ JUL 82)	TOTAL COSTS (US$ JUL 82)
1 - EARTHWORK				
Earth moving	m^3	7,545,080	1.94	14,637,455.20
Rock moving	m^3	986,660	18.89	18,638,007.40
Soil compactation	m^3	5,602,090	1.67	9,355,490.30
2 - DRAINAGE AND CURRENT CONSTRUCTION	-	-	-	17,052,381.00
3 - SPECIAL CONSTRUCTION WORK				
Bridge over Zambeze River	m	1,000	15,000.00	15,000,000.00
Other special construction	m	1,200	10,000.00	12,000,000.00
4 - LINE SUPERSTRUCTURE				
Subballast	m^3	177,870	6.76	1,202,401.20
Track laying	km	151	196,380.00	29,653,380.00
Crossing loops (including 1 between Moatize and Cateme)	un	8	370,000.00	2,960,000.00
5 - SYSTEM				
Signalling				
Crossing loops	un	6	32,000.00	192,000.00
Shunting yard	un	3	72,400.00	217,200.00
Telecommunications	km	151	13,735.00	2,073,985.00
6 - COMPLEMENTARY WORK	-	-	-	8,526,190.00
TOTAL				131,508,490.10

(2) common to alternatives 1.2, 2.1, 2.2, 3.1

COST ESTIMATIONS

TABLE -9.II.3.3 - SECTION: Cateme-Moatize (variant) (3)

LENGTH: 32 km

ITEMS OF SERVICES	UN.	QUANTITATIVES	UNIT COSTS (US$ JUL 82)	TOTAL COSTS (US$ JUL 82)
1st. PHASE : 6 x 10^6 tons/year				
1 - EARTHWORK				
Earth moving	m^3	246,328	1.94	477,876.32
Rock moving	m^3	4,615	18.89	87,177.35
Soil compactation	m^3	172,430	1.67	287,958.10
2 - DRAINAGE AND CURRENT CONSTRUCTION WORK	-	-	-	341,205.00
3 - SPECIAL CONSTRUCTION	m	200	10,000.00	2,000,000.00
4 - LINE SUPERSTRUCTURE				
Subballast	m^3	38,720	6.76	261,747.20
Track laying	km	32	196,380.00	6,284,160.00
5 - SYSTEM				
Telecommunications	km	32	13,735.00	439,520.00
Signalling (crossing loop)	un	1	32,000.00	32,000.00
6 - COMPLEMENTARY WORKS	-	-	-	170,602.00
TOTAL				10,382,245.97
2nd. PHASE : 10 x 10^6 tons/year				
LINE SUPERSTRUCTURE				
Complements	km	32	4,445.00	142,240.00
TOTAL				142,240.00

(3) common to all alternatives

TABLE-9.II.3.4 - SECTION: Cateme- Cambulatsisse (4)

LENGTH: 26 km

ITEMS OF SERVICES	UN.	QUANTITATIVES	UNIT COSTS (US$ JUL 82)	TOTAL COSTS (US$ JUL 82)
1st. PHASE : 6 x 10^6 tons/year				
DRAINAGE				
Drain	m	10,000	12.40	124,000.00
LINE SUPERSTRUCTURE				
Subballast	m^3	31,450	6.76	212,602.00
Rehabilitation	km	26	200,000.00	5,200,000.00
SYSTEM				
Telecommunication	km	26	13,735.00	357,110.00
Signalling				
- Crossing loops	un	1	32,000.00	32,000.00
- Shunting yard	un	1	62,450.00	62,450.00
TOTAL				5,988,162.00
2nd. PHASE : 10 x 10^6 tons/year				
LINE SUPERSTRUCTURE	km	26	4,445.00	115,570.00
Yard enlargement	un	2	103,550.00	207,100.00
SYSTEM				
Signalling	un	1	9,950.00	9,950.00
TOTAL				332,620.00

(4) Common to all alternatives

TABLE 9.II.3.5 - SECTION: Cambulatsisse-Nhamalabue (5)

LENGTH: 196 km

ITEMS OF SERVICES	UN.	QUANTITATIVES	UNIT COSTS (US$ JUL 82)	TOTAL COSTS (US$ JUL 82)
1st PHASE : 6 x 10^6 tons/year				
DRAINAGE				
Drains	m	90,000	12.40	1,116,000.00
LINE SUPERSTRUCTURE				
Subballast	m^3	237,150	6.76	1,603,134.00
Rehabilitation	km	196	200,000.00	39,200,000.00
SYSTEM				
Telecommunication	km	196	13,735.00	2,692,060.00
Signalling				
- Crossing loops	un	9	32,000.00	288,000.00
- Shunting yard	un	2	62,450.00	124,900.00
TOTAL				45,024,094.00
2nd PHASE : 10 x 10^6 tons/year				
LINE SUPERSTRUCTURE	km	196	4,445.00	871,220.00
Yard enlargement	un	11	103,500.00	1,139,050.00
- Crossing Loops	un	1	370,000.00	370,000.00
SYSTEM				
Signalling	un	2	9,950.00	19,900.00
TOTAL				2,400,170.00

TABLE- 9.II.3.6 - SECTION: Nhamalabue - Inhamitanga (6)

16 km (1st Phase) + 94 km (2nd Phase) = 110 km

ITEMS OF SERVICES	UN.	QUANTITATIVES	UNIT COSIS (US$ JUL 82)	TOTAL COSTS (US$ JUL 82)
1st PHASE : 6 x 10^6 tons/year				
DRAINAGE				
Drains	m	60,000	12.40	744,000.00
LINE SUPERSTRUCTURE				
Subballast	m^3	133,100	6.76	899,756.00
Total rehabilitation	km	16	200,000.00	3,200,000.00
Ballast and sleepers renewing	km	94	94,967.00	8,926,898.00
SYSTEM				
Telecommunication	km	110	13,735.00	1,510,850.00
Signalling				
- Crossing loops		6	32,000.00	192,000.00
- Shunting yard		2	62,450.00	124,900.00
TOTAL				15,598,404.00
2nd PHASE : 10 x 10^6 tons/year				
LINE SUPERSTRUCTURE				
Rail renewing	km	94	105,033.00	9,873,102.00
Sleeper and ballast renewing	km	110	4,445.00	488,950.00
Yard enlargement	un	8	103,550.00	828,400.00
SYSTEM				
Signalling	un	2	9,950.00	19,900.00
TOTAL				11,210,352.00

(6) Common to alternatives 1.1 and 1.2

COST ESTIMATIONS

TABLE -9.II.3.7 - SECTION: Inhamitanga-Dondo (7)

130 Km (1st Phase) + 53 Km (2nd Phase) = 183 Km

ITEMS OF SERVICES	UN.	QUANTITATIVES	UNIT COSTS (US$ JUL 82)	TOTAL COSTS (US$ JUL 82)
1st PHASE : 6 x 10^6 tons/year				
DRAINAGE				
Drains	m	90,000	12.40	1,116,000.00
LINE SUPERSTRUCTURE				
Subballast				
Total renewing	m^3	221,450	6.76	1,497,002.00
Ballast and sleepers renewing	km	130	200,000.00	26,000,000.00
	km	53	94,967.00	5,033,251.00
SYSTEM				
Telecommunication	km	183	13,735.00	2,513,505.00
Signalling				
- Crossing loops	un	7	32,000.00	224,000.00
- Shunting yard	un	1	62,450.00	62,450.00
TOTAL				36,446,208.00
2nd PHASE : 10 x 10^6 tons/year				
LINE SUPERSTRUCTURE				
Rail renewing	km	53	105,033.00	5,566,749.00
Complementations	km	183	4,445.00	813,435.00
Yard enlargements	un	8	103,552.00	828,400.00
SYSTEM				
Signalling	un	1	9,950.00	9,950.00
TOTAL				7,218,534.00

(7) common to alternatives 1.1 and 1.2

COST ESTIMATIONS

TABLE- 9.II.3.8 - SECTION: Dondo-Beira (8)

LENGTH: 28 km

ITEMS OF SERVICES	UN.	QUANTITATIVES	UNIT COSTS (US$ JUL 82)	TOTAL COSTS (US$ JUL 82)
DUPLICATION	km	11	267,857.00	2,946,427.00
SYSTEM				
Signalling	un	1	12,500,000.00	12,500,000.00
Telecommunications	km	28	13,735.00	384,580.00
TOTAL				15,831,007.00

(8) Common to alternatives 1.1 and 1.2

COST ESTIMATIONS

TABLE- 9.II.3.9 - SECTION: Cambulatsisse-Utale (9)

LENGTH: 191 Km

ITEMS OF SERVICES	UN.	QUANTITATIVES	UNIT COSTS (US$ JUL 82)	TOTAL COSTS (US$ JUL 82)
1st PHASE: 6 x 10^6 tons/year				
1 - Earthwork				
earth moving	m^3	4,782,000	1.94	9,277,080.00
rock moving	m^3	382,300	18.89	7,221,647.00
soil compactation	m^3	3,347,400	1.67	5,590,158.00
2 - DRAINGE AND CURRENT CONSTRUCTION WORK	-	-	-	8,835,554.00
3 - SPECIAL CONSTRUCTION WORK	m	1,212	10,000.00	12,120,000.00
4 - LINE SUPERSTRUCTURE				
Subballast	m^3	231,100	6.76	1,562,236.00
Track Laying	km	187	196,380.00	36,723,060.00
Rehabilitation	km	4	200,000.00	800,000.00
Crossing loops	un	10	370,000.00	3,700,000.00
5 - SYSTEM				
Signalling				
- Crossing loop	un	8	32,000.00	256,000.00
- Shunting yard	un	2	72,400.00	144,800.00
Telecommunication	km	191	13,735.00	2,623,385.00
6 - COMPLEMENTARY WORK	-	-	-	4,417,777.00
TOTAL				93,271,697.00
2nd PHASE: 10 x 10^6 tons/year				
LINE SUPERSTRUCTURE				
Crossing loops	un	8	370,000.00	2,960,000.00
Complementation	km	191	4,445.00	848,995.00
Signalling				
Crossing loops	un	6	32,000.00	194,000.00
Shunting yard	un	2	72,400.00	144,800.00
TOTAL				4,147,795.00

MAIN QUANTITATIVES WERE OBTTAINED ON BRIAN COLOHUHOUN, HUGH O'DONNEL AND PARTNERS. THEY WERE KEEPED EVEN THOUGH UNDER-ESTIMATED IT COMPARED WITH SIMILAR PROJECTS

COST ESTIMATIONS

TABLE- 9.II.3.10 - SECTION: Utale-Nkaia (10)

LENGTH: 11 km

ITEMS OF SERVICES	UN.	QUANTITATIVES	UNIT COSTS (US$ JUL 82)	TOTAL COSTS (US$ JUL 82)
1st PHASE : 6×10^6 tons/year				
DRAINAGE				
Drains	m	6,000	12.40	74,400.00
LINE SUPERSTRUCTURE				
Subballast	m^3	13,300	6.76	89,908.00
Rehabilitation	km	11	94,967.00	1,044,637.00
SYSTEM				
Telecommunication Signalling	km	11	13,735.00	151,085.00
- Crossing loops	un	1	32,000.00	32,000.00
- Shunting yard	un	1	62,450.00	62,450.00
TOTAL				1,454,480.00
2nd PHASE : 10×10^6 tons/year				
LINE SUPERSTRUCTURE				
Complementation	km	11	4,445.00	48,895.00
Rail substitution	km	5	105,033.00	525,165.00
Yard enlargement	un	2	103,550.00	207,100.00
SYSTEM				
Signalling	un	1	9,950.00	9,950.00
TOTAL				791,110.00

(10) common to alternatives 2.1 and 2.3

TABLE-9.II.3.11 - SECTION: Nkaia-Entre Lagos (11)

