

アフリカ開発銀行



スーダン民主共和国 運 輸 省 道路橋梁公団

スーダン国道路建設計画 フィージビリティ調査 EL OBEID—UM RUABA

ファイナル レポート 資 料 編

昭和53年3月

国際協力事業団





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ファイナル レポート

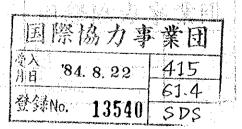
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TABLE 3-1 TOTAL POPULATION IN THE SUDAN

	Populati	on	Percentage	Rate of Annu	al Increase
	Total	Urban	of (B)/(A)	Total	Urban
Year	(A)	(B)	(c)	(D)	(E)
	('000)	('000')	(%)	(%)	(%)
1966	14,120	1,492	10.6	}	
1967	15,504	1,574	10.2	5.8	5.5
1968	14,936	1,661	11.1	}	5.5
1969	15,312	1,752	11.4		<u>i e di la calanta di la calan</u>
1970	15,695	1,848	11.8	2.5	5.5
1971	16,087	1,950	12.1	2.5	5.5
1972	16,489	2,058	12.5	2.5	5.5
1973	16,901	2,170	12.8	2.5	5.4
1974	17,324	2,289	13.2	2.5	5.5
AVERAGE			11.7 2)	2.6 3)	5.5 3)

Figures in A and B indicate estimates of questionable reliability.

Source: Dept. of Economics and Social Affairs, Statistical Office,

Demographic Year Book 27th Issue, 1976, U.N. New York,

N.Y., U.S.A.

Notes: 1) Rates of annual increase are calculated from the figures in Columns A and B.

- 2) Indicating the average of percentage figures in Column C.
- 3) Indicating the average annual growth rate from 1966 to 1974.

TABLE 3-2 POPULATION AND DENSITY BY PROVINCE IN 1955/56 AND 1973

	Area	Population ('000)	n ('000)	Density	ty //m ² >	Average Growth	Revised Population	Average Growth
Province	km (A)	1955/56 (B)	1973	1955/56 (D)=B/A	1973 (E)=C/A	Rate (I) (%) p.a. 1956-'7 (F) 1)	(1000) 3 1973 (G) 2)	Rate (II) (%) p.a. 1956-'73 (H) 3)
Bahrel Ghazal	213,751	න ග ග	1,367	ທ	ဖ	o. □	9## ° T	2.2
Blue Nile	142,138	2,069	3,914	15	58	∞ °	4,065	亡· 寸
Darfur	496,369	1,329	1,839	ო	a	Б. Э.	1,945	2.3
Equatoria	198,121	†06	725		寸	თ 	766	-1.0
Kassala and Red Sea	340,655	146	1,472	ო	ហ	2.6	1,557	3.0
Kordofan	380,546	1,762	2,010	ໜ	ιo	8.0	2,202	e ⊢
Northern	477,074	873	902	2	8	0.2	954	0.5
Upper Nile	236,180	883	799	æ	က	-0.7	845	0.3
Khartoum	20,961	505	1,113	5 th	ന	8.	1,178	2.1
Total	2,505,805	10,263	14,141	≢	Ó	o.1	14,958	2.2

Source: Department of Statistics, Statistical Year Book, 1973

Notes: 1) Average growth rate (I) p.a. is estimated by Column (B) and (C).

The total population is given by Dept. of Statistics, National Income 1972/73-1974/75. Revised population in province is estimated by adjusting provincial populations in Column (C) to the total of 14,958,000. 5)

The rates are estimated by using the revised population in Column (B) and (G). 3

ANNEX III-3

TABLE 3-3 LABOUR FORCE BY OCCUPATION

Occupation	Percentage
Professional and Technical	1.9
Administrative and Managerial	0.4
Clerical and Related Scales	1.4
Salesmen	4.5
Services Workers	7.6
Agricultural, Animal and Forestry	71.6
Production, Transport, Operation	12.6
TOTAL	100.0

Source: Population Census 1973 (Ministry of Planning, Economic Survey,

1975/76)

Note: These figures are provisional and subject to revision.

ANNEX III-4

TABLE 3-4 COTTON PRODUCTION BY VARIETY

Variety	197	73/74	197	4/75		1 1975/76)
		Production in bales	Acreage	Production in bales	Acreage	Produ in b	
		****			1111	Min.	Max.
Long Staple	824,500	1,009,000	838,000	790,500	593,523	355,695	449,111
Medium	196,500	210,400	231,000	240,000	227,839	142,260	172,642
Short	157,000	18,400	99,000	27,000	132,235	26,730	40,270
Experi- ments			***		3,932	4,398	4,894
Total	1,178,000	1,237,800	1,168,000	1,057,500	957,529	529,084	666,917

Source: Cotton Public Corporation (Economic Survey, 1975/76)

Note: 1) Output of 1975/76 is an estimate.

AREA, PRODUCTION AND AVERAGE YIELD FOR SOME AGRICULTUREAL CROPS TABLE 3-5

1973/74 - 1975/76

	μ	4791/8791		- .⊣	1974/1975		193	1975/1976 ¹⁾	
	1	, + · · · · · · · · · · · · · · · · · ·	Average	4.5	Production	Average Yield	Area	Estimated Production	Average Yield
	Area Fed.	Ton	kg/Fed.		Ton	kg/Fed.	Fed.	Ton	kg/Fed.
1	301.200	0 1.628.290	308	5,577,030	1,704,853	303	6,200,309	2,055,280	ಕಣ
טוונים.	0,00E,100	781,531	•	2,576,380		156	2,512,160	403,145	161
Dukan Ottom danata	705 303			1,785,290		521	2,065,740	930,765	457
Groundius	1, 10, 00 C			2,172,690		107	2,291,045	238,080	104
Sesame Fibost	420,072			591,437	276,265	467	713,790	397,030	556
Cotton	1,178,000			1,168,000		ı	957,000	į	i
Total	13,523,000	- 0(13,870,000	1	l l	13,783,000	i	ı

Source: Ministry of Agriculture, Food and Natural Resources (Economic Survey, 1975/76)

Note: 1) Estimated.

ANNEX III-6

	* .	
(Ton)	1975/76	30,000
70/71 - 1975/	1974/75	52,000
TABLE 3-6 GUM ARABIC PRODUCTION 1970/71 - 1975/76	1973/74	22,000
GUM ARABIC	1972/73	21.194
TABLE 3-6	1971/72	25 QLQ
	1970/71	0 12 14 14

Forests Department, Ministry of Agriculture, Food and Natural Resources (Economic Survey, 1975/76) Source:

Note: 1) Estimated.

ANNEX III-8

TABLE 3-7 DOMESTIC PRODUCTION OF SUGAR AND THE RATIOS OF PRODUCTION TO LOCAL CONSUMPTION FOR THE SEASONS, 1972/73 - 1975/76

Season	Domestic Production (Ton)	Consumption (Ton)	Ratio of Production to Consumption (%)
1972/73	112,641	250,000	45
1973/74	120,571	269,754	45
1974/75	128,651	257,917	50
1975/76	124,000 (Estimated)	310,000	40

Source: Sugar and Beverages Corporation (Economic Survey, 1975/76)

TABLE 3-8 LIVESTOCK WEALTH ESTIMATES FOR THE FISCAL YEAR 1973/74

			(He	eads)
Province	Cattle	Sheep	Goats	Camels
Kordofan	1,989,850	2,961,330	1,004,850	1,231,300
Khartoum	57,980	91,480	346,140	54,060
Darfur	4,752,420	2,900,860	2,507,870	434,350
Blue Nile	1,196,470	3,623,970	2,403,320	252,140
Kassala	385,590	1,116,210	655,630	637,710
Northern	207,350	525,810	327,890	79,840
Upper Nile	1,850,820	697,810	1,242,650	<u> </u>
Equatoria	628,610	478,420	861,300	-
Bahr El Ghazal	3,084,680	976,820	1,146,960	-
Total	14,153,770	13,272,710	10,496,610	2,698,400

Source: Ministry of Agriculture, Food and Natural Resources (Economic Survey, 1975/76)

GROSS DOMESTIC PRODUCT ACCORDING TO THE CURRENT PRICES IN LS MILLION 3-6 3-8 TABLE

(LS Million and Percentage)