LENGTH: 102 km

ITEMS OF SERVICES	UN.	QUANTITATIVES	UNIT COSTS (US$ JUL 82)	TOTAL COSTS (US$ JUL 82)
1. st PHASE : 6 x 10^6 tons/year				
LINE SUPERSTRUCTURE				
-Crossing Loops	un	1	370,000.00	370,000.00
SYSTEM				
Telecommunications	km	102	13,735.00	1,400,970.00
Signalling				
- Crossing loops	un	5	32,000.00	160,000.00
TOTAL				1,930,970.00
2. nd PHASE : 10 x 10^6 tons/year				
LINE SUPERSTRUCTURE				
Rail renewing	km	102	105,033.00	10,713,366.00
Ballast and sleepers renewing	km	102	4,445.00	453,390.00
Crossing loops	un	1	370,000.00	370,000.00
Yard enlargement	un	5	103,550.00	517,750.00
SYSTEMS				
Signalling				
- Crossing loops	un	1	32,000.00	32,000.00
TOTAL				12,086,506.00

(11) common to alternatives 2.1 and 2.3

TABLE - 9.II.3.12 - SECTION: Entre Lagos-Nampula (12)

LENGTH: 423 km

ITEMS OF SERVICES	UN.	QUANTITATIVES	UNIT COSTS (US$ JUL 82)	TOTAL COSTS (US$ JUL 82)
1st PHASE : 6 x 10^6 tons/year				
DRAINAGE .				
Drains	m	170,000	12.40	2,108,000.00
LINE SUPERSTRUCTURE				
Subballast	m^3	511,850	6.76	3,460,160.00
Renewing	km	423	200,000.00	84,600,000.00
-Crossing Loops	un	1	370,000.00	370,000.00
SYSTEM				
Telecommunication	m	423	13,735.00	5,809,905.00
Signalling				
- Crossing loops	un	17	32,000.00	544,000.00
- Shunting yard	un	6	62,450.00	374,700.00
TOTAL				97,266,765.00
2nd PHASE : 6 x 10^6 tons/year				
LINE SUPERSTRUCTURE				
Complementation	km	423	4,445.00	1,880,235.00
Crossing loops	un	2	370,000.00	740,000.00
SYSTEM				
Signalling	un	1	62,450.00	62,450.00
TOTAL				2,682,685.00

(12) CORRESPONDS TO ALTERNATIVES 2.1 AND 2.3

TABLE - 9.II.3.13 - SECTION: Nampula-Monapo (13)

LENGTH: 126 km

ITEMS OF SERVICES	UN.	QUANTITATIVES	UNIT COSTS (US$ JUL 82)	TOTAL COSTS (US$ JUL 82)
1st PHASE : 6 x 10^6 tons/year				
DRAINAGE				
Drains	m	70,000	12.40	868,000.00
LINE SUPERSTRUCTURE				
Subballast	m^3	152,460	6.76	1,030,629.60
Renewing	km	126	200,000.00	25,200,000.00
SYSTEMS				
Telecommunications	m	126	13,735.00	1,730,610.00
Signalling				
- Crossing loops	un	7	32,000.00	224,000.00
- Shunting yard	un	2	62,450.00	124,900.00
TOTAL				29,178,139.60
2nd PHASE : 10 x 10^6 tons/year				
LINE SUPERSTRUCTURE				
Complementation	km	126	4,445.00	560,070.00
TOTAL				560,070.00

(12) Common alternatives 2.1 and 2.3

TABLE-9.II.3.14 -SECTION: Nacala-Monapo (14)

LENGTH: 66 km

ITEMS OF SERVICES	UN.	QUANTITATIVES	UNIT COSTS (US$ JUL 82)	TOTAL COSTS (US$ JUL 82)
1. st PHASE : 6 x 10^6 tonx/year				
DRAINAGE				
Drains	m	28,000	12.40	347,200.00
LINE SUPERSTRUCTURE				
Subballast	m^3	79,860	6.76	539,853.60
Renewing	km	66	200,000.00	13,200,000.00
SYSTEM				
Telecommunication	km	66	13,735.00	906,510.00
Signalling				
- Crossing loop	un	3	32,000.00	96,000.00
- Shunting yard	un	2	62,450.00	124,900.00
TOTAL				15,214,463.60
2. nd PHASE : 10 x 10^6 tons/year				
LINE SUPERSTRUCTURE				
Complementation	km	66	4,445.00	293,370.00
TOTAL				293,370.00

(14) common to alternatives 2.1, 2.2, 2.3 and 2.4

COST ESTIMATIONS

TABLE-9.II.3.15 - SECTION: Monapo-Muconha (15)

LENGTH: 479 km

ITEMS OF SERVICES	UN.	QUANTITATIVES	UNIT COSTS (US$ JUL 82)	TOTAL COSTS (US$ JUL 82)
1st PHASE : 6×10^6 tons/year				
1 - EARTHWORK				
Earth moving	m^3	14,738,360	1.94	28,592,418.40
Rock moving	m^3	626,500	18.89	11,834,585.00
Soil compactation	m^3	9,771,340	1.67	16,318,137.80
2 - DRAINAGE AND CURRENT CONSTRUCTION WORK	-	-	-	22,698,056.00
3 - SPECIAL CONSTRUCTION	m	4,750	10,000.00	47,500,000.00
4 - LINE SUPERSTRUCTURE				
Subballast	m^3	579,590	6.76	3,918,028.40
Track laying	km	479	196,380.00	94,066,020.00
Crossing loops	un	25	370,000.00	9,250,000.00
5 - SYSTEMS				
Signalling				
- Crossing loops	un	19	32,000.00	608,000.00
- Shunting yard	un	6	62,450.00	374,700.00
Telecommunications	km	479	13,735.00	6,579,065.00
6 - COMPLEMENTARY WORKS	-	-	-	11,349,028.00
TOTAL				253,088,038.60
2nd PHASE : 10×10^6 tons/year				
LINE SUPERSTRUCTURE				
Complements	km	479	4,445.00	2,129.155.00
TOTAL				2,129.155.00

TABLE- 9.II.3.16 - SECTION: Muconha-Rio Muelaiva (16)

LENGTH: 25 km

ITEMS OF SERVICES	UN.	QUANTITATIVES	UNIT COSTS (US$ JUL 82)	TOTAL COSTS (US$ JUL 82)
1.st PHASE : 6 x 10^6 tons/year				
DRAINAGE				
Drains	m	10,000	12.40	124,000.00
LINE SUPERSTRUCTURE				
Subballast	m^3	30,250	6.76	204,490.00
Rehabilitation	km	25	200,000.00	5,000,000.00
SYSTEM				
Telecommunications	km	25	13,735.00	343,375.00
Signalling				
- Crossing loops	un	2	32,000.00	64,000.00
TOTAL				5,735,865.00
2.nd PHASE : 10 x 10^6 tons/year				
LINE SUPERSTRUCTURE				
Complementation	km	25	4,445.00	111,125.00
Crossing loops	un	1	370,000.00	370,000.00
SYSTEM				
Signalling				
- Crossing loops	un	1	32,000.00	32,000.00
TOTAL				513,125.00

(16) Common to alternatives 2,2 and 2,4

TABLE-9.II.3.17 - SECTION: Muelaiva-Nhamalabue (17)

LENGTH: 257 km

ITEMS OF SERVICES	UN.	QUANTITATIVES	UNIT COSTS (US$ JUL 82)	TOTAL COSTS (US$ JUL 82)
1st PHASE : 6 x 10^6 tons/year				
1 - EARTHWORK				
Earth moving	m^3	28,918,250	1,94	56,101,450.00
Rock moving	m^3	1,187,440	18,89	22,430,741.60
Soil compactation	m^3	21,698,970	1,67	36,237,279.90
2 - DRAINAGE AND CURRENT CONSTRUCTION WORK				45,907,770.00
3 - SPECIAL CONSTRUCTION	m	4,810	10,000.00	48,100,000.00
4 - LINE SUPERSTRUCTURE				
Subballast	m^3	310,970	6,76	2,102,157.20
Track laying	km	257	196,380.00	50,469,660.00
Crossing loops	un	15	370,000.00	5,550,000.00
5 - SYSTEMS				
Signalling				
- Crossing loops	un	11	32,000,00	352,000.00
- Shunting yard	un	4	62,450,00	249,800.00
Telecommunications	km	257	13,735.00	3,529,895.00
6 - COMPLEMENTARY WORKS				22,953,885.00
TOTAL				293,934,638,70
2nd PHASE : 10 x 10^6 tons/year				
LINE SUPERSTRUCTURE				
Complements	km	257	4,445.00	1,142,365.00
TOTAL				1,142,365.00

(17) common to alternatives 2·2 and 2.4

TABLE- 9.II.3.18 - SECTION: Moatize-Tete (18)

LENGTH: 29 km

ITEMS OF SERVICES	UN.	QUANTITATIVES	UNIT COSIS (US$ JUL 82)	TOTAL COSTS (US$ JUL 82)
1 st PHASE : 6 x 10^6 tons/year				
1 - EARTHWORK				
Earth moving	m^3	1,017,150	1.94	1,973,271.00
Rock moving	m^3	80,200	18.89	1,514,978.00
Soil compactation	m^3	667,300	1.67	1,114,391.00
2 - DRAINAGE AND CURRENT CONSTRUCTION WORK				1,841,056.00
3 - SPECIAL CONSTRUCTION	m	600	10,000.00	6,000,000.00
4 - LINE SUPERSTRUCTURE				
Subballast	m^3	35,100	6.76	237,276.00
Track laying	km	29	196,380.00	5,695,020.00
Crossing loops	un	1	370,000.00	370,000.00
5 - SYSTEMS				
Signalling				
- Crossing loops	un	1	32,000.00	32,000.00
- Shunting yard	un	1	72,400.00	72,400.00
Telecommunications	km	29	13,735.00	398,315.00
6 - COMPLEMENTARY WORKS				920,528.00
TOTAL				20,169,235.00
2 nd PHASE : 10 x 10^6 tons/year				
LINE SUPERSTRUCTURE				
Complements	km	29	4,445.00	128,905.00
TOTAL				128,905.00

(18) common to alternatives 3.1 and 3.2

TABLE 9.II.3.19 - SECTION: Nhancapirire-Tete (19)

LENGTH: 131 km

ITEMS OF SERVICES	UN.	QUANTITATIVES	UNIT COSTS (US$ JUL 82)	TOTAL COSTS (US$ JUL 82)
1 - EARTHWORK				
Earth moving	m^3	6,527,340	1.94	12,663,039.60
Rock moving	m^3	906,460	18.89	17,123,029.40
Soil compactation	m^3	4,934,780	1.67	8,241,082.60
2 - DRAINAGE AND CURRENT CONSTRUCTION WORK				15,210,860.00
3 - SPECIAL CONSTRUCTION				
Bridge over the Zembeze River	m	1,000	15,000.00	15,000,000.00
Other Special Constructions	m	600	10,000.00	6,000,000.00
4 - LINE SUPERSTRUCTURE				
Subballast	m^3	148,830	6.76	1,006,090.80
Track laying	km	123	196,380.00	24,154,740.00
Crossing loops	un	5	370,000.00	1,850,000.00
5 - SYSTEMS				
Signalling				
- Crossing loops	un	4	32,000.00	128,000.00
- Shunting yard	un	1	72,400.00	72,400.00
Telecommunications	km	123	13,735.00	1,689,405.00
6 - Complementary works				7,605,430.00
TOTAL				110,744,077.40

(19) common to alternatives 3.1 and 3.2

APPENDIX 9.II-B

OPERATIONAL COSTS

9. II-4 - OPERATIONAL PARAMETERS

TABLE -9.II.4.1- OPERATIONAL PARAMETERS

ROUTES / YEARS	TRAIN/DAY		TRAIN/YEAR		LOCOS/TRAIN		WAGON.Km $\times 10^6$		LOCO.HOUR $\times 10^3$	
	MUCANHA/ VUZI	MOATIZE	MUCANHA/ VUZI	MOATIZE	MUCANHA/ VUZI	MOATIZE	MUCANHA/ VUZI	MOATIZE	MUCANHA/ VUZI	MOATIZE
ROUTE 1 - BEIRA										
ALT.1.1 (NORTHERN) THROUGH CFM-CENTER										
1986	-	2.2	-	704	-	1	-	18.6	-	30.7
1988	1.1	3.3	352	1,056	1	1	14.3	27.9	20.8	46.0
1990	2.2	4.3	704	1,376	1	1	28.5	36.4	41.5	60.0
1995	3.3*	3.3*	1,056	1,056	2	2	85.6	55.8	124.6	92.1
2000	4.3**	2.9**	1,376	928	3	3	167.3	73.5	243.6	121.4
2010	4.3**	2.9**	1,376	928	3	3	167.3	73.5	243.6	121.4
ROUTE 1 - BEIRA										
ALT. 1.2 (SOUTHERN) THROUGH CFM-CENTER										
1986	-	2.2	-	704	-	1	-	18.6	-	30.7
1988	1.1	3.3	352	1,056	1	1	11.8	27.9	17.7	46.0
1990	2.2	4.3	704	1,376	1	1	23.5	36.4	35.3	60.0
1995	3.3*	3.3*	1,056	1,056	2	2	70.6	55.8	106.0	92.1
2000	4.3**	2.9**	1,376	928	3	3	137.9	73.5	207.2	121.4
2010	4.3**	2.9**	1,376	928	3	3	137.9	73.5	207.2	121.4

* - Double traction
** - Triple traction

TABLE 9.II.4.1- OPERATIONAL PARAMETERS

(cont.)

ROUTES / YEARS	TRAIN/DAY		TRAIN/YEAR		LOCOS/TRAIN		WAGON.Km (10^6)		LOCO.HOUR (10^3)	
	MUCANHA/ VUZI	MOATIZE	MUCANHA/ VUZI	MOATIZE	MUCANHA/ VUZI	MOATIZE	MUCANHA/ VUZI	MOATIZE	MUCANHA/ VUZI	MOATIZE
ROUTE 2 - NACALA										
ALT. 2.1 (SOUTHERN) THROUGH MALAWI										
1986	-	3.3	-	1,056	-	1	-	30.9	-	92.5
1988	1.7	4.9	544	1,568	1	1	18.4	46.0	51.2	137.4
1990	1.7*	3.3*	544	1,056	2	2	36.8	61.9	102.5	185.0
1995	3.3**	3.3**	1,056	1,056	3	3	107.2	92.8	298.4	277.5
2000	6.7**	4.4**	2,144	1,408	3	3	217.6	123.8	605.9	370.0
2010	6.7**	4.4**	2,144	1,408	3	3	217.6	123.8	605.9	370.0
ROUTE 2 - NACALA										
ALT. 2.2 (SOUTHERN) THROUGH ZAMBEZIA										
1986	-	2.2	-	704	-	1	-	35.0	-	47.5
1988	1.1	3.3	352	1,056	1	1	20.0	52.6	26.0	71.2
1990	2.2	4.3	704	1,376	1	1	39.9	68.5	52.1	92.7
1995	3.3*	3.3*	1,056	1,056	2	2	119.8	105.2	156.3	142.3
2000	6.5*	4.3*	2,080	1,376	2	2	236.0	137.0	307.8	185.5
2010	6.5*	4.3*	2,080	1,376	2	2	236.0	137.0	307.8	185.5

* - Double traction

TABLE-9.II.4.1 - OPERATIONAL PARAMETERS

(cont.)

ROUTES / YEARS	TRAIN/DAY		TRAIN/YEAR		LOCOS/TRAIN		WAGON.Km 10^6		LOCO.HOUR 10^3	
	MUCANHA/VUZI	MOATIZE	MUCANHA/VUZI	MOATIZE	MUCANHA/VUZI	MOATIZE	MUCANHA/VUZI	MOATIZE	MUCANHA/VUZI	MOATIZE
ROUTE 2 - NACALA										
ALT.2.3 (NORTHERN) THROUGH MALAWI - CFM (NORTHERN)										
1986	-	3.3	-	1,056	-	1	-	30.9	-	92.5
1988	1.7	4.9	544	1,568	1	1	20.9	46.0	56.0	137.4
1990	1.7*	3.3*	544	1,056	2	2	41.9	61.9	112.1	185.0
1995	3.3**	3.3**	1,056	1,056	3	3	121.9	92.8	326.3	277.5
2000	6.7**	4.4**	2,144	1,408	3	3	247,6	123.8	662.5	370.0
2010	6.7**	4.4**	2,144	1,408	3	3	247.6	123.8	662.5	370.0
ROUTE 2 - NACALA										
ALT.2.4 - (NORTHERN) THROUGH ZAMBEZIA										
1986	-	2.2	-	704	-	1	-	35.0	-	47.5
1988	1.1	3.3	352	1,056	1	1	22.5	52.6	29.1	71.2
1990	2.2	4.3	704	1,376	1	1	44.9	68.5	58.3	92.7
1995	3.3*	3.3*	1,056	1,056	2	2	134.8	105.2	174.9	142.3
2000	6.5*	4.3*	2,080	1,376	2	2	265.6	137.0	344.4	185.5
2010	6.5*	4.3*	2,080	1,376	2	2	265.6	137.0	344.4	185.5

* - Double traction

** - Triple traction

TABLE-9.II.4.1 - OPERATIONAL PARAMETERS

(cont.)

ROUTES / YEARS	TRAIN/DAY		TRAIN/YEAR		LOCOS/TRAIN		WAGON.Km (10^6)		LOCO.HOUR (10^3)	
	MUCANHA/ VUZI	MOATIZE	MUCANHA/ VUZI	MOATIZE	MUCANHA/ VUZI	MOATIZE	MUCANHA/ VUZI	MOATIZE	MUCANHA/ VUZI	MOATIZE
ROUTE 3 - ZAMBEZE-RIVER										
ALT. 3.1 (SOUTHERN) THROUGH CAHORA BASSA LAKE										
1986	-	2.4	-	768	-	1	-	0.6	-	5.1
1988	1.2	3.6	384	1,152	1	1	2.1	1.0	5.0	7.6
1990	2.4	4.7	768	1,504	1	1	4.2	1.3	10.0	9.9
1995	7.1	7.1	2,272	2,272	1	1	12.5	1.9	29.5	15.0
2000	7.1*	4.8*	2,272	1,536	2	2	25.0	2.6	59.0	20.3
2010	7.1*	4.8*	2,272	1,536	2	2	25.0	2.6	59.0	20.3
ROUTE 3 - ZAMBEZE-RIVER										
ALT. 3.2. (NORTHERN)										
1986	-	2.4	-	768	-	1	-	0.6	-	5.1
1988	1.2	3.6	384	1,152	1	1	7.1	1.0	11.9	7.6
1990	2.4	4.7	768	1,504	1	1	14.3	1.3	23.8	9.9
1995	7.1	7.1	2,272	2,272	1	1	42.2	1.9	70.4	15.0
2000	7.1*	4.8*	2,272	1,536	2	2	84.4	2.6	140.9	20.3
2010	7.1*	4.8*	2,272	1,536	2	2	84.4	2.6	140.9	20.3

* Double traction

9.II.5 - MAINTENANCE COSTS

TABLE 9.II.5.1- MAINTENANCE OF PERMANENT WAY

ROUTES/YEARS	EQUALIZED DISTANCE (KM)		GROSS TONS (10^3)		COST/KM/YEAR (US$ JUL/82)		ANNUAL COST US$ 10^3 (JUL/82)		TOTAL ANNUAL COST US$ 10^3 (JUL/82)
	MUCANHA/ VUZI	MOATIZE	MUCANHA/ VUZI	MOATIZE	MUCANHA/ VUZI	MOATIZE	MUCANHA/ VUZI	MOATIZE	
ROUTE: BEIRA									
ALTERNATIVE: 1.1 (NORTHERN)	901	588							
- 1986			-	1,728	-	1,959	-	1,152	1,152
- 1988			864	2,594	1,594	2,225	1,436	1,308	2,744
- 1990			1,728	3,450	1,959	2,446	1,765	1,438	3,203
- 1995			5,186	5,186	2,812	2,812	2,537	1,653	4,190
- 2000			10,350	6,908	3,609	3,122	3,252	1,836	5,088
- 2010			10,350	6,908	3,609	3,122	3,252	1,836	5,088
ROUTE: BEIRA									
ALTERNATIVE: 1.2 (SOUTHERN)	743	588							
- 1986			-	1,728	-	1,959	-	1,152	1,152
- 1988			864	2,594	1,594	2,225	1,184	1,308	2,492
- 1990			1,728	3,450	1,959	2,446	1,455	1,438	2,893
- 1995			5,186	5,186	2,812	2,812	2,089	1,653	3,742
- 2000			10,350	6,908	3,609	3,122	2,681	1,836	4,517
- 2010			10,350	6,908	3,609	3,122	2,681	1,836	4,517

(Cont.)

TABLE 9.II.5.1 - MAINTENANCE OF PERMANENT WAY

(Cont.)

ROUTES/YEARS	EQUALIZED DISTANCE (KM)		GROSS TONS (10^3)		COST/KM/YEAR (US$ JUL/82)		ANNUAL COST US$ 10^3 (JUL/82)		TOTAL ANNUAL COST US$ 10^3 (JUL/82)
	MUCANHA/ VUZI	MOATIZE	MUCANHA/ VUZI	MOATIZE	MUCANHA/ VUZI	MOATIZE	MUCANHA/ VUZI	MOATIZE	
ROUTE: NACALA									
ALTERNATIVE: 2.1 (SOUTHERN) MALAWI	1,154	999							
- 1986			-	1,814	-	1,993	-	1,991	1,991
- 1988			910	2,716	1,616	2,258	1,865	2,256	4,121
- 1990			1,820	3,626	1,993	2,491	2,300	2,488	4,788
- 1995			5,440	5,440	2,867	2,867	3,308	2,864	6,172
- 2000			10,904	7,254	3,686	3,177	4,254	3,174	7,428
- 2010			10,904	7,254	3,686	3,177	4,254	3,174	7,428
ROUTE: NACALA									
ALTERNATIVE: 2.2 (SOUTHERN) ZAMBEZIA	1,261	1,107							
- 1986			-	1,728	-	1,959	-	2,169	2,169
- 1988			864	2,594	1,594	2,225	2,010	2,463	4,473
- 1990			1,728	3,450	1,959	2,446	2,470	2,708	5,178
- 1995			5,186	5,186	2,812	2,812	3,546	3,113	6,659
- 2000			10,358	6,908	3,609	3,122	4,551	3,456	8,007
- 2010			10,358	6,908	3,609	3,122	4,551	3,456	8,007

TABLE 9.II.5.1 - MAINTENANCE OF PERMANENT WAY

(Cont.)