ė														ת בי	מוזף ווסדדדדמו פחי	ט זוט סווט	המביטמוו המאמ	<u></u>
	1966/67	/67	196	1967/68	196	1968/69	196	1969/70	1970	1970/71	197	1971/72	1972/73	173	1973/74	7t	7.	75
·	I S E	Share %	LS	Share %	LS	Share %	LS	Share %	LS MM	Share %	S. S.	Share %	LS S MM	Share %	LS	Share %	LS S	Share %
Agriculture 176.2	176.2	33.0	194.0	33.9	203.9	33.2	208.2	32.3	219.1	31.9	243.8	32.4	334.6	38.4	516.4	4.1.5	585.	38.7
Manufacturing and Mining	ng 49.4	ი თ	ა ქ	6.7	57.3	თ თ	66.8	10.3	69.2	10.1	76.8	10.2	82.9	6.5	111.2	တ ထ	142.9	ى ئ
Electricity and Water	76.6	പ് ത	16.3	8	16.6	2.7	16.5	2.6	16.6	ਜ ਼ ਟ	16.9	2.2	17.5	2.0	18.6	ц ъ	20.9	a. H
Construction & Building	n 23.9	<u>។</u> ល	22.8	O •	24.4	· †	24.3	დ დ	23.3	ю т	26.2	സ	31.2		61.0	ာ တ	65.0	φ. π.
Wholesale Trade, Finance, Real- estate, etc.154.	e Trade, Real- etc.154.0	28.0	162.7 28.4	28.4	178.9	29.1	146.4	22.6	158.6	23.1	179.8	23.9	197.0	22.0	271.5	21.8	354.4	23.4
Transport & munication	Com-	9	33.6 6	ស ស	36.1	വ	51.1	6.7	50.7	7.4	51	8	61.5	6.9	74.8	6.0	77.08	0.0
Sub Total 453.5	453.5		1 -3	84.6	i R3	84.2		79.5	537.5		292.0	79.1	734.7	82.0 1	1,053.6	84.5	1,257.9	83.2
Government Services	† † † † † † † † † † † † † † † † † † †	φ φ	50.7	σ· &	က က က	8.7	81.5	12.6	87.4	12.7	98.2	13.1	104.8	11.7	127.9	10.3	151.2	0.01
Customs & Others	35.5	9	37.3	6.5	т3. ц	7.1	51.2	7.9	6.09	8	58.9	7.8	57.3	€:9	64.7	5.2	101.7	8.0
Total GDP	533.4	100.0	572.3 100.0	100.0	613.9	100.0	647.0	100.0	685.8	100.0	752.1	100.001	896.8	10000	1,246.2	100.001	1,510.8	100.00
Price Index %	% 2)				e e		100.0	•	107.5		118.2		137.6		172.2		211.1	
GDP at Constant Price	tant Pr	rice 3)	•		. •		647.0	· · · · · · · · · · · · · · · · · · ·	638.0		636.3		651.7		723.7		715.7	
	1	,	(•	F	1									ř			

Dept. of Statistics, June 1977 Source:

* This figures does not contain the workers compensation in the southern region government. Notes:

- 1) Current price is used instead of factor cost in this publication.
 2) Price index of the cost of living (1970-75) is applied in this Table. The index is quoted from the Economic Survey, 1975/76, Ministry of Planning
 3) The constant price as in 1970 was derived by dividing 1) by 2). It is calculated that GDP has grown at 2.0% p.a. in terms of constant price.

TABLE 3-10 THE BALANCE OF PAYMENTS

(LS Million)

		1971/72 Actual	1972/73 Actual	1973/74 Actual	1974/75 Actual	1974/76 1) Prov. Actual
(A)	The Current Account					
	(1 + 2 + 3)	- 30.9	- 1.5	- 30.5	-160.3	-178.9
1.	Exports	102.4	127.6	142.8	157.8	183.3
	Cotton	55.3	71.7	73.8	63.1	90.0
	Others	47.1	55.9	69.0	94.7	93.3
2.	Imports	121.4	113.1	149.6	280.0	341.8
4	Government Purchases	37.3	.39.8	48.1	137.7	211.8
	Private Sector Imports	84.1	73.3	101.5	142.3	130.0
	Trade Balances (1-2)	- 19.0	14.5	- 6.8	-122.2	- 15.8
3.	Invisible Account (net)	- 11.9	- 16.0	- 23.7	- 38.1	- 20.4
٠.	Receipts	16.4	16.4	17.8	28.9	39.6
	Payments	28.3	32.4	41.5	67.0	60.0
(B)	Capital Account (net)	8.1	2.6	16.8	108.6	110.0
	Drawings	20.1	17.9	41.3	111.5	142.0
	Repayments	1.2.0	15.3	18.2	13.3	32.0
	Compensations for Nationalized Companies		· · · · · · · · · · · · · · · · · · ·	6.3	_	. <u></u>
	External Assets of SDC	7	-	* =	10.4	_
(c)	Errors and Omissions	2.6	- 1.8	- 1.5	0.2	_
(D)	Balance of Payments	- 20.2	- 0.7	- 15.2	51.9	- 68.9

Source: Bank of Sudan (Economic Survey, 1975/76)

Note: 1) Preliminary estimates

1971-75 ANNEX III-11	Quantity in Metric Ton, Value in LS Million	1974 1975 Quantity Value	78,646 43,202 156,652 70,193	19,987 14,157 15,643 7,548	83,508 16,511. 56,624 11,939	99,052 18,163 204,960 34,382	н,562 253 -	89,217 3,401 45,084 2,233	5,276 3,777 6,040 3,187	- 21,486 - 22,980	- 122,010 - 152,468
AND VALUE OF MAIN EXPORTS DURING 1971-75		1973 Quantity Value	743,726 84,311	33,941 7,403	101,863 10,706	138,425 12,993	14,987 530	93,953 2,922	8,159 6,072	27,235	152,172
QUANTITY AND VALUE O		1972 Quantity Value	256,315 73,088	40,758 8,729	85,197 8,810	113,740 9,637	21,815 611	7,032 1,646	5,991 3,011	- 17,702	480-801
TABLE 3-11		1971 Quantity Value	294,585 69,906	41,971 8,030	7,997	115,061 9,327	49,770 1,468			- 14,683	0
			Cotton	Gum Arabic	Sesame	Groundnuts	Cotton Seed	Dura	Hides and Skins	Others	
							٠.		III	-8	

Source: Bank of Sudan (Ministry of Planning, Economic Survey, 1975/76)

TABLE 3-12 IMPORTS BY COMMODITY

(Value in LS Million)

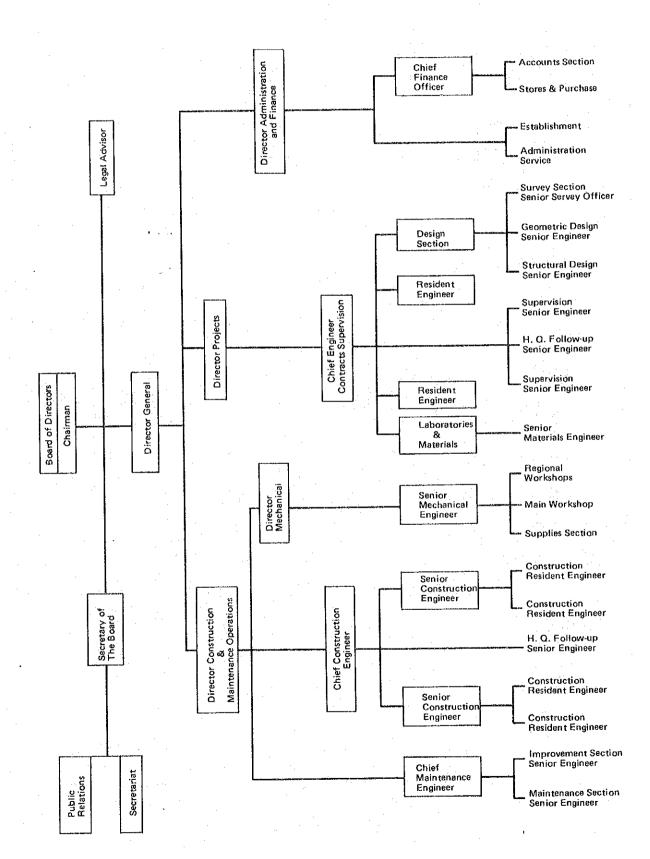
		the second secon			
	1971	1972	1973	1974	1975
			•		
Food Stuffs	21.65	27.55	33.93	56.47	60.45
Drinks and Tobacco	3.00	3.95	2.32	3.20	4.26
Crude Materials	3.37	1.55	1.52	33.98	28.20
Chemicals	12.88	14.30	18.95	27.21	40.16
Manufactured Goods	24.57	24.12	33.61	38.73	60.16
Machinery and Equipment	14.19	15.93	20.00	20.09	59.14
Transport Equipment	11.45	13.40	25.29	33.68	64.47
Textiles	25.33	16.91	16.23	24.15	43.06
	<u> </u>		· .		
Total	116.44	117.91	151.85	247.54	359.90