ROUTES/YEARS	EQUALIZED DISTANCE (KM)		GROSS TONS (10^3)		COST/KM/YEAR (US$ JUL/82)		ANNUAL COST US$ 10^3 (JUL/82)		TOTAL ANNUAL COST US$ 10^3 (JUL/82)
	MUCANHA/ VUZI	MOATIZE	MUCANHA/ VUZI	MOATIZE	MUCANHA/ VUZI	MOATIZE	MUCANHA/ VUZI	MOATIZE	
ROUTE: NACALA									
ALTERNATIVE: 2.3 (NORTHERN) MALAWI	1,312	999							
- 1986			-	1,814	-	1,993	-	1,991	1,991
- 1988			910	2,716	1,616	2,258	2,120	2,256	4,376
- 1990			1,820	3,626	1,993	2,491	2,615	2,488	5,103
- 1995			5,440	5,440	2,867	2,867	3,761	2,864	6,625
- 2000			10,904	7,254	3,686	3,177	4,836	3,174	8,010
- 2010			10,904	7,254	3,686	3,177	4,836	3,174	8,010
ROUTE: NACALA									
ALTERNATIVE: 2.4 (NORTHERN) ZAMBEZIA	1,420	1,107							
- 1986			-	1,728	-	1,959	-	2,169	2,169
- 1988			864	2,594	1,594	2,225	2,263	2,463	4,726
- 1990			1,728	3,450	1,959	2,446	2,782	2,708	5,490
- 1995			5,186	5,186	2,812	2,812	3,993	3,113	7,106
- 2000			10,358	6,908	3,609	3,122	5,125	3,456	8,581
- 2010			10,358	6,908	3,609	3,122	5,125	3,456	8,581

TABLE 9.II.5.1- MAINTENANCE OF PERMANENT WAY

(Cont.)

ROUTES/YEARS	EQUALIZED DISTANCE (KM)		GROSS TONS (10^3)		COST/KM/YEAR (US$ JUL/82)		ANNUAL COST US$ 10^3 (JUL/82)		TOTAL ANNUAL COST US$ 10^3 (JUL/82)
	MUCANHA/ VUZI	MOATIZE	MUCANHA/ VUZI	MOATIZE	MUCANHA/ VUZI	MOATIZE	MUCANHA/ VUZI	MOATIZE	
ROUTE: ZAMBEZE/RIVER ALTERNATIVE:3.1(SOUTHERN)	134	21							
- 1986			-	1,744	-	1,959	-	41	41
- 1988			872	2,616	1,594	2,236	214	47	261
- 1990			1,744	3,480	1,959	2,457	262	52	314
- 1995			5,226	5,226	2,823	2,823	378	59	437
- 2000			10,450	6,978	3,620	3,133	485	66	551
- 2010			10,450	6,978	3,620	3,133	485	66	551
ROUTE: ZAMBEZE/RIVER ALTERNATIVE:3.2(NORTHERN)	452	21							
- 1986			-	1,744	-	1,959	-	41	41
- 1988			872	2,616	1,594	2,236	720	47	767
- 1990			1,744	3,480	1,959	2,457	885	52	937
- 1995			5,226	5,226	2,823	2,823	1,276	59	1,335
- 2000			10,450	6,978	3,620	3,133	1,636	66	1,702
- 2010			10,450	6,978	3,620	3,133	1,636	66	1,702

TABLE-9.II.5.2

AUXILIARY TABLE FOR MAINTENANCE OF PERMANENT WAY CALCULATION PER KM

US$ JULY 82

D (10^6)	$D^{0.435}$	$0.5 + D^{0.435}$	A
0.864	0.94	1.44	1,594
0.872	0.94	1.44	1,594
0.910	0.96	1.46	1,616
1.728	1.27	1.77	1,959
1.744	1.27	1.77	1,959
1,814	1.30	1.80	1,993
1.820	1.30	1.80	1,993
2.594	1.51	2.01	2,225
2.616	1.52	2.02	2,236
2.716	1.54	2.04	2,258
3.450	1.71	2.21	2,446
3.480	1.72	2.22	2,457
3.626	1.75	2.25	2,491
5.186	2.04	2.54	2,812
5.226	2.05	2.55	2,823
5.440	2.09	2.59	2,867
6.900	2.32	2.82	3,122
6.908	2.32	2.82	3,122
6.978	2.33	2.83	3,133
7.254	2.37	2.87	3,177
10.350	2.76	3.26	3,609
10.358	2.76	3.26	3,609
10.450	2.77	3.27	3,620
10.904	2.83	3.33	3,686

$A = 1,107 \ (0.5 + D^{0.435})$

A = US$/km cost

D = Gross tons.x10^6

TABLE-9.II.5.3— MAINTENANCE OF LOCOS

ROUTES/YEARS	LOCO HOUR/YEAR (10^3)		ANNUAL COST [1] US$.10^3 (JUL/82)		TOTAL ANNUAL COST US$.10^3 (JUL/82)
	MUCANHA/VUZI	MOATIZE	MUCANHA/VUZI	MOATIZE	
ROUTE: BEIRA					
ALTERNATIVE 1.1 - NORTHERN					
- 1986	-	30.7	-	204	204
- 1988	20.8	46.0	138	306	444
- 1990	41.5	60.0	276	399	675
- 1995	124.6	92.1	829	612	1,441
- 2000	243.6	121.4	1.620	807	2,427
- 2010	243.6	121.4	1.620	807	2,427
ROUTE: BEIRA					
ALTERNATIVE 1.2 - SOUTHERN					
- 1986	-	30.7	-	204	204
- 1988	17.7	46.0	118	306	424
- 1990	35.3	60.0	235	399	634
- 1995	106.0	92.1	705	612	1,317
- 2000	207.2	121.4	1,378	807	2,185
- 2010	207.2	121.4	1,378	807	2,185

[1] LOCO.hour cost = US$ 6.65

TABLE - 9.II.5.3 - MAINTENANCE OF LOCOS

(cont.)

ROUTES/YEARS	LOCO HOUR/YEAR (10^3)		ANNUAL COST [1] US$.$10^3$ (JUL/82)		TOTAL ANNUAL COST US$.$10^3$ (JUL/82)
	MUCANHA/VUZI	MOATIZE	MUCANHA/VUZI	MOATIZE	
ROUTE: NACALA					
ALTERNATIVE: 2.1 - SOUTHERN-MALAWI					
- 1986	-	92.5	-	615	615
- 1988	51.2	137.4	340	914	1,254
- 1990	102.5	185.0	682	1,230	1,912
- 1995	298.4	277.5	1,984	1,845	3,829
- 2000	605.9	370.0	4,029	2,460	6,489
- 2010	605.9	370.0	4,029	2,460	6,489
ROUTE: NACALA					
ALTERNATIVE: 2.2 - SOUTHERN-ZAMBEZIA					
- 1986	-	47.5	-	316	316
- 1988	26.0	71.2	173	473	646
- 1990	52.1	92.7	346	616	962
- 1995	156.3	142.3	1,040	946	1,986
- 2000	307.8	185.5	2,047	1,234	3,281
- 2010	307.8	185.5	2,047	1,234	3,281

[1] LOCO.hour cost = US$ 6.65

TABLE-9.II.5.3 - MAINTENANCE OF LOCOS

(cont.)

ROUTES/YEARS	LOCO HOUR/YEAR (10^3)		ANNUAL COST [1] US$.10^3 (JUL/82)		TOTAL ANNUAL COST US$.10^3 (JUL/82)
	MUCANHA/VUZI	MOATIZE	MUCANHA/VUZI	MOATIZE	
ROUTE: NACALA					
ALTERNATIVE: 2.3 - NORTHERN-MALAWI					
- 1986	-	92.5	-	615	615
- 1988	56.0	137.4	372	914	1,286
- 1990	112.1	185.0	745	1,230	1,975
- 1995	326.3	277.5	2,170	1,845	4,015
- 2000	662.5	370.0	4,406	2,460	6,866
- 2010	662.5	370.0	4,406	2,460	6,866
ROUTE: NACALA					
ALTERNATIVE: NORTHERN-ZAMBEZIA					
- 1986	-	47.5	-	316	316
- 1988	29.1	71.2	193	473	666
- 1990	58.3	92.7	388	616	1,004
- 1995	174.9	142.3	1,163	946	2,109
- 2000	344.4	185.5	2,290	1,234	3,524
- 2010	344.4	185.5	2,290	1,234	3,524

[1] LOCO.hour cost = US$ 6.65

TABLE-9.II.5.3 - MAINTENANCE OF LOCOS

(cont.)

ROUTES/YEARS	LOCO HOUR/YEAR (10^3)		ANNUAL COST [1] US$.10^3 (JUL/82)		TOTAL ANNUAL COST US$.$10^3$ (JUL/82)
	MUCANHA/VUZI	MOATIZE	MUCANHA/VUZI	MOATIZE	
ROUTE: ZAMBEZE RIVER					
ALTERNATIVE: 3.1 - SOUTHERN					
- 1986	-	5.1	-	34	34
- 1988	5.0	7.6	33	50	83
- 1990	10.0	9.9	66	66	132
- 1995	29.5	15.0	196	100	296
- 2000	59.0	20.3	392	135	527
- 2010	59.0	20.3	392	135	527
ROUTE: ZAMBEZE RIVER					
ALTERNATIVE: 3.2 - NORTHERN					
- 1986	-	5.1	-	34	34
- 1988	11.9	7.6	79	50	129
- 1990	23.8	9.9	158	66	224
- 1995	70.4	15.0	468	100	568
- 2000	140.9	20.3	937	135	1,072
- 2010	140.9	20.3	937	135	1,072

[1] LOCO.hour cost = US$ 6.65

TABLE-9.II.5.4 —MAINTENANCE OF WAGONS

ROUTES/YEARS	WAGON.KM/YEAR (10^6)		ANNUAL COST [1] US$.$10^3$ (JUL/82)		TOTAL ANNUAL COST US$.$10^3$ (JUL/82)
	MUCANHA/VUZI	MOATIZE	MUCANHA/VUZI	MOATIZE	
ROUTE: BEIRA					
ALTERNATIVE 1.1 (NORTHERN)					
- 1986	-	18.6	-	558	558
- 1988	14.3	27.9	429	837	1,266
- 1990	28.5	36.4	855	1,092	1,947
- 1995	85.6	55.8	2,568	1,674	4,242
- 2000	167.3	73.5	5,019	2,205	7,224
- 2010	167.3	73.5	5,019	2,205	7,224
ROUTE: BEIRA					
ALTERNATIVE 1.2 (SOUTHERN)					
- 1986	-	18.6	-	558	558
- 1988	11.8	27.9	354	837	1,191
- 1990	23.5	36.4	705	1,092	1,797
- 1995	70.6	55.8	2,118	1,674	3,792
- 2000	137.9	73.5	4,137	2,205	6,342
- 2010	137.9	73.5	4,137	2,205	6,342

[1] Wagon.Km Cost = US$ 0.03

TABLE-9.II.5.4 - MAINTENANCE OF WAGONS

(cont.)

ROUTES/YEARS	WAGON.KM/YEAR (10^6)		ANNUAL COST [1] US$.10³ (JUL/82)		TOTAL ANNUAL COST US$.10³ (JUL/82)
	MUCANHA/VUZI	MOATIZE	MUCANHA/VUZI	MOATIZE	
ROUTE: NACALA					
ALTERNATIVE 2.1-(SOUTHERN) MALAWI					
- 1986	-	30.9	-	927	927
- 1988	18.4	46.0	552	1,380	1,932
- 1990	36.8	61.9	1,104	1,857	2,961
- 1995	107.1	92.8	3,213	2,784	5,997
- 2000	217.6	123.8	6,528	3,714	10,242
- 2010	217.6	123.8	6,528	3,714	10,242
ROUTE: NACALA					
ALTERNATIVE 2.2-(SOUTHERN) ZAMBEZIA					
- 1986	-	35.0	-	1,050	1,050
- 1988	20.0	52.6	600	1,578	2,178
- 1990	39.9	68.5	1,197	2,055	3,252
- 1995	119.8	105.2	3,594	3,156	6,750
- 2000	236.0	137.0	7,080	4,110	11,190
- 2010	236.0	137.0	7,080	4,110	11,190

[1] Wagon.km Cost = US$ 0.03

TABLE -9.II.5.4 --MAINTENANCE OF WAGONS

(cont.)