Source: Bank of Sudan (Economic Survey, 1975/76)

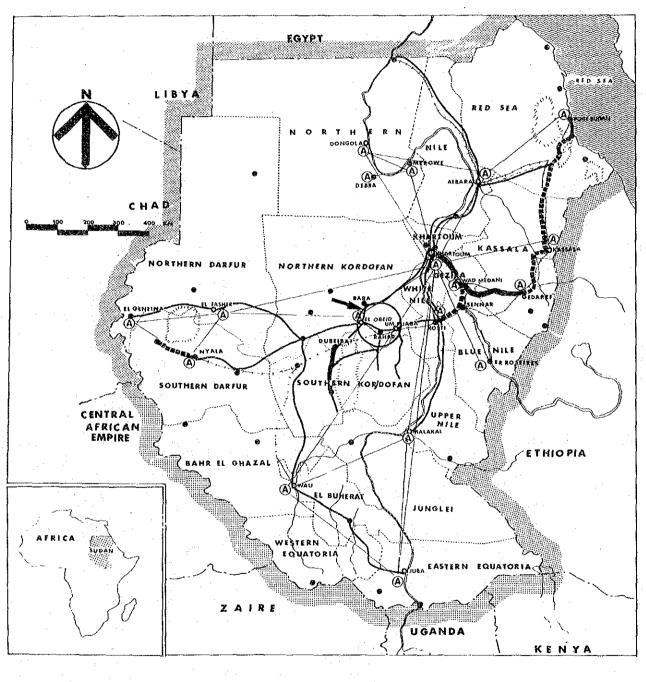
TABLE 3-13 SUDAN AIRWAYS PASSENGER AND FREIGHT TRAFFIC

	L×I		-h					2		7
	Index	100	1 8	06	95	101	87	. 82	011	197
lraffic	Total	1.633	1.386	1.482	1.554	1.652	1.421	1.340	2.298	3.230
<pre>1 Freight Traffic (Ton)</pre>	Domestic	N.A.	N.A.	.797	448.	.855	.708	.750	788	8 8
Total	International	N.A.	N.A.	0.685	0.710	0.797	0.713	0.590	1.510	2.337
	Index	100	106	†66	129	129	147	140	233	239
Fic.	rassengers) (000)	98	102	다 ග	124	124	142	135	224	230
er Fer	ig b	N.A.	N.A.	37	56	n T	ន	.£9	<u>ო</u> თ	1 0
Passen	(Numbe International	N.A.	N.A.	54	89	70	87	72	131	136
•	Period	1965/66	1966/67	1967/68	1968/69	1969/70	1970/71	1971/72	1972/73	1073/74

Source: Sudan Airways Financial and Statistical Reports, (Transport Statistical Bulletin, 1974)



ANNEX III-15 FIG. 3-2 TRANSPORTATION NETWORK, SUDAN



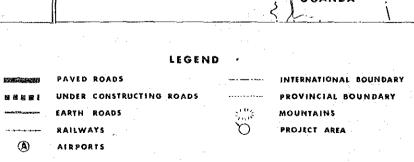


TABLE 3-14 ROADS IN RBPC

1)	Length	
Paved Roads 1)		756
Khartoum-Wad Medani Road	187	
Wad Medani - Gedaref Road	227	
Port Sudan - Suakin Road	57	
Khartoum North - El Gaili Road	42	
Khartoum - Jebel Aulia Road	36	
Omdurman - Wadi Saidna Road	21	
Dubeibat - Dilling - Kadugli Road	186	
Under Construction Roads 1)		936
Gedaref - Kassala Road	220	
Kassala - Haiya Road	350	
Haiya - Suakin Road	149	
Wad Medani - Sennar - Kosti Road	217	
		1,026
Completely Designed and Waiting for Financing Roads	210	1,020
Nyala - Kas - Zalingei Road	260	
Jebel Aulia - Ed Dueim - Rabak Road Sennar - Suki - El Roseires Road	233	
· · · · · · · · · · · · · · · · · · ·	154	
Gedaref - Doka - Gallabat Road El Obeid - Dubeibat Road	134 94	
Kassala - Sabderat	75	
Massard - Sanderat	, ,	
Under Feasibility Study Roads		1,121
Gedaref - Um Barakat Road	110	
Wad El Huni - Simsim Road	77	
Gedaref - Suki Road	178	
Rabak - Renk Road	166	
El Obeid - Um Ruaba Road	150	
Kadugli - Talodi Road	100	
Juba - Torit - Lodwar Road	340	
Proposed Roads Projects		4,559
Kosti - Um Ruaba Road	170	1 , .
Juba - Minule - Gubu Road	281	
Zalingei - El Geneina - Adre Road	193	
Port Sudan - Bernis Road	508	
or		
Omdurman - Dongola - Halfa Road	547	
Renk - Malakal - Juba Road	851	•
El Obeid - En Nahud Road	235	
En Nahud - El Fasher Road	452	
El Fasher - Nyala Road	225	•
Talodi — Malakal Road	246	
Kadugli - Wau Road		
Khartoum - Kassala Road	401	
Khartoum - Atbara Road	312	
Renk - El Roseires Road	- 138	
Wad Medani - Ed Dueim Road	TOQ	

Source: RBPC, Sudan, June 1977

Note: 1) RBPC is initially responsible for these roads.

ANNEX III-17

TABLE 3-15 LICENCED MOTOR VEHICLES

TYPE OF VEHICLE

		1	тгь	01 11111			
Year	Passenger Cars	Buses	Lorries	Delivery Vans Box Cars	Tractors Motorcycles	Others	Total
				•			
1970	25,387	2,003	10,817	7,770	2,030	802	49,484
1971	28,026	2,015	12,677	7,139	1,717	554	52,797
1070	29,407	2,782	15,813	7,819	2,259	660	59,450
1972	29,407	2,702	10,010	7,013		·	
1973	33,061	2,664	21,549	21,549	3,107	2,217	62,464
1974	38,143	3,137	22,908	11,227	2,543	1,121	79,079
	1	* .					
Average Annual Growth	10.2	11.7	20.6	9.6	5.8	8.7	12.4
Rate (%)) :						

Source: Transport Statistical Bulletin, 1975

TABLE 3-16-1 GASOLINE AND BENZINE CONSUMPTION IN THE SUDAN 1)

	Gasoline	Benzine	('000 Tons)
Year	(Diesel)	(Gasoline)	Total
1970	271	95	366
1971	298	97	395
1972	301	101	402
1973	323	105	428
1974	329	106	435
1975	349	116	465
1976 2)	391	131	522
Average Annual Growth Rate (%)	6.3	5.5	6.1

Sources: 1) Transport Statistical Bulletin, 1975

2) Shell Company of the Sudan, June 1977

TABLE 3-16-2 GASOLINE AND BENZINE CONSUMPTION ON ROADS

	and the second		('000 Tons)
<u>Year</u>	Gasoline (Diesel)	Benzine (Gasoline)	<u>Total</u>
1970	110	95	205
1971	121	97	218
1972	128	101	229
1973	129	105	234
1974	132	106	238
1975	140	116	256
Average Annual Growth Rate (%)	4.9	4.1	4.5

Source: Transport Statistical Bulletin, 1975

TABLE 3-17 RAIL PASSENGERS BY CLASS OF TRAVEL 1)

('000 persons)

Year	Sleeper (Suppl.)	lst Class	2nd Class	3rd and 4th Class	All Classes	
1970/71	20.3	65.5	192.2	3,139.2	3,417.2	
1971/72	18.7	54.6	172.5	2,996.1	3,241.9	
1972/73	28.4	87.6	236.4	3,029.8	3,382.8	
1973/74	24.9	69,9	199.0	2,513.4	2,807.2	
1974/75	24.9	79.4	233.9	2,608.6	2,946.5	
1975/76 ²⁾	30.0	111.1	232.1	2,696.0	3,069.2	

Sources: 1) Transport Statistical Bulletin, 1975

2) Sudan Railways Corporation, Annual Report, 1975/76

TABLE 3-18 SUDAN RAILWAYS TRAFFIC BY TYPE 1)

('000 tons)

Year	Exported Traffic	Imported Traffic	Local Traffic	Livestock Equivalent	<u>Total</u>
Actual 1969/70	843	1,384	725	53	3,005
1970/71	872	1,532	61.8	40	3,062
1971/72	923	1,460	505	20	2,908
1972/73	854	1,421	495	30	2,800
1973/74	697	1,379	477	28	2,581
1974/75	644	1,312	433	11	2,400
1975/76 ²⁾	815	1,494	346	16	2,673