ROUTES/YEARS	WAGON.KM/YEAR (10^6)		ANNUAL COST [1] US$.10³ (JUL/82)		TOTAL ANNUAL COST US$.10³ (JUL/82)
	MUCANHA/VUZI	MOATIZE	MUCANHA/VUZI	MOATIZE	
ROUTE: NACALA					
ALTERNATIVE 2.3 (NORTHERN) MALAWI					
- 1986	-	30.9	-	927	927
- 1988	20.9	46.0	627	1,380	2,007
- 1990	41.9	61.9	1,257	1,857	3,114
- 1995	121.9	92.8	3,657	2,784	6,441
- 2000	247.6	123.8	7,428	3,714	11,142
- 2010	247.6	123.8	7,428	3,714	11,142
ROUTE: NACALA					
ALTERNATIVE 2.4 (NORTHERN) ZAMBEZIA					
- 1986	-	35.0	-	1,050	1,050
- 1988	22.5	52.6	675	1,578	2,253
- 1990	44.9	68.5	1,347	2,055	3,402
- 1995	134.8	105.2	4,044	3,156	7,200
- 2000	265.6	137.0	7,968	4,110	12,078
- 2010	265.6	137.0	7,968	4,110	12,078

[1] Wagon.km Cost = US$ 0.03

TABLE-9.II.5.4- MAINTENANCE OF WAGONS

(cont.)

ROUTES/YEARS	WAGON.KM/YEAR (10^6)		ANNUAL COST [1] US$.10³ (JUL/82)		TOTAL ANNUAL COST US$.10³ (JUL/82)
	MUCANHA/VUZI	MOATIZE	MUCANHA/VUZI	MOATIZE	
ROUTE: ZAMBEZE (RIVER) ALTERNATIVE 3.1-SOUTHERN					
- 1986	-	0.6	-	18	18
- 1988	2.1	1.0	63	30	93
- 1990	4.2	1.3	126	39	165
- 1995	12.5	1.9	375	57	432
- 2000	25.0	2.6	750	78	828
- 2010	25.0	2.6	750	78	828
ROUTE: ZAMBEZE (RIVER) ALTERNATIVE 3.2-NORTHERN					
- 1986	-	0.6	-	18	18
- 1988	7.1	1.0	213	30	243
- 1990	14.3	1.3	429	39	468
- 1995	42.2	1.9	1,266	57	1,323
- 2000	84.4	2.6	2,532	78	2,610
- 2010	84.4	2.6	2,532	78	2,610

[1] Wagon.km Cost = US$ 0.03

9.II.6 - TRAIN CREW

TABLE-9.II.6.1 - TRAIN CREW

ROUTES/YEARS	CREW.HOUR/YEAR (10^3)		ANNUAL COST [1] US$.10^3 (JUL/82)		TOTAL ANNUAL COST US$.$10^3$ (JUL/82)
	MUCANHA/VUZI	MOATIZE	MUCANHA/VUZI	MOATIZE	
ROUTE: BEIRA					
ALTERNATIVE 1.1 (NORTHERN)					
- 1986	-	30.7	-	94	94
- 1988	20.8	46.0	63	140	203
- 1990	41.5	60.0	127	183	310
- 1995	62.3	46.0	190	140	330
- 2000	81.2	40.5	248	123	371
- 2010	81.2	40.5	248	123	371
ROUTE: BEIRA					
ALTERNATIVE 1.2 (SOUTHERN)					
- 1986	-	30.7	-	94	94
- 1988	17.7	46.0	54	140	194
- 1990	35.3	60.0	108	183	291
- 1995	53.0	46.0	161	140	301
- 2000	69.1	40.5	211	123	334
- 2010	69.1	40.5	211	123	334

[1] Crew Cost/Hour = US$ 3.05

TABLE-9.II.6.1 - TRAIN CREW

(cont.)

ROUTES/YEARS	CREW.HOUR/YEAR (10^3)		ANNUAL COST [1] US$.$10^3$ (JUL/82)		TOTAL ANNUAL COST US$.$10^3$ (JUL/82)
	MUCANHA/VUZI	MOATIZE	MUCANHA/VUZI	MOATIZE	
ROUTE: NACALA					
ALTERNATIVE 2.1(SOUTHERN) MALAWI					
- 1986	-	92.5	-	282	282
- 1988	51.2	137.4	156	419	575
- 1990	51.2	92.5	156	282	438
- 1995	99.5	92.5	303	282	585
- 2000	202.0	123.3	616	376	992
- 2010	202.0	123.3	616	376	992
ROUTE: NACALA					
ALTERNATIVE 2.2(SOUTHERN) ZAMBEZIA					
- 1986	-	47.5	-	145	145
- 1988	26.0	71.2	79	217	296
- 1990	52.1	92.7	159	283	442
- 1995	78.1	71.1	238	217	455
- 2000	153.9	92.7	469	283	752
- 2010	153.9	92.7	469	283	752

[1] Crew Cost/Hour = US$ 3.05

TABLE-9.II.6.1 -TRAIN CREW.

(cont.)

ROUTES/YEARS	CREW.HOUR/YEAR (10^3)		ANNUAL COST [1] US$.$10^3$ (JUL/82)		TOTAL ANNUAL COST US$.$10^3$ (JUL/82)
	MUCANHA/VUZI	MOATIZE	MUCANHA/VUZI	MOATIZE	
ROUTE: NACALA					
ALTERNATIVE 2.3-(NORTHERN) MALAWI					
- 1986	-	92.5	-	282	282
- 1988	56.0	137.4	171	419	590
- 1990	56.0	92.5	171	282	453
- 1995	108.7	92.5	331	282	613
- 2000	220.8	123.3	673	376	1,049
- 2010	220.8	123.3	673	376	1,049
ROUTE: NACALA					
ALTERNATIVE 2.4-(NORTHERN) ZAMBEZIA					
- 1986	-	47.5	-	145	145
- 1988	29.1	71.2	89	217	306
- 1990	58.3	92.7	178	283	461
- 1995	87.4	71.1	267	217	484
- 2000	172.2	92.7	525	283	808
- 2010	172.2	92.7	525	283	808

[1] Crew Cost/Hour = US$ 3.05

TABLE-9.II.6.1 - TRAIN CREW

(cont.)

ROUTES/YEARS	CREW.HOUR/YEAR (10^3)		ANNUAL COST [1] US$.$10^3$ (JUL/82)		TOTAL ANNUAL COST US$.$10^3$ (JUL/82)
	MUCANHA/VUZI	MOATIZE	MUCANHA/VUZI	MOATIZE	
ROUTE: ZAMBEZE RIVER					
ALTERNATIVE 3.1 (SOUTHERN)					
- 1986	-	5.1	-	16	16
- 1988	5.0	7.6	15	23	38
- 1990	10.0	9.9	30	30	60
- 1995	29.5	15.0	90	46	136
- 2000	29.5	10.1	90	31	121
- 2010	29.5	10.1	90	31	121
ROUTE: ZAMBEZE RIVER					
ALTERNATIVE 3.2 (NORTHERN)					
- 1986	-	5.1	-	16	16
- 1988	11.9	7.6	36	23	59
- 1990	23.8	9.9	73	30	103
- 1995	70.4	15.0	215	46	261
- 2000	70.4	10.1	215	31	246
- 2010	70.4	10.1	215	31	246

[1] Crew Cost/Hour = US$ 3.05

9. II.7 - FUEL CONSUMPTION

TABLE 9.II.7.1 - FUEL CONSUMPTION

ROUTES/YEARS	EXPORT DIRECTION						IMPORT DIRECTION						ANNUAL [1] CONSUMPTION $\ell(10^3)$		ANNUAL [2] COST US10^3(JUL/82)		TOTAL COST
	MUCANHA/VUZI			MOATIZE			MUCANHA/VUZI			MOATIZE							
	GTK (10^6)	$\ell/10^3$ GTK	$\ell(10^3)$	GTK (10^6)	$\ell/10^3$ GTK	$\ell(10^3)$	GTK (10^6)	$\ell/10^3$ GTK	$\ell(10^3)$	GTK (10^6)	$\ell/10^3$ GTK	$\ell(10^3)$	MUCANHA/VUZE	MOTIZE	MUCANHA/VUZE	MOATIZE	US$ 10^3 (JUL/82)
ROUTE: BEIRA ALT.1.1-NORTHERN																	
- 1986	-	4.26	-	793	4.30	3,410	-	5.89	-	201	6.15	1,236	-	4,181	-	1,098	1,098
- 1988	601	4.26	2,560	1,190	4.30	5,117	160	5.89	942	301	6.15	1,851	3,152	6,271	827	1,646	2,473
- 1990	1,200	4.26	5,112	1,551	4.30	6,669	322	5.89	1,897	433	6.15	2,663	6,308	8,399	1,656	2,205	3,861
- 1995	3,646	4.26	15,532	2,380	4.30	10,234	922	5.89	5,431	602	6.15	3,702	18,867	12,542	4,952	3,292	8,244
- 2000	7,128	4.26	30,365	3,138	4.30	13,493	1,990	5.89	11,721	834	6.15	5,129	37,877	16,760	9,943	4,399	14,342
- 2010	7,128	4.26	30,365	3,138	4.30	13,493	1,990	5.89	11,721	834	6.15	5,129	37,877	16,760	9,943	4,399	14,342
ROUTE: BEIRA ALT. 1.2 - SOUTHERN																	
- 1986	-	4.32	-	793	4.30	3,410	-	6.00	-	201	6.15	1,236	-	4,181	-	1,098	1,098
- 1988	495	4.32	2,138	1,190	4.30	5,117	132	6.00	792	301	6.15	1,851	2,637	6,271	692	1,646	2,338
- 1990	989	4.32	4,272	1,551	4.30	6,669	266	6.00	1,596	433	6.15	2,663	5,281	8,399	1,386	2,205	3,391
- 1995	3,005	4.32	12,982	2,380	4.30	10,234	760	6.00	4,560	602	6.15	3,702	15,788	12,542	4,144	3,292	7,436
- 2000	5,874	4.32	25,376	3,138	4.30	13,493	1,640	6.00	9,840	834	6.15	5,129	31,694	16,760	8,320	4,399	12,719
- 2010	5,874	4.32	25,376	3,138	4.30	13,493	1,640	6.00	9,840	834	6.15	5,129	31,694	16,760	8,320	4,399	12,719

[1] 90% of consumption according with the methodology
[2] Fuel price = US$ 0,25 per litre with 5% for lubricant

TABLE 9.II.7.1 - FUEL CONSUMPTION

(Cont.)