Sources: 1) Transport Statistical Bulletin, 1975

2) Sudan Railways Corporation, Annual Report, 1975/76

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TABLE 4-1 POPULATION AND GROWTH RATE, KORDOFAN PROVINCE AND THE SUDAN

	Populat 1955/56	ion 1973	Growth Rate per year (%)	Sources
Sudan Total	10,262,500	14,958,000	2,24	Department of Statistics, Ministry of National Planning, 1977
ff	10,262,500	14,901,894	2.22	National Planning Commission, Sudan, Economic Survey, 1974
*.				
Kordofan Province	1,762,000	2,202,346	1.32	
		+ , + .		tandarin da karantarin da Karantarin da karantarin d
- ""-	1,762,000	2,099,121	1.04	Statistics Department, Northern Kordofan
				Province

BLE 4-2 URBAN POPULATION IN NORTHERN AND SOUTHERN KORDOFAN PROVINCES

Urban Population	Growth Rate per Year (A) to (B)									4.10%		٠										5,10%	%\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	
	19/3 Urban Persons ₂) Present(B)	٠	90.073	26,005	19,713	1th to t	8,927	2,674	7,177	169,013		19,216	18,468	5,274	4,801	6,936	7,738	3,588	12,051	10,418	5,294	93,784	262,797	
	ich In Insti- tutes		248	818	482	188	371	166	697	3,487		808	572	110	247	529	150	295	332	309	521	3,871	7,358	
insus 1)	of which In Private IN Households tr			19,220	•	8,590	9,060	2,880	5,470	118,114		11,890	10,960	4,860	•	•	•	3,260	•	ຸ ຄ	3,610	59,150	178,264	
1964/66 Census 1)	r Persons Present (A)		63,831	20,038	14,392	8,924	6,431	3,046	5,939	122,601		12,696	11,532	4,970	799,4	4,709	4,250	3,555	7,092	5,419	4,131	63,021	185,622	
	Permanent Member of Private Household	Province	62,560	19,770	14,210	8,600	6,140	2,820	5,660	119,760	Province	11,910	11,180	5,120	4,470	4,270	4,030	3,260	7,460	5,180	3,750	60,630	180,390	
	Town	Northern Kordofan	El Obeid	En Nahud	Um Ruaba	Rahad	Bara	Sodiri	Abu Zabad [~]	Sub Total	Southern Kordofan	Dilling	Kadugli	بد	El Abassiya	Muglad	Talodi	Rashad 3)	Babanousa 3)	sebaha	Rigl El Foula'	Sub Total	All Towns Total	

Notes: 1) Dept. of Statistics, Sudan. Population and Housing Survey, Urban Areas, Kordofan Province, 1964/66. (Khartoum, 1968) Statistics Dept. of Northern Kordofan Province. These towns were included in rural areas at the 1964/66 census.

TABLE 4-3 DISTRICT POPULATION OF NORTHERN AND SOUTHERN KORDOFAN PROVINCES, 1973

Province &	Рорг	ılation Se	ttled		
District	Urban	Rural	Sub Total	Nomad	Total
Northern Kordofan F	rovince				
Central Dist.	90,073	94,446	184,519	4,973	189,492
Eastern Dist.	34,157	281,481	315,638	20,634	336,272
Western Dist.	33,182	296,530	329,712	9,486	339,198
Northern Dist.	8,927	135,880	144,807	14,762	159,569
North-Western Dist.	2,674	63,851	66,525	137,523	204,048
Free Lance	<u></u>	944		67,509	67,509
Total	169,013	872,188	1,041,201	254,887	1,296,088
8	13.0	67.3	80.3	19.7	100.0
Southern Kordofan F	rovince				·
Miosaria Dist.	24,281	148,074	172,355		
Northern Hills Dist.	19,216	151,597	170,813	00.000	
Southern Hills Dist.	26,206	206,674	232,880	99,266	<u>4.</u>
Tagali Dist.	24,081	171,147	195,228		
Free Lance		-	<u></u>	35,716	
Total	93,784	677,492	771,276	134,982	906,258
%	10.3	74.8	85.1	14.9	100.0

Source: Statistics Dept., Northern Kordofan Province, Eastern Kordofan District Office and the Dept. of Statistics, Sudan Government.

OF NORTHERN AND SOUTHERN KORDOFAN PROVINCES, 1955/56-1977 POPULATION AND ITS GROWTH RATE IN URBAN AND RURAL AREAS TABLE 4-4

1973 Census 1977 Estimate	2,202,346 ¹ , 2,321,044	1.321% 262,797 ² 312,792	%\phi = \phi	169,013 ³ 198,406	%50°†	93,784 ³ 114,386	5.09%	1,938,549 2,008,252	1,127,075 1,166,999	812,474 841,253	0.874%
1964/66 Urban Census (1966)		1,321% 185,622 ²⁾	:	122,601 ²⁾	%60° h	63,021 ²⁾	5,09%	1.00%			
1955/56 Census (1956)	1,762,000 ¹⁾	123,340	4,65%					1,638,660			
	(1) Population in Both Provinces	Amnual Growth Rate (2) Urban Population	Annual Growth Rate	a. Northern Kordofan Urban Area	Annual Growth Rate	b. Southern Kordofan Urban Area	Annual Growth Rate	(3) Rural Population including Nomads Annual Growth Rate	a. Northern Kordofan Rural Area	b. Southern Kordofan Rural Area	Annual Growth Rate

National Planning Commission, Economic Survey, 1974 (Sudan, 1975). G 60 60 Sources:

Population and Housing Survey, Urban Area, Kordofan Province, 1964/66. Northern Kordofan Province Government.

ANNEX IV-5 ゾーン別人口の推定

1962年作成された 1:48.000 集成航空写真, 1975年修正された 1:250,000 地図, そして1977年本調査団によって作成された 1:25,000 集成航空写真によって各ゾ ーンの村落数が調べられた。

村落は3グループに分けられた。80戸が最小,150戸が中間グループ,214戸~700戸の値が最大の村落に分類した。この調査結果は次の表に示される。

TABLE 4-5-1 NUMBER OF VILLAGES

* "	Urban	Numb	er of Vill	a des	
Zone	Area	Large	Medium	Small	<u>Total</u>
1.	El Obeid		1.	33	34
2	.: 	. 2	- .	28	30
3	-	1	2	21	24
ц	. -	1 .	7	13	21
5	Um Ruaba	-	2	41	43
6	· •	1	2	16	19
7	i e e -	2	2	19	23
8	Rahad	1	_	28	29
9		•	1	15	16
10		4		7	11
Total	3	12	17	221	250

一戸平均の家族数を 5 人と仮定して,各ソーンの定住人口は,以下の表 4 - 5 - 2 に推定されている。

TABLE 4-5-2 POPULATION BY ZONE

Zone No.	Urban	Rural	Total
1	105,738	13,950	119,668
2	- '.	13,340	13,340
3	· ·	10,970	10,970
ц .	. **	13,950	13,950
5	23,141	17,900	41,041
6		9,614	9,614
7	- 1 ₋ 1 ₋ 1	12,922	12,922
8	16,956	12,270	29,226
9	- · · · · · · · · · · · · · · · · · · ·	6,750	6,750
10		12,800	12,800
Total	145,835	124,466	270,301

1955/56 国勢調査によると総人口に対する都市人口は7.0%であり、労働人口のうち農業従事人口は85.8%であった。スーダンの一戸当り平均家族数は都市部家族5.5人、農村定住家族4.9人、遊牧民家族5.7人、全国では5.1人であった。農業部門人口は8.806.000人、全人口の85.8%と推定された。

1970年と1973年に調査されている数字によると, 遊牧民を含む農村部人口は9,545,000 人で農業部門人口は923%であった。農業人口は,1977年のスーダン農村部人口の85 %と考えられる。

このパーセント数値は、Northern Kordofan 県に適用され、表4-5-3に示す。

TABLE 4-5-3 RURAL AND AGRICULTURAL POPULATION IN NORTHERN KORDOFAN PROVINCE

	Rural Population Including Nomad (1)	Agricultural Population (1) x 0.85 (2)	Nomad (3)	Agricultural Population Settled (2)-(3)	Rural - Popula- tion Settled (4)=(1)-(3)	(2)-(3) (4) (%)
Central Dist.	102,941	87,500	5,149	82,351	97,792	84.2
Eastern Dist.	312,816	265,894	21,365	244,529	291,451	83.9
Sub-Total	415,757	353,394	26,514	326,880	389,243	84.0
Northern K. Province	1,166,999	991,949	213,916	778,033	903,083	86.1

上表の Central 及び Eastern 両 District の農村定着人口のなかに占める農業人口比率の平均値 8 4 0 % である。

この比を適用して、ブロジェクト地域の各ゾーン別の農村定着人口と、その中の定着農業人口, 農家数を次のように推定し、表4-5-4と表Ⅳ-2にされている。

TABLE 4-5-4 SETTLED POPULATION BY ZONE, 1977

Zone	Rural Population Settled	Agricultural Population Settled * x 0.84	Farm Households (Families)
		23.0	0 200
1	13,950	11,718	2,344
2	13,340	11,206	2,241
3	10,970	9,215	1,843
4	13,950	11,718	2,344
5	17,900	15,036	3,007
6	9,614	8,076	1,615
7	12,922	10,854	2,171
8	12,270	10,307	2,061
9	6,750	5,670	1,134
1,0	12,800	10,752	2,150
Total	124,466	104,552	20,910

TABLE 4-5 AGRICULTURAL AND FORESTRY PRODUCTS IN NORTHERN KORDOFAN PROVINCE

			:						[발]								
seds	Produc- tion (ton)			39,812	37,124	35,090	37,342	1)	Government Products (m3)		2,500				•		2,500
Watermelon Seeds	Yield (kg/f.)			97	46	06	32	Firewood	Private Products (m3)		3,300						3,300
Watern	Area (feddan)			410,430	382,718	389,885	384,344	Char- 1)	coal Pro Pro (ton)		12,000		·	•			12,000
	Produc- tion (ton)	41,949	73,690	185,230	222,720	157,000	126,168		Produc- tion (ton)		184	684					337
Groundnuts	Yield kg/f.)	172	18	320	375.	375	217	Cotton	Vield kg/f		88	163					133
Grou	lan) (244,569	810,597	578,830	593,930	418,000	581,087		Area (feddan)		2,063	3,000	٠				2,532
	Area (feddan)	2 th	81(578	59	#18	58		Total	945 15,612	17,545	14,370	6,730			6,650	12,181
	Production (ton)	152,098 82,151	161,722	049,49	71,290	63,000	99,155	r a b i	Production Hashab Talh 7 (t o n)	14,667 945	16,950 595	11,496	6,730				
. S.	Yield (kg/f.)	143 81	1 6	70	75	.02	06	Ą	_	50 14,	59 IG,	50 11,	50 ° 6,			50	50
S	Area (feddan)	1,061,370	1,778,940	923,800	950,000	000,006	1,103,695	<u>ម</u> ១	Area Estimate Yield (feddan)(kg/f.	312,240	350,900	287,400 5	134,600			133,000 5	243,628 5
	Production (ton)	77,309	100,029	25,931	94,214	126,000	95,790		Produc- tion (ton)					3,695	1,328	3,500	2,841
Dura	Yield (kg/f.)	162. 145	137	140	140	200	153	Sanamakar	Yield kg/f.)					240	240	540	240
D t	Area (feddan)	476,046 559,877	731,831	685,224	672,954	631,000	626,155	Sar	Area (feddan) (6,842	2,460	6,482	5,261
	Production (ton)	140,955 185,726	106,699	112,500	. 125,700	196,000	114,597	đ	Produc- tion (ton)					617	573	203	1911
D u k h n	Yield tion (kg/f.) (ton)	196	ထ	06	700	145	119	ი ი ი	Yield (kg/f.)					13	13	얶	12
Д	Area (feddan)	718,046	1,564,925	1,250,000	1,257,000	1,353,000	1,216,719	X a x k	Area (feddan) (· ·				47,481	560 ⁴ 71	20,276	37,284
		1970 1971	1972	1974	1975	1976	Aver- age			1970	1971	1972	1973	1974	1975	1976	Aver- age

Approximately estimated by taking half of the production of Northern and Southern Kordofan Provinces. The statistical data registering the production in both Kordofan Provinces in 1971 are as follows: Charcoal, 23,750 tons, Firewood - private; 6,601 m³, Government; 5,000 m³, Note: 1) Sources:

Sudan Yearbook of Agricultural Statistics, 1974; Current Agricultural Statistics CAS-Vol. 1, No.2, 1976; H.M. AWOUDA, Forest Department, Production & Supply of Gum Arabic 1970-1971; Statistics Dept. of Northern Kordofan Prov.; and Dept. of Agricultural Economics and Statistics, Ministry of Agriculture, Khartoum.

TABLE 4-7 LIVESTOCK IN TWO DISTRICTS, 1976

(Heads)

			Rainy Season	Dry Season
				01.000
7	1,1	Cattle	156,000	81,000
10		Sheep	125,000	64,000
Central Kordofan		Goats	109,000	56,000
District	1)	Camels	8,000	4,000
		Donkeys	3,000	2,000
		Horses	4,000	2,000
		Total	405,000	209,000
			·	
	78			
		Cattle	250,000	75,000
Eastern		Sheep	125,000	17,500
Kordofan District	2)	Goats	200,000	150,000
		Camels	130,000	100,000
		Total	705,000	342,500

Sources: 1) Acting Commissioner for Animal Resources, Northern Kordofan Province, El Obeid.

²⁾ District Veterinary Office, Eastern District Northern Kordofan Province, Rahad.

TABLE 4-8 LIVESTOCK TRADED

(Heads)

CENTRAL KORDOFAN DISTRICT ANIMAL MARKETS, JAN.-MAR. 1977 a)

	Jan. 1	977	Feb. 1	977	Mar. 1	977	Total Ja	nMar.
	Brought	Sold	Brought	Sold	Brought	Sold	Brought	Sold
Cattle	3,590	1,331	3,899	213	2,749	1,074	10,238	2,618
Sheep	10,051	6,387	8,233	5,467	7,185	5,509	25,469	17,363
Goats	482	. 294	· -		699	132	1,181	426
Camels	1,023	162	1,591	134	960	89	3,574	385
Donkeys	1,193	336	1,175	269	897	191	3,265	796
Horses	121	46	119	24	121	73	361	143
Total	16,460	8,556	15,017	6,107	12,611	7,068	114,088	21,731

UM RUABA ANIMAL MARKET 1973/74 - 75/76 b)

	1973/	74	1974/	75	1975/	76
	Brought	Sold	Brought	Sold	Brought	Sold
Cattle	700	500	5,750	3,594	13,980	11,070
Sheep	1,900	1,400	4,250	3,466	29,300	19,750
Goats	1,000	750	910	546	9,120	2,230
Total	3,600	2,650	10,910	7,606	52,400	33,050

CENTRAL KORDOFAN DISTRICT SLAUGHTER HOUSES a)

•	S1aug	ghtered	Prices
	74/75	75/76	Registered 1)
Cattle	24,647	24,058	46.50
Cows	5,218	7,223	,
Sheep	51,598	81,602	7.50
Goats	6,919	9,409	4.00
Camels	1,340	991	80.00
Total	89,722	123,283	

Sources: a) Acting Commissioner for Animal Resources, Northern Kordofan Province, El Obeid.

b) District Veterinary Office, Eastern District Northern Kordofan Province, Rahad. The volumes traded at Rahad animal market is said to be

one-third of those traded at Um Ruaba animal market.

Note: 1) Prices are an average LS per head March, 1977.

CROP PRODUCTION ESTIMATES IN THE ZONES OF THE PROJECT AREA, 1977 TABLE 4-9

Unit: Area - feddan Product - ton

					. '			Wate	Watermelon					•	
Crop Dukhn D			Dura	Sesa	ıme	Groun	Groundnuts	Se	Seeds	Kar	Karkadeh	Sanar	Sanamakar	Gum Ar	Arabic
Product Are	Are	ល	Area Product	Area P	roduct	Area	Product	Area	Product	Area	Product	Area Pr	Product	Area P	Product
2,341 9,905	တ် တ	05	1,486	13,807	1,036	7,954	2,784	5,928	563	522	7	75.	040	2,026	101
2,237 9,463	⊅ 6	63	1,420	13,191	686 6	7,599	2,660	5,663	538	530	9	72	39	1,936	97
1,840 7,783	7.7	83	1,167	10,849	814	6,250	2,187	4,658	442	436	ស	59	32	1,592	80
2,341 9,905	တ်	905	1,486	13,807	1,036	7,954	2,784	5,928	563	555	7	75	10	2,026	101
3,010 12,735	12,	735	1,910	1,910 17,752	1,331	10,227	3,580	7,622	724	714	ω	96	52	2,605	130
1,610 6,810 1,022	တ်	810	1,022	69469	712	5,469	1,914	9206	387	382	Ŋ	52	28	1,393	70
2,174 9,198	တ	198	1,380	12,821	962	7,386	2,585	5,505	523	516	9	70	38	1,881	1 0
2,069 8,	ω,	8,756	1,313	12,205	915	7,031	2,461	5,240	86+	497	ω	.99	36	1,791	06
1,129 4,776	→	977	716	6,657.	ნ ე ე	3,835	1,342	2,858	272	268	თ	36	20.	977	1 0
2,153 9,	တ်	9,109	1,366	12,698	952	7,315	2,560	5,452	518	511	φ	69	37	1,863	6
20,904 88,440	38,1	0+	13,266 1	123,280	9,246	71,020	24,857	52,930	5,028	4,958	29	670	362	18,090	905

Note: The distribution of cultivated area by zone is calculated by the percentage distribution of farm households among the zones.