ROUTES/YEARS	EXPORT DIRECTION						IMPORT DIRECTION						ANNUAL [1] CONSUMPTION $\ell(10^3)$		ANNUAL [2] COST US10^3(JUL/82)		TOTAL COST US$ 10^3 (JUL/82)
	MUCANHA/VUZI			MOATIZE			MUCANHA/VUZI			MOATIZE							
	GTK (10^6)	$\ell/10^3$ GTK	$\ell(10^3)$	GTK (10^6)	$\ell/10^3$ GTK	$\ell(10^3)$	GTK (10^6)	$\ell/10^3$ GTK	$\ell(10^3)$	GTK (10^6)	$\ell/10^3$ GTK	$\ell(10^3)$	MUCANHA/VUZE	MOTIZE	MUCANHA/VUZE	MOATIZE	
ROUTE: NACALA																	
ALT. 2.1- SOUTHERN-MALAWI																	
- 1986	-	4.75	-	1,362	4.83	6,578	-	6.94	-	410	6.80	2,788	-	8,429	-	2,213	2,213
- 1988	810	4.75	3,847	2,022	4.83	9,766	217	6.94	1,506	631	6.80	4,291	4,818	12,651	1,265	3,321	4,586
- 1990	1,620	4.75	7,695	2,723	4.83	13,152	433	6.94	3,005	820	6.80	5,576	9,630	16,855	2,528	4,424	6,952
- 1995	4,717	4.75	22,406	4,086	4.83	19,735	1,419	6.94	9,848	1,229	6.80	8,357	29,029	25,283	7,620	6,637	14,257
- 2000	9,577	4.75	45,491	5,448	4.83	26,314	2,723	6.94	18,898	1,639	6.80	11,145	57,950	33,713	15,212	8,850	24,062
- 2010	9,577	4.75	45,491	5,448	4.83	26,314	2,723	6.94	18,898	1,639	6.80	11,145	57,950	33,713	15,212	8,850	24,062
ROUTE: NACALA																	
ALT. 2.2- SOUTHERN-ZAMBÉZIA																	
- 1986	-	4.29	-	1,492	4.30	6,416	-	5.78	-	378	5.66	2,139	-	7,699	-	2,021	2,021
- 1988	851	4.29	3,651	2,240	4.30	9,632	214	5.78	1,237	567	5.66	3,209	4,399	11,557	1,155	3,034	4,189
- 1990	1,700	4.29	7,293	2,918	4.30	12,547	430	5.78	2,485	815	5.66	4,613	8,800	15,544	2,310	4,054	6,364
- 1995	5,090	4.29	21,836	4,478	4.30	19,255	1,304	5.78	7,537	1,133	5.66	6,413	26,436	23,101	6,939	6,064	13,003
- 2000	10,053	4.29	43,127	5,836	4.30	25,095	2,719	5.78	15,716	1,629	5.66	9,220	52,959	30,883	13,902	8,107	22,019
- 2010	10,053	4.29	43,127	5,836	4.30	25,095	2,719	5.78	15,716	1,629	5.66	9,220	52,959	30,883	13,902	8,107	22,019

[1] 90% of consumption according with the methodology
[2] Fuel price = US$ 0,25 per litre with 5% for lubricant

TABLE 9.II.7.1 - FUEL CONSUMPTION

(Cont.)

ROUTES/YEARS	EXPORT DIRECTION						IMPORT DIRECTION						ANNUAL [1] CONSUMPTION $\ell(10^3)$		ANNUAL [2] COST US10^3(JUL/82)		TOTAL COST
	MUCANHA/VUZI			MOATIZE			MUCANHA/VUZI			MOATIZE							
	GTK (10^6)	$\ell/10^3$ GTK	$\ell(10^3)$	GTK (10^6)	$\ell/10^3$ GTK	$\ell(10^3)$	GTK (10^6)	$\ell/10^3$ GTK	$\ell(10^3)$	GTK (10^6)	$\ell/10^3$ GTK	$\ell(10^3)$	MUCANHA/VUZE	MOTIZE	MUCANHA/VUZE	MOATIZE	US$ 10^3 (JUL/82)
ROUTE: NACALA																	
ALT. 2.3- NORTHERN-MALAWI																	
- 1986	-	4.68	-	1,362	4.83	6,578	-	6.48	-	410	6.80	2,788	-	8,429	-	2,213	2,213
- 1988	921	4.68	4,310	2,022	4.83	9,766	246	6.48	1,594	631	6.80	4,291	5,314	12,651	1,395	3,321	4,716
- 1990	1,842	4.68	8,621	2,723	4.83	13,152	493	6.48	3,195	820	6.80	5,576	10,634	16,855	2,791	4,424	7,215
- 1995	5,365	4.68	25,108	4,086	4.83	19,735	1,614	6.48	10,459	1,229	6.80	8,357	32,010	25,283	8,403	6,637	15,040
- 2000	10,893	4.68	50,979	5,448	4.83	26,314	3,097	6.48	20,069	1,639	6.80	11,145	63,943	33,713	16,785	8,850	25,635
- 2010	10,893	4.68	50,979	5,448	4.83	26,314	3,097	6.48	20,069	1,639	6.80	11,145	63,943	33,713	16,785	8,850	25,635
ROUTE: NACALA																	
ALT. 2.4 NORTHERN-ZAMBÉZIA																	
- 1986	-	4.27	-	1,492	4.30	6,416	-	5.62	-	378	5.66	2,139	-	7,698	-	2,021	2,021
- 1988	958	4.27	4,091	2,240	4.30	9,632	241	5.62	1,354	567	5.66	3,209	4,900	11,557	1,286	3,034	4,320
- 1990	1,914	4.27	8,173	2,918	4.30	12,547	484	5.62	2,720	815	5.66	4,613	9,804	15,444	2,573	4,054	6,627
- 1995	5,730	4.27	24,467	4,478	4.30	19,255	1,468	5.62	8,250	1,133	5.66	6,413	29,445	23,101	7,729	6,064	13,793
- 2000	11,316	4.27	48,319	5,836	4.30	25,095	3,060	5.62	17,197	1,629	5.66	9,220	58,964	30,883	15,478	8,107	23,585
- 2010	11,316	4.27	48,319	5,836	4.30	25,095	3,060	5.62	17,197	1,629	5.66	9,220	58,964	30,883	15,478	8,107	23,585

[1] 90% of consumption according with the methodology
[2] Fuel price = US$ 0,25 per litre with 5% for lubricant

TABLE 9.II.7.1 - FUEL CONSUMPTION

(Cont.)

ROUTES/YEARS	EXPORT DIRECTION						IMPORT DIRECTION						ANNUAL [1] CONSUMPTION ℓ(10³)		ANNUAL [2] COST US$10³(JUL/82)		TOTAL COST
	MUCANHA/VUZI			MOATIZE			MUCANHA/VUZI			MOATIZE							
	GTK (10⁶)	ℓ/10³ GTK	ℓ(10³)	GTK (10⁶)	ℓ/10³ GTK	ℓ(10³)	GTK (10⁶)	ℓ/10³ GTK	ℓ(10³)	GTK (10⁶)	ℓ/10³ GTK	ℓ(10³)	MUCANHA/VUZE	MOTIZE	MUCANHA/VUZE	MOATIZE	US$ 10³ (JUL/82)
ROUTE: ZAMBÉZIA RIVER																	
ALT. 3.1 SOUTHERN																	
- 1986	-	4.27	-	28	4.27	120	-	5.44	-	7	5.44	38	-	142	-	37	37
- 1988	90	4,27	384	41	4.27	175	24	5.44	131	11	5.44	60	463	211	122	55	177
- 1990	181	4.27	773	54	4.27	231	47	5.44	256	15	5.44	82	926	282	243	74	317
- 1995	536	4.27	2,289	82	4.27	350	149	5.44	811	23	5.44	125	2,790	427	732	112	844
- 2000	1,071	4.27	4,573	111	4.27	474	297	5.44	1,616	29	5.44	158	5,570	569	1,462	149	1,611
- 2010	1,071	4.27	4,573	111	4.27	474	297	5.44	1,616	29	5.44	158	5,570	569	1,462	149	1,611
ROUTE: ZAMBÉZIA RIVER																	
ALT. 3.2 NORTHERN																	
- 1986	-	4.36	-	28	4.27	120	-	5.62	-	7	5.44	38	-	142	-	37	37
- 1988	305	4.36	1,330	41	4.27	175	80	5.62	450	11	5.44	60	1,602	211	420	55	475
- 1990	611	4.36	2,664	54	4.27	231	160	5.62	900	15	5.44	82	3,208	282	842	74	916
- 1995	1,808	4.36	7,883	82	4.27	350	502	5.62	2,821	23	5.44	125	9,634	427	2,529	112	2,641
- 2000	3,615	4.36	15,761	111	4.27	474	1.004	5.62	5,642	29	5.44	158	19,263	569	5,056	149	5,205
- 2010	3,615	4.36	15,761	111	4.27	474	1.004	5.62	5,642	29	5.44	158	19,263	569	5,056	149	5,205

[1] 90% of consumption according with the methodology
[2] Fuel price = US$ 0,25 per litre with 5% for lubricant

TABLE - 9.II.7.2 - AUXILIARY TABLE FOR FUEL CONSUMPTION CALCULATION

£/1,000 TKB

ALTERNATIVE	SECTIONS	LENGTH km	CONSUMPTION/SECTION		SECTION SHARE IN CONSUMPTION	AVARAGE WEIGHED CONSUMPTION	
			EXPORT DIRECTION	IMPORT DIRECTION		EXPORT DIRECTION	IMPORT DIRECTION
1.1. Mucanha/Vuzi	Mucanha -Vuzi-Cambulatsisse	364	4.21	5.55	41	1.72	2.27
	Cambulatsisse-Dondo	489	4.37	6.13	56	2.45	3.43
	Dondo-Beira	28	3.00	6.50	3	0.09	0.19
		881				4.26	5.89
1.1. Moatize	Moatize-Cambulatsisse	58	4.37	6.13	10	0.44	0.61
	Cambulatsisse-Dondo	489	4.37	6.13	85	3.71	5.21
	Dondo-Beira	28	3.00	6.50	5	0.15	0.33
		575				4.30	6.15
1.2. Mucanha/Vuzi	Nhancapirire-Tete	131	4.27	5.44	18	0.77	0.98
	Tete-Moatize	20	4.27	5.44	3	0.13	0.16
	Moatize-Cambulatsisse	58	4.37	6.13	8	0.35	0.49
	Cambulatsisse-Dondo	489	4.37	6.13	67	2.93	4.11
	Dondo-Beira	28	3.00	6.50	4	0.14	0.26
		726				4.32	6.00
1.2. Moatize	Moatize-Cambulatsisse	58	4.37	6.13	10	0.44	0.61
	Cambulatsisse-Dondo	489	4.37	6.13	85	3.71	5.21
	Dondo-Beira	28	3.00	6.50	5	0.15	0.33
		575				4.30	6.15
2.1. Mucanha/Vuzi	Nhancapirire-Tete	131	4.27	5.44	12	0.51	0.65
	Tete-Moatize	20	4.27	5.44	2	0.08	0.43
	Moatize-Cambulatsisse	58	4.37	6.13	4	0.17	0.25
	Cambulatsisse-Nkaia	202	4.68	5.48	18	0.84	0.99
	Nkaia-Monapo	650	4.73	7.25	58	2.74	4.20
	Monapo-Nacala	67	6.79	7.01	6	0.41	0.42
		1,128				4.75	6.94
2.1. Moatize	Moatize-Cambulatsisse	58	4.37	6.13	6	0.26	0.37
	Cambulatsisse-Nkaia	202	4.68	5.48	21	0.98	1.15
	Nkaia-Monapo	650	4.73	7.25	66	3.12	4.79
	Monapo-Nacala	67	6.79	7.01	7	0.47	0.49
		977				4.83	6.80
2.2. Mucanha/Vuzi	Nhancapirire-Tete	131	4.27	5.44	10	0.43	0.54
	Tete-Moatize	20	4.27	5.44	2	0.09	0.11
	Moatize-Cambulatsisse	58	4.37	6.13	5	0.22	0.31
	Cambulatsisse-Nhamalabue	196	4.37	6.13	16	0.70	0.98
	Nhamalabue-Monapo	761	4.05	5.40	62	2.51	3.49
	Monapo-Nacala	67	6.79	7.01	5	0.34	7.01
		1,233				4.29	5.73
2.2. Moatize	Moatize-Cambulatsisse	58	4.37	6.13	5	0.22	0.31
	Cambulatsisse-Nhamalabue	196	4.37	6.13	18	0.79	1.10
	Nhamalabue-Monapo	761	4.05	5.40	71	2.88	3.83
	Monapo-Nacala	67	6.79	7.01	6	0.41	0.42
		1,082				4.30	5.66
2.3. Mucanha/Vuzi	Mucanha-Vuzi-Cambulatsisse	364	4.21	5.55	28	1.18	1.55
	Cambulatsisse-Nkaia	202	4.68	5.48	16	0.75	0.88
	Nkaia-Monapo	650	4.73	7.25	51	2.41	3.70
	Monapo-Nacala	67	6.79	7.01	5	0.34	0.35
		1,283				4.68	6.48
2.3. Moatize	Moatize-Cambulatsisse	58	4.37	6.13	6	0.26	0.37
	Cambulatsisse-Nkaia	202	4.68	5.48	21	0.98	1.15
	Nkaia-Monapo	650	4.73	7.25	66	3.12	4.79
	Monapo-Nacala	67	6.79	7.01	7	0.47	0.49
		977				4.83	6.80
2.4. Mucanha/Vuzi	Mucanha-Vuzi-Cambulatsisse	364	4.21	5.55	26	1.09	1.44
	Cambulatsisse-Nhamalabue	196	4.37	6.13	14	0.61	0.86
	Nhamalabue-Monapo	761	4.05	5.40	55	2.23	2.97
	Monapo-Nacala	67	6.79	7.01	5	0.34	0.35
		1,388				4.27	5.62
2.4. Moatize	Moatize-Cambulatsisse	58	4.37	6.13	5	0.22	0.31
	Cambulatsisse-Nhamalabue	196	4.37	6.13	18	0.79	1.10
	Nhamalabue-Monapo	761	4.05	5.40	71	2.88	3.83
	Monapo-Nacala	67	6.79	7.01	6	0.41	0.42
		1,082				4.30	5.66
3.1. Mucanha/Vuzi	Nhancapirire-Tete	131	4.27	5.44		4.27	5.44
3.1. Moatize	Moatize-Tete	20	4.27	5.44		4.27	5.44
3.2. Mucanha/Vuzi	Mucanha-Vuzi-Cambulatsisse	364	4.21	5.55	82	3.45	4.55
	Cambulatsisse-Moatize	58	5.37	6.13	13	0.70	0.80
	Moatize-Tete	20	4.27	5.44	5	0.21	0.27
		442				4.36	5.62
3.2. Moatize	Moatize-Tete	20	4.27	5.44		4.27	5.44