ANNEX IV-10

TABLE 4-10 PRODUCER'S PRICES IN CROP MARKETS IN EL OBEID AND EASTERN KORDOFAN DISTRICT

Products							
and							s Price
Markets	1974/75		75/76 (7.6./Kanatana)			197	
	LS/Kg(LS/Ka	ntar) LS/Kg	(LS/Kantar)	T2\K3 (1	rs/rancar)	12/16/1	w/ranrar)
Dukhn							
El Obeid		e kun Mad	F4 F4 F4 54 F4 F4	0.093	(4.200)	0.093	(4.200)
				- •	,		•
Dúra			٠				
El Obeid	ALL, MER AND DIS NAME OF THE PER	d. Erne levis		0.055	(2.500)	0.055	(2,500)
Sesame							
El Obeid	0.125 (5.	.632) 0.125	(5.624)	0.102	(4.600)		
Eastern						0.111	(5.000)
Kordofan (14 markets)	0.119 (5.	370) 0.118	(5.300)				
(I4 markets)							
Groundnuts							
El Obeid	0.078 (3.	507) 0.077	(3.467)	0.071	(3.200)		
Eastern	en de la companya de La companya de la co					0.071	(3.200)
Kordofan	0.071 (3.	.187) 0.071	(3,190)	·			
(14 markets)							
Watermelon Se	eds						v
El Obeid	0.054 (2.	414) 0.066	(2.936)	0.093	(4.200)		
Eastern						0.089	(4.000)
Kordofan	0.044 (1.	995) 0.021	(0.934)	*** 000 mit ***			•
(14 markets)							
Karkadeh		•					
	0.344 (6	404) 0 110	(E 220)	0 222	(15 000)		
El Obeid	0.144 (6.	484) 0.116	(5,228)	0.333	(15,000)		
Eastern	0.158 (7.		/ E 525)			0.222	(10.000)
Kordofan (14 markets)	0.138 (/.	127) 0.123	(5,555)				
(2.1			٠.				
Gum Arabic	4						
El Obeid	0.406 (18.	.250) 0.272	(12,250)	0.208	(9.353)		t .
Eastern						0.200	(9,000)
Kordofan	0.345 (15.	547) 0.191	(8,605)		orn ma aris and took flot		
(14 markets)	•	٠	• .				

Source: El Obeid and Um Ruaba crop markets, 1977

based on the data provided by Current Agricultural Statistics, (Ministry of Agriculture) June, 1976. Estimate ੰਲ Source:

Notes: 1) Assumed each family has five persons. 2) Unit values are determined ten nement

Unit values are determined ten percent less than the price in Annex IV-10 to cover transport cost and losses.

is held by nomads. Therefore, earnings by selling livestock by settled farmers is not included Settled farmers have few animals with which they can earn cash income. Majority of livestock 8

(kg/feddan)

TABLE 4-12 UNIT YIELD OF MAIN CROPS

	Groundnuts	North Kordofan	172	16	91	320	375	210
.*	Groun	Whole Sudan	371	256	346	519	45J	68 88 8
	ате	Whole North Sudan Kordofan	e +	81	16	70	75	92
	Ses	Whole Sudan	160	154	119	107	101	129
		th ²⁾ ofan	96	50	99	06	100	121
-	Dukhn	Whole North Sudan Kordofan	253 1	210	39	156	161 . 1	184 1
	I ,	W. Su	C	(2)	П		H	H
÷	a	Whole North Sudan Kordofan	·	145		150	164	152
٠	Dura	Whole	314	349	317	306	327	323
				_				974/75
			1970/71 1)	1971/72 ¹⁾	1972/73 ^{1,}	1974/75 3)	1975/76 3)	1970/71-1974/75 Average

Sources: 1) National Planning Commission, Economic Survey, 1974.

Ministry of Agricultural, Food and Natural Resources (MIN. AFNR), Yearbook of Agricultural Statistics, 1974. 5)

3) MIN. AFNR, Current Agricultural Statistics, June 1976.

ANNEX IV-13 El Obeid 空港滑走路建設

El Obeid の既存空港には 1,800 mと 1,300 mの砂利路面の 2 つの滑走路がある。Sudan Airways の F 2 7 と B 7 3 7 が発着している。エプロン,ターミナルビル,緊急消火施設,離着陸誘導装置,いずれも旧式の設備である。

空港施設の改良が緊急を要するということが政府に認識されている。航空便の運行の正確さ と安全性の確保と、大型航空機の運行が必要でプライオリティは高い。

このような環境の中で, 新滑走路が改良工事として次のように行なわれている。

新滑走路 : 延長2500m 巾員45m

第1次施工 : 1977年6月まで舗装路盤工および排水施設の完成

第2次施工 : 1978年12月までアスファルトによる表層工の完成

この事業費は、1976年価格で LS1,500,000 である。

ANNEX IV-14 El Ain 貯水池增設工事

El Ainにある既存貯水池は、El Obeidの住民に対して十分の給水量を持っていない。貯水量が $350万m^3$ しかないため El Obeidは雨期の 2、 $350万m^3$ しかないため El Obeidは雨期の 2000円を除いて水不足に悩まされる。

スーダン給水事業団が増設工事に直接関与している。プロジェクトは K. El Baggara 沿いの既存貯水池のそばで新しい貯水池の建設と El Obeid まで約30kmの新しいパイプラインの建設とで構成されている。

増設工事は1972年11月にはじまり、1977年7月に終った。工事完了によって全貯水量は最大550万㎡に達する。プロジェクトの最後の部分50万㎡の貯水池工事は1977年1月にはじまった。その建設費は LS 200,000 である。

工事完了後には、El Obeid へ十分な給水ができるとともに一部を特に農業へ利用することができると期待されている。

		ANNEX V	
		할 때, 그림에 말려 왔는 그 집합하다는데	Page
ANNEX V-1	FIG. 5-1	Existing Roads	V-1
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EXISTING ROADS

FIG. 5-1

- RIVERS (KHORS)

002

V-1

GRADIENT CONDITION OF EXISTING ROADS

(km)

			1 No. 10 No.			(Km)
		Dista	ince by Grad	ient		
Route	Surface	i = 0-3%	i = 3-5%	i = 5%-	Total	Remarks
	Pavement	2.2	0	0		
I	Earth 1)	1.4	O	0		
.	Track 2)	67.8	3.8	0		
	Total	71.4	3.8	0	75.2	
	Pavement	2.2	0	0		
11	Earth	24.1	0	0		
11	Track	48.2	1.1	0.2		
. '	Total	74.5	1.1	0.2	75.8	
	Pavement	0	0	: 0.		
T.T.T	Earth	2.5	0	0		
III	Track	76.5	0	: 0		
`.	Total	79.0	0	0 ,	79.0	
	Pavement	0	0	0		
IA	Earth	3.9	0.	0		1
TA	Track	41.8	17.1	9.7		
	Total	45.7	17.1	9.7	72.5	
	Pavement	0	0	0		
.77	Earth	3.7	0	0		
V	Track	81.5	22.1	11.4		
	Total	85.2	22.1	11.4	118.7	
	Pavement	0	0	0		
Access	Earth	1.6	0	0		
Road	Track	38.3	1.0	0,		
	Total	39.9	1.0	0	40.9	

Notes:

Sections having either hard surface or some engineering works. Sections having no engineering work.

¹⁾ 2)

TABLE 5-2 SURFACE CONDITION OF EXISTING ROADS

(km)

		Lengt	h by Su	rface C	ondition	1		
Route	Pavement		Earth	1)		Track	2)	Total
	Poor	Fair	Poor	Bad	Fair	Poor	Bad	
I ·	2.2	0	1.0	0.4	29.5	20.1	22.0	75 ° 2
II	2.2	14.6	6.6	2.9	9.2	21.0	19.3	7 5.8
III	0	0	1.1	1.4	16.3	23.3	36.9	79.0
IV	0	0	1.1	2.8	0	6.6	62.0	72.5
V	0	1.0	2.7	0	2.3	27.8	84.9	118.7
Access Road	0	0	1.6	0	0	10.3	29.0	40.9

Notes: 1) Sections having either hard surface or some engineering works.