9.II.8 - ANNUAL COSTS OF COASTAL, FLUVIAL, LACUSTRINE TRANSPORTATION AND IN THE TERMINALS

TABLE-9.II.8.1-LOADING TERMINAL AT BOHOZI (ANNUAL COSTS IN US$ 1,000.00)

	1st.PHASE $1x10^6$tons	2nd.PHASE $3x10^6$ tons	3rd.PHASE $6x10^6$ tons
1.1 - DIRECT COSTS			
a) Operational Labor			
Specialized 5 (workers)x3(turns)x1.2(pause)x7 (annual wages)	126.0	126.0	201.6
Not qualified 8 (workers)x3(turns)x1.2 (pause)x 2 (annual wages)	57.6	57.6	93.6
Obs.: In 3rd. phase each turn will have 8 specialized and 13 non specialized			
b) Consumption material (budget)	50.0	100.0	150.0
c) Fuel and lubricants (budget)	50.0	100.0	150.0
d) Electrical energy			
1,500 (HP) x 1,500 (hours/year)x0.07 (US$/ Kw hour) (4,500 hours in 2nd.phase and 2,100 HP and 4,500 hours in 3rd.phase)	157.5	472.5	661.5
e) Maintenance			
Port Civil work 1,07x0.03x2,820(in 3rd. phase 4,740)	90.5	90.5	152.2
Other civil work 1.07x0.015x1,900(in 3rd.phase 2,000)	30.5	30.5	32.1
Equipment 0.07x1,3x4,835(in 3rd.phase 6,479)	440.0	440.0	590.0
Electrical installations 0.03x1.3x490(in 3rd. phase 655)	19.1	19.1	25.5
P.S. Dredgin maintenance not needed			
SUBTOTAL 1	1,021.2	1,436.2	2,056.5
1.2 - INDIRECT COSTS (fixed)			
a) General Administration Labor			
Terminal Administration 2 (workers)x13.6(annual wages)	27.2	27.2	27.2
Not specialized 8 (workers)x2 (annual wages)	16.0	16.0	16.0
specialized 2 (workers)x7 (annual wages)	14.0	14.0	14.0
Security and fireman 9(workers)x5(annual wages)	45.0	45.0	45.0
b) Depreciation			
Civil work (30 years)	168.3	168.3	240.0
Equipment and eletrical installations(20 years)	345.8	345.8	463.2
SUBTOTAL 2	616.3	616.3	805.4
GENERAL TOTAL	1,637.5	2,052,5	2,861.9
COST PER TON (in US$)	1,64	0.68	0.48

TABLE-9.II.8.2-LAKE NAVIGATION (ANNUAL COSTS IN US$ 1,000.00)

	1st PHASE 1x10^6 tons	2nd PHASE 3x10^6 tons	3rd PHASE 6 x10^6tons
2.1.DIRECT COSTS			
a) OPERATIONAL LABOR			
Specialized 2 (workers)x2(Alternation)x 7 (annual wages)x2(pusher boat)	56.0	168.0	224.0
Not specialized 3 (workers)x2(altern.) x 2 (a.w.)x2 (pusher boat)	24.0	72.0	96.0
Obs.: in 3rdPhase, labor do not increases in the same freight proportion due to round trip.			
b) Consumption Materials (Budget)*	30.0	90.0	120.0
c) Fuel			
$2{,}000HP \times 0.85 \times \left(\frac{0.16kg/HP}{0.83}\right) \times 0.25 \times 1.05 \times$ 2,728 Hours/year.	234.7	704.1	1,408.2
Budget for spare pusher boat services	30.0	30.0	30.0
d) Insurance			
Pusher boat 0.02x3,000(1st Phase=2; 2 nd Phase=4; 3rd Phase=6)(1 spare)	120.0	180.0	240.0
Barges 0.02x4x1,200(1st Phase=1; 2nd. Phase=3; 3rd.Phase=5 convoys)	96.0	288.0	480.0
e) Maintenance			
Pusher boats 0.10x3,000	600.0	1,200.0	1,800.0
Barges 0.03x4,800	144.0	432.0	720.0
Signalling and Buoys 0.03 x 1,500	45.0	45.0	45.0
SUBTOTAL 1	1,379.7	3,209.1	5,163.2
2.2.INDIRECT COSTS (FIXED)			
a) DEPRECIATION			
Pusher boat 3,000 (15 years)	400.0	800.0	1,200.0
Barges 4,800 (15 years)	320.0	960.0	1,600.0
Signalling and Buoys (20 years)	75.0	75.0	75.0
SUBTOTAL 2	795.0	1,835.0	2,875.0
GENERAL TOTAL	2,174.7	5,044.1	8,038.2
COST PER TON (in US$)	2.17	1.68	1.34

* Crew's food supply included

TABLE-9.II.8.3-UNLOADING TERMINAL IN NHANCAPIRIRE (ANNUAL COSTS IN US$ 1,000.00)

	1st.PHASE $1x10^6$ tons	2nd.PHASE $3x10^6$ tons	3rd.PHASE $6x10^6$ tons
3.1 - DIRECTS COSTS			
a) Operational Labor			
Specialized 11(workers)x3(turns)x1.2 (pause)x7 (annual wages)	277.2	277.2	327.6
Not specialized 11(workers)x3(turns)x1.2 (pause) x2 (annual wages)	79.2	79.2	115.2
Obs.: In 3rd.phase each turn will have 13 specialized and 16 not specia lized workers			
b) Consumption material (budget)	50.0	100.0	150.0
c) Fuel and lubricants			
Fixed parcel (budget)	80.0	150.0	200.0
Wheel loader 23.5(litt./h)x0.25x1.05 (US$/litt.)x 2,500 (hours/year)	15.4	46.2	92.4
Obs.: In 2nd.phase number of hours are triple and double 3rd.phase			
d) Electrical Energy			
2,184x1,500(hours/year)0.07(US$/Kw hour)	229.3	687.9	1,330.6
Obs.: 4,500 hours in 2nd. and 3rd.phases being used 4,224 HP in 3rd.phase)			
e) Maintenance			
Port Civil Work 1.07x0.03x3,060(in 3rd. phase 5,220)	98.2	98.2	167.6
Other Civil Works 1.07x0.015x6,418(in 3d. phase 6,518)	103.0	103.0	104.6
Equipment 0.07x1.3x9,366(in 3rd.phase 15,323)	852.3	852.3	1,394.4
Electrical Installations 0.03x1.3x1,405 (in 3rd.phase 2,005)	54.8	54.8	78.2
Obs.: Dredging maintenance not needed			
SUBTOTAL 1	1,839.4	2,448.8	3,960.6
3.2 - INDIRECT COSTS (fixed)			
a) General Administration Labor			
Terminal Administration 2 (workers)x13.6 (annual wages)	27.2	27.2	27.2
Not specialized 12 (workers)x2(annual wages)	24.0	24.0	24.0
specialized 3 (workers)x7(annual wages)	21.0	21.0	21.0
Security and fireman 12 (workers)x5 (annual wages)	60.0	60.0	60.0

TABLE-9.II.8.3-UNLOADING TERMINAL IN NHANCAPIRIRE (ANNUAL COSTS IN US$ 1,000.00)

(Cont.)

	1st PHASE 1x10^6 tons	2nd PHASE 3x10^6 tons	3rd PHASE 6x10^6 tons
b) Depreciation			
Civil Works (30 years)	319.5	319.5	400.0
Equip.and electric. Installations (20 years)	703.6	703.6	1,130.4
SUBTOTAL 2	1,155.3	1,155 3	1,662.6
TOTAL GERAL	2,944.7	3,604.1	5,623.2
COST PER TON (in US$)	3.00	1.20	0.94

TABLE-9.II.8.4-RIVER LOAD TERMINAL AT TETE (ANNUAL COSTS IN US$ 1,000.00)

	1st PHASE 3x10^6 tons	2nd PHASE 6x10^6 tons	3rd PHASE 10 x10^6 tons
4.1. DIRECT COSTS			
a) Operational Labor			
Specialized 15 (workers) x3 (turns) x1,2 (pause) x7 (annual wages)	378.0	529.2	740.9
Not Specialized 20 (workers) x3 (turns) x 1,2 (pause) x 2 (annual wages)	180.0	252.0	352.8
b) Consumption Material (budget)	100.0	200.0	300.0
c) Fuel and lubricants (budget)	120.0	200.0	280.0
d) Electrical energy 2,322 (HP) x 3,700 (hours/year) x0.07 (US$/ Kw Hour) (3,888 HP in 2nd. Phase and 5,553 HP in 3rd. Phase)	601.4	1,007.0	1,598.0
e) Port Civil work 1.07x0.03x2,100 (2nd. Phase 3,900; 3rd. Phase 5,700)	67.4	125.2	183.0
Other civil work 1.07x0.015x8,500 (2nd. Phase 10,400; 3rd. Phase 11,300)	138.8	171.2	187.7
Equipment 1.3x0.07x9,765 (2nd. Phase 19,262; 3rd. Phase 24,875)	888.6	1,752.8	2,264.1
Electrical installations 1.3x0.03x1,500 (2nd. Phase 2,450; 3rd. Phase 3,050)	58.5	95.6	119.0
SUBTOTAL 1	2,532.7	4,333.0	6,025.5
4.2. INDIRECT COSTS (Fixed)			
a) Administration labor			
Terminal Administration 2 (workers) x13.6 (annual wages)	27.2	27.2	27.2
Not Specialized 12 (workers) x2 (a.w.)	24.0	24.0	24.0
Specialized 3 (workers) x7 (a.w)	21.0	21.0	21.0
Security and fireman 12 (workers) x5 (a.w.)	60.0	60.0	60.0
b) Depreciation			
Civil work (40 years)	283.8	382.8	467.8
Equipment and electrical installations (20 years)	735.9	1,415.7	1,824.1
SUBTOTAL 2	1,151.9	1,930.7	2,424.1
GENERAL TOTAL	3,684.6	6,263.7	8,449.6
COST PER TON (in US$)	1.23	1.04	0.85

TABLE 9.II.8.5 - RIVER TRANSPORT: TETE - CHINDE (ANNUAL COSTS IN US$ 1,000.00)

	1st PHASE 3x10^6 tons	2nd PHASE 6x10^6 tons	3rd PHASE 10x10^{6}tons
5.1 - DIRECT COSTS			
a) Operational labor (crew)			
Specialized 2(workers)x2(altern)x x7(a.w.)x8 pusher boats	224.0	364.0	588.0
Not Specialized 3(workers)x2(altern)x 2(a.w.)x8 pusher boats	96.0	156.0	252.0
Obs.: In 1st phase =8 pusher;in 2nd phase will be 13; in 3rd phase will be 21 pusher boats			
b) Consumption material (budget)	180.0	330.0	540.0
c) Fuel and lubricants			
2,500HPx0.85x($\frac{0.16kg/HP}{0.83}$)x0.25x1.05x x5,556 hours/year x8 convoys	4,779.5	7,820.9	13,263.0
budget of the spare pusher boats	50.0	50.0	50.0
d) Insurance			
Pusher boats 0.02x3,000x8(pusher)(2nd phase = 13; 3rd phase = 21)	480.0	,780.0	1,260,0
Barges 0.02x1,000x42(barges) (2nd phase = 72; 3rd phase = 120)	840.0	1,440.0	2,400.0
e) Maintenance			
Pusher boats 0.10x3,000 x 8 (2nd phase = = 13; 3rd phase = 21)	2,400.0	3,900.0	6,300.0
Barges 0.03 x 1,000 x 42 (2nd phase = = 72; 3rd phase = 120)	1,260.0	2,160.0	3,600.0
Signalling and buoys 0.03x3,000	90.0	90.0	90.0
Dredging 0.40 x 13,500	5,400.0	5,400.0	5,400.0
SUB-TOTAL 1	15,799.5	22,490.0	33,743.0
5.2 - INDIRECT COSTS (Fix)			
a) Depreciation			
Pusher boats 24,000(15 years) (2nd phase 39,000; 3rd 63,000)	1,600.0	2,600.0	4,200.0
Barges 42,000 (15 years) (2nd phase = 72,000; 3rd phase 120,000)	2,800.0	4,800.0	8,000.0
Signalling and buoys 3,000 (20 years)	150.0	150.0	150:0
SUB-TOTAL 2	4,550.0	7,550.0	12,350.0
GENERAL TOTAL	20,349.5	30,040.0	46,093.0
COST PER TON (US$)	6.78	5.01	4.61

TABLE 9.II.8.6 - SEA TERMINAL - CHINDE ALTERNATIVE (BARGE COMING) (ANNUAL COSTS IN US$ 1,000.00)

	1st PHASE 3x10^6 tons	2nd PHASE 6x10^6 tons	3rd PHASE 10x10^6tons
6.1 - DIRECT COSTS			
a) Operational Labor			
Specialized 16(workers)x3(turns)x x1.2(pause)x7(annual wages)	403.2	564.5	677.4
Not Specialized 20(workers)x3(turns)x 1.2x(pause)x2(annual wages) (40% is added in 2nd phase and 20% in 3rd phase	144.0	201.6	241.9
b) Consumption Material (budget)	130.0	260.0	390.0
c) Fuel and lubricants (budget)	250.0	350.0	470.0
d) Electrical Energy			
10,800(HP)x3,000(hours/year)x0.07(US$ kw/hour) (11,619 HP in 2nd phase e 21,618 HP in 3rd)	2,268.0	2,846.7	5,296.4
e) Maintenance			
Port Civil Work 1.07x0.03x139,970 (2nd phase 141,970; 3rd phase 158,970)	4,493.0	4,557.2	5,102.9
Other Civil Works 1.07x0.015x31,600(2nd phase 34,700; 3rd phase 37,700)	507.2	546.6	605.1
Equipment 1.3x0.07x42,565 (2nd phase 57,189; 3rd phase 93,203)	3,873.4	5,204.2	8,481.5
Electrical Instal. 1.3x0.03x6,400 (2nd phase 7,680; 3rd phase 11,790)	249.6	299.5	459.8
SUB-TOTAL 1	12,318.0	14,831.3	21,725.0
6.2 - INDIRECT COSTS (fixed)			
a) General Administration Labor			
Terminal Administration 3(workers)x x13.6(annual wages)	40.8	40.8	40.8
Not specialized 25(workers)x2(annual wages)	50.0	50.0	50.0
Specialized 6(workers)x7(annual wages)	42.0	42.0	42.0
Security and fireman 12x(workers)x5(annual wages)	60.0	60.0	60.0
b) Depreciation			
Civil work (40 years)	4,287.8	4,399.0	4,910.3
Equipment and Electrical Installations (20 years)	3,183.3	4,229.0	6,825.4
SUB-TOTAL 2	7,763.9	8,820.8	11,928.5
GENERAL TOTAL	20,081.9	23,652.1	33,653.5
COST PER TON (in US$)	6.69	3.94	3.37

TABLE 9.II.8.7 - SEA TERMINAL - NACALA ALTERNATIVE (ANNUAL COSTS IN US$ 1,000.00)

	1st PHASE 3x10^6 tons	2nd PHASE 6x10^6 tons	3rd PHASE 10x10^{6}tons
8.1 - DIRECT COSTS			
a) Operational Labor			
Specialized 15 (workers)x3(turns)x x1.2(pause)x7(annual wages)	378.0	529.2	635.0
Not Specialized 18(workers)x3(turns)x x1.2(pause)x2(annual wages) (40% is added in 2nd stage and 20% in 3rd stage)	129.6	181.4	217.7
b) Consumption Material (budget)	100.0	200.0	300.0
c) Fuel and lubricants Fixed part (budget)	120.0	200.0	250.0
Wheel loaders 23.5(litt./hour)x0.25x x1.05(US$ litt)x7,500 (hours/year) (in 2nd and 3rd phase used as auxiliary equipment)	46.3	23.1	23.1
d) Electrical Energy			
2,628(HP)x3,000(hours/year)x0.07(US$ Kw hour) (3,528 HP in 2nd phase and 5,436 in 3rd with 3,500 hour)	551.9	864.4	1,331.8
e) Maintenance			
Port Civil Work 1,07x0.03x15,000 (3rd phase 26,900)	481.5	481.5	863.5
Other Civil Works 1.07x17,400 (2nd phase 20,100; 3rd phase 23,300)	279.3	322.6	374.0
Equipment 0.07x18,022x1.3(2nd phase 28,722; 3rd phase 41,022)	1,640.0	2,613.7	3,733.0
Electrical Instal. 0.03x2,600x1.3 (2nd phase 3,700 and 3rd phase 4,700)	101.4	144.3	183.3
SUB-TOTAL 1	3,828.0	5,560.2	7,911.4
8.2 - INDIRECT COSTS			
a) General Administration Labor			
Terminal Administration 3(workers)x x13.6(annual wages)	40.8	40.8	40.8
Not Specialized 20(workers)x2(annual wages)	40.0	40.0	40.0
Specialized 5(workers)x7(annual wages)	35.0	35.0	35.0
Security and fireman 20(workers)x5(annual wages)	100.0	100.0	100.0
b) Depreciation			
Civil Works (40 years) (3rd phase 50,200) (2nd phase 35,100) and (1st phase 32,400)	810.0	877.5	1,255.0
Equip. and Electr.Inst. (20 years) (3rd phase 59,212) (2nd phase 41,922) and (1st phase 26,622)	1,331.1	2,096.1	2,960.6
SUB-TOTAL 2	2,356.9	3,189.4	4,431.4
GENERAL TOTAL	6,184.9	8,749.6	12,342.8
COST PER TON (in US$)	2.06	1.46	1.23

TABLE 9.II.8.8 - SEA TERMINAL-BEIRA (ESTUARY) ALTERNATIVE (ANNUAL COST IN US$ 1,000.00)

	1st PHASE 3x10^6 tons	2nd PHASE 6x10^6 tons	3rd PHASE 10x10^6 tons
9.1 - DIRECT COSTS			
a) Operational Labor			
Specialized 15 (workers)x3(turns)x x1.2(pause)x7(annual wages)	378.0	529.2	635.0
Not specialized 20 (workers)x3(turns) x1.2(pause)x2(annual wages) (40% is added in 2nd phase and 20% in 3rd phase)	144.0	201.6	241.9
b) Consumption Material (Budget)	110.0	220.0	330.0
c) Fuel and Lubricant			
Fixed Parcel (Budget)	150.0	250.0	300.0
Wheel Loader 23.5(litt/h)x0.25x1.05x x(US$/litt)x7,500 (hours/year) (in 2nd and 3rd phase used as auxiliary equip.)	46.3	23.1	23.1
d) Electrical Energy			
3,348(HP)x3,000(hours/year)x0.07 (US$ kw hours) (4,248 HP in 2nd phase and 6,606 HP in 3rd with 3,500 hours)	703.1	1,040.8	1,618.5
e) Maintenance			
Port Civil Work 1.07x0.03x13,850 (3rd phase 25,450)	444.6	444.6	816.9
Other Civil Works 1.07x0.015x14,000(2nd phase 16,700; 3rd phase 19,900)	224.7	268.0	319.4
Equipment 1.3x0.07x21,316 (2nd phase 32,016; 3rd phase 46,659)	1,939.8	2,913.5	4,246.0
Electrical Install. 1.3x0.03x3,200(2nd phase 4,300; 3rd phase 5,800)	124.8	167.7	226.2
Dredging 0.42x0.2x42,500 (2nd phase = =0.55x0.20x65,000) and (3rd phase = =0.57x0.2x90,500)	3,570.0	7,150.0	10,317.0
SUB-TOTAL 1	7,835.3	13,208.5	19,074.0
9.2 - INDIRECT COSTS			
a) General Administration Labor			
Terminal Administration 3(workers) x 13.6(annual wages)	40.8	40.8	40.8
Not Specialized 20(workers)x2(annual wages)	40.0	40.0	40.0
Specialized 5(workers)x7(annual wages)	35.0	35.0	35.0
Security and fireman 20(workers)x5x x(annual wages)	100.0	100.0	100.0

TABLE 9.II.8.8 - SEA TERMINAL-BEIRA (ESTUARY) ALTERNATIVE (ANNUAL COST IN US$ 1,000.00)

(Cont.)

	1st PHASE 3x10^6 tons	2nd PHASE 6x10^6 tons	3rd PHASE 10x10^6tons
b) Depreciation			
Civil Works (40 years) (1st phase 27,850; 2nd phase 30,550; 3rd phase 45,350)	696.3	763.8	1,133.8
Equip. and Elect. Inst. (20 years) (1st phase 31,866; 2nd phase 41,166 and 3rd phase 68,109)	1,593.3	2,358.3	3,405.5
Signalling and Buoys (20 years) 1,500	75.0	75.0	75.0
SUB-TOTAL 2	2,580.4	3,412.9	4,830.1
GENERAL TOTAL	10,415.7	16,621.4	23,904.1
COST PER TON (in US$)	3.47	2,77	2,39