2) Sections having no engineering work.

TABLE 5-3-1 INVENTORY OF THE EXISTING ROAD

ANNEX V-4

Route I El Obeid ____ Rahad (75.2km)

(km)

			Soil	Condit	ion			C2 m-+-3	Total
Gradient	Surface C	condition	Qoz	Sandy Silt	Silty Clay	Cotton Clay	Clay	Sub Total	Total
0% < i < 3%	Pavement	Poor	Bitumi- nous 2.2					2.2	
		Poor	1.0						
	Earth	Bad	0.4					1.4	
		Fair		20.1	² 5.9 2.6				
	Track	Poor	3.8	8.3	6.7				
	.:	Bad	9.1	4.0	7.3			67.8	71.4
3% ≤ i < 5%		Fair	0.5		0.4				
	Track	Poor	1.3						
		Bad	1.4		0.2			3.8	

* Hard surface

TABLE 5-3-2 INVENTORY OF THE EXISTING ROAD

ANNEX V-4

Route II El Obeid ____ Rahad (75.8km)

(km)

	Noute		L ODCIG		ranaa ((VIII)	
			Soil	Condit	and the second second				
Gradient	Surface (Condition	Qoz	Sandy Silt	Silty Clay	Cotton Clay	Clay	Sub Total	Total
0% < i < 3%	Pavement	Poor	Bitumi- nous 2.2					2.2	. :
		Fair		6.4	8,2				
	Earth	Poor	0.2	1.4	5.0				
		Bad		0.6	2.3			24.1	
		Fair		3.1	6.1				
	Track	Poor	1.6	10.3	8.4				
		Bad	6.7	5.7	6.3	a.		48.2	74.5
3 ≦ i < 5%	Track	Poor	0.3	0.4					
	Track	Bad	0.2	0.2				1.1	1.1
5% ≦ i	Track	Bad		0.2				0.2	0.2

TABLE 5-3-3 INVENTORY OF THE EXISTING ROAD

ANNEX V-4

Route III

Rahad ____ Um Ruaba (79.0km)

(km)

				Soil C	Conditio				
Gradient	Surface	Condition	Qoz	Sandy Silt		Cotton Clay	Clay	Sub Total	Total
0% < i < 3%		Poor	1.1						
	Earth	Bad	1.4					2.5	
		Fair				16.3			
	Track	Poor	4.1			19.2			
		Bad	8.1			28.8		76.5	79.0

TABLE 5-3-4 INVENTORY OF THE EXISTING ROAL

ANNEX V-1+

	Route	IV	Rah	ad	Um Ruaba	a (72.5	km)	(km)	
				Soil Co		Sub Total	Total		
Gradient	Surface	Condition	Qoz	Sandy Silt	Silty Clay	Cotton Clay	Clay	Sub locar	10tai.
0% < i < 3%	T	Poor	1.1						
	Earth	Bad	2.8					3.9	
		Poor	6.4						
	Track	Bad	34.2				1.2	41.8	45.7
3%≦i ^{<} 5%		Poor	0.2						
	Track	Bad	15.9				1.0	17.1	17.1
i <u>≥</u> 5%	Track	Bad	9.7					9.7	9.7

TABLE 5-3-5 INVENTORY OF THE EXISTING ROAD

ANNEX V-4

Route V

El Obeid ____ Um Ruaba (118.7km)

(km)

				Soil (Conditi	on			
Gradient	Surface (Condition	Qoz	sandy silt	silty clay	cotton clay	Clay	Sub Total	Total
0% <i<3%< td=""><td>Earth</td><td>Fair</td><td></td><td>1.0</td><td></td><td></td><td></td><td></td><td></td></i<3%<>	Earth	Fair		1.0					
	Darth	Poor	0.7	2.0				3.7	
	·	Fair		2.3					
	Track	Poor	7.5	15.9	2.3				
		Bad	42.0	4.9	4.6		2.0	81.5	85.2
09/1/59	Tnack	Poor		2.1					
3% <u>≤</u> i<5% Track	Hack	Bad	15.1	2.9	2.0			22.1	22.1
5% <u>∠</u> i	Track	Bad	11.4				·	11.4	11.4

TABLE 5-3~6	INVENTORY	OF THE	EIXSTING	ROAD

ANNEX V-4

Access Road

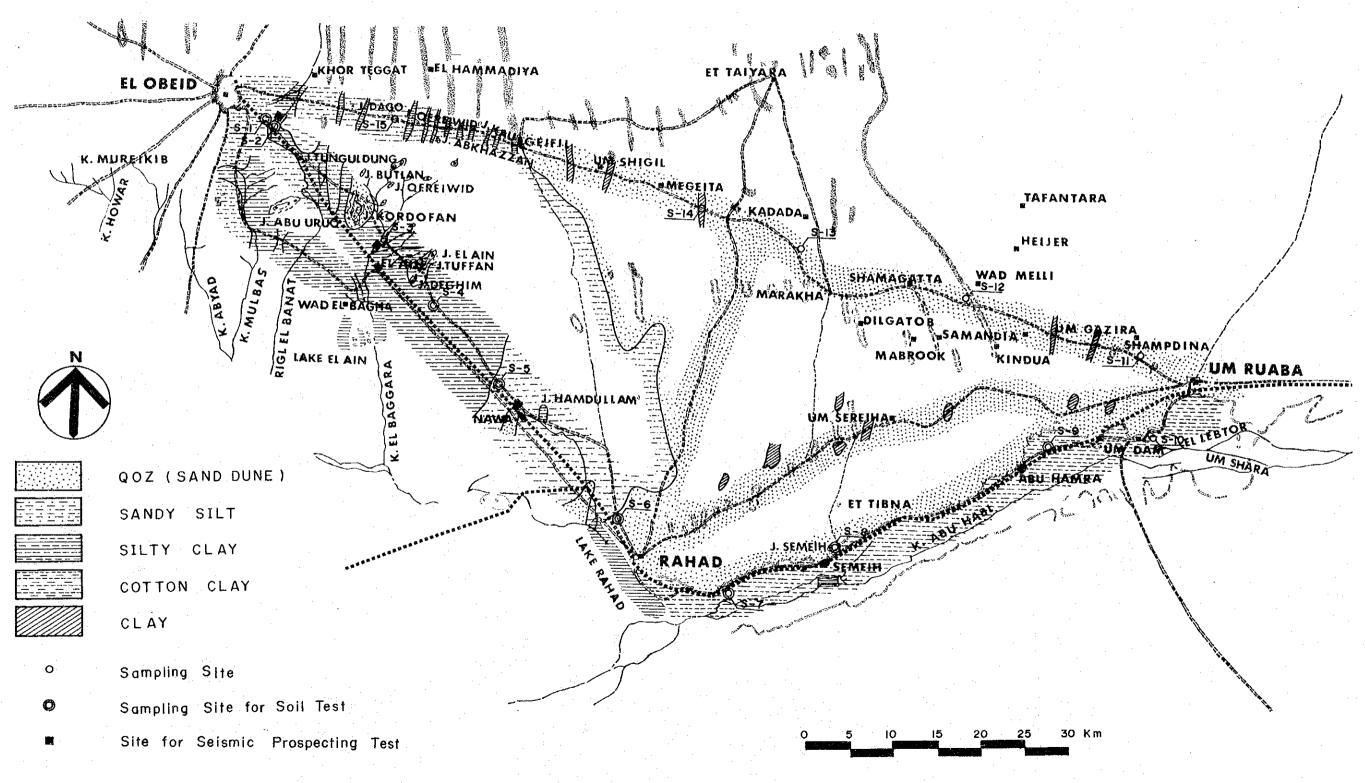
Rahad ----

Route V (40.9km)

(km)

			<u> </u>	Soil (Conditi	on .		1	
Gradient	Surface	Condition	$Q_{\mathbf{O}_{\mathbf{Z}}}$		Silty Clay	Cotton Clay	Clay	Sub Total	Total
	Earth	Poor	1.6					1.6	
0% <i<3%< td=""><td>Track</td><td>Poor</td><td>8.0</td><td>2.3</td><td></td><td></td><td></td><td></td><td></td></i<3%<>	Track	Poor	8.0	2.3					
	ITACK	Bad	23.7	4.3		·		38.3	39.9
3%≦i≤5%	Track	Bad	1.0					1.0	1.0

FIG. 5-2 SOIL MAP OF PROJECT AREA



										· ^					•
ANNEX V-6	8-10	Cotton Clay	2.70	4. 4	98.6	63.4	32.8	30.8	23.56	A-7-6 (13	;	19.0	1.71	3.2	m
ANNE	S-7	Cotton Clay	2.64	61.1	38.9	28.5	12.2	16.3	23.25	A-6 (2)	3	11.2	1.97	2.2	ო
	S-4 Yellow Grev	Silty Clay	2.68	51.8	48.2	24.9	13.7	11.2	;	A-6 (3)	3	ာ	2.06	ა. ი	ហេ
	- 1	Silty Clay													თ
TESTS	S-5.	Sandy Slit	2.45	71.4	28.6	17.0	N.P.	N.P.	1	A-2-4 (0)	ر م	а т .	2.07	12.4	12
SUMMARY OF SOIL TESTS	S-1	Sandy Silt	2.58	78.4	21.6	•	<u>م</u> ۲	o.	•	A-2-4 (0)	ກ	7.4	2.06	18.0	12
ABLE 5-4 SU	8-8	(sand dune)	2.60	36.5	ທີ່		N D	N.P.	1	A-3-(0)	0	11.2	1.76	13.2	12
		(sand dune)	2.59	87.9		1	N.P. T.	N.P.	ı	A-3 (0)	00	1 .6	1.93	18.6	12
				Sand &	Silt and Clay %	Liquid Limit %	Plastic Limit %	Plasticity Index	40	AASHTO 3)	Casagrande	OMC %	MDD t/m3		rement Design %
	Sample No.	Soil Type	Specific Gravity	Particle Size	Analysis		Atterberg	Limit	Shrinkage Limit	Classification			compaction	CBR Modified %	Adopted CBR for Pavement Design

CI: clays (inorganic) of medium Non plastic. SU: uniform sands with little or no fines. SC: well graded sands with small clay content. plasticity. CL: clay silts (inorganic). OH: organic clays of high plasticity. Classification is based on the following table. Notes: 1) 2) 3

CLASSIFICATION OF SOILS AND SOIL-AGGREGATE MIXTURES

Group Classification	A-3	A-2-4	A-6	A-7-6	
Sieve Analysis Ferenti Fassing. 2.00 mm (No. 10) 0.425 mm (No. 40) 0.075 mm (No. 200)	51 min. 10 max.	35 I BAX.	36 min.		Note: A figure in () means
Characteristics of Fraction Passing 0.425 mm (No. 40) Liquid Limit	I	40 max.	40 max.	41 min.	group index as calculated by AASHIO specification.
Plasticity Index General Rating as Sub-grade	N.P. Excell	10 max. Excellent to Good	il min. Fair to Poor	ll min. Poor	Source: AASHTO Designation:

7.1 基礎地盤の弾性波速度

弾性波探査の結果,P波速度(V_p)は,図 $5-3-1\sim5-3-3$ に示すように,800~900 m/scc を示し,かなり締った地盤であることを示している。経験式によると,P波速度(V_p)と,S波速度(V_s)との関係は,ポアソン比(σ)をパラメータとして図 5-3-4 に示すように表わされる。この関係を適用して,ポアソン比 $\sigma=0.47$ と 仮定すれば,基礎地盤の S 波速度 (V_s) は $230\sim250$ m/scc と 推定される。

コンサルタントの実験室での実験によると Vp=926 m/sec, Vs=320 m/secであった。ポアソン比は次の公式により推定すると, $\sigma=0.43$ であった。

$$Vs = \frac{Vp}{\sqrt{\frac{1-\sigma}{\frac{1}{2}-\sigma}}}$$

7.2 基礎地盤のN値

N値と Vsとの関係は、数多くの報告あるいは文献に示されている。図 5-3-5 はその一例である。

性:1) J.T. Cherry and K.H. Waters, "Shear-wave Recording Using Continuous Signal Methods, Part I - Early Development" Geophisics, Vol. 33, No. 2 (U.S.A., 1968).

"A shear (S) wave is defined as a disturbance which moves through an infinite medium in such a manner that the displacement of a point is parallel to the wavefront, in distinction to a compressional (P) wave in which the displacement of a point is perpendicular to the wavefront. The speeds of the two types of wave are different and are controlled by the density and two different elastic moduli of the medium. The P-wave velocity is always higher than the S-wave velocity(OKVSCO.7Vp), and the ratio between the velocities (Vs/Vp) represents a dynamic measurement of an elastic property of the medium; from it, if desired, one can derive a particular elastic constant of the medium called Poisson's ratio."

注:2) 今井常雄,吉村正義,地盤の弾性波速度と力学的性質,物理探鉱(第25巻,第6号,物理探鉱 技術協会 昭和47年12月) N_1 値は、図 5-3-5 で推定したものであり、 N_2 値は注 3 の公式によって推定される。

Vs (m/sec)	2 3 0	250	3 2 0
N_1 2)	22	2 3	4 6
N_2 3)	15	22	4 5

7.3 基礎地盤の支持力

上記のN値をもとに、Dunhamの提案した次の公式により許容支持力(Q)は推定される。

$$Q = 1.17 \text{ N} (t/m^2)$$

(注:沖積シルト質粘土の場合)

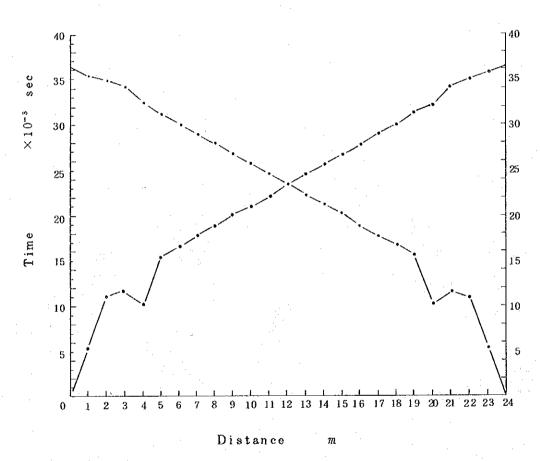
この調査で基礎地盤の許容支持力は 25 ^t/m²以上あると見て差支えないと考えられる。

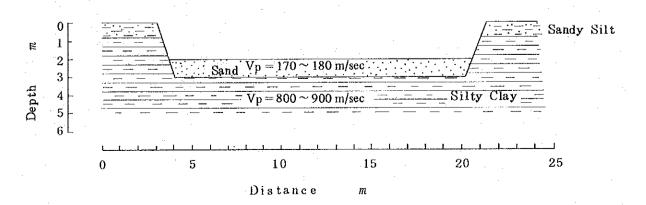
注:3) 太田 裕,後藤典俊, S波速度を他の土質的指標から推定する試み,物理探鉱(第29巻,第4号,物理探鉱技術協会,昭和51年8月)

$$Vs = 85.34 N^{0.348} (r = 0.719)$$

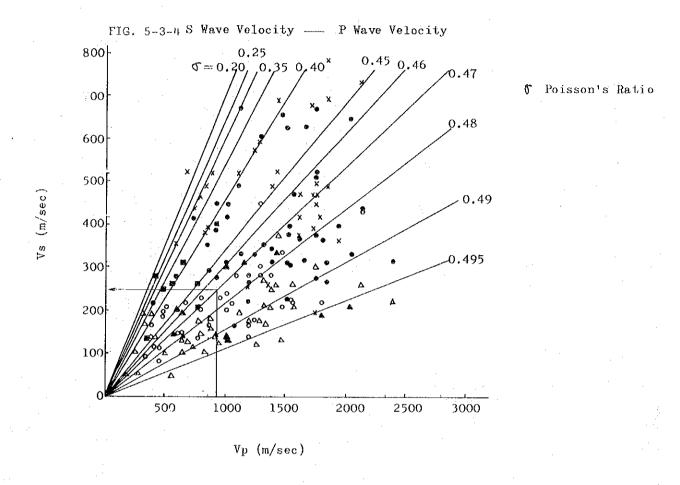
FIG. 5-3-1 Analysis of Seismic Prospecting
7.4 km from EL OBEID

Time - Distance Curve





Sandy silt 10 20 25 10 11 12 13 14 15 16 17 18 19 0 FIG. 5-3-3 Analysis of Seismic Prospecting (K. NAWA) 15 E Time-Distance Curve E Distance Distance 13 10 210-3 sec Time Debth 9 10 11 12 13 14 15 16 17 FIG. 5-3-2 Analysis of Seismic Prospecting (K. EL BAGGARA) Ε Time-Distance Curve E Vp=800 ~ 900 m/sec 9 Distance Distance ผ Time x10-3 sec ' w. Depth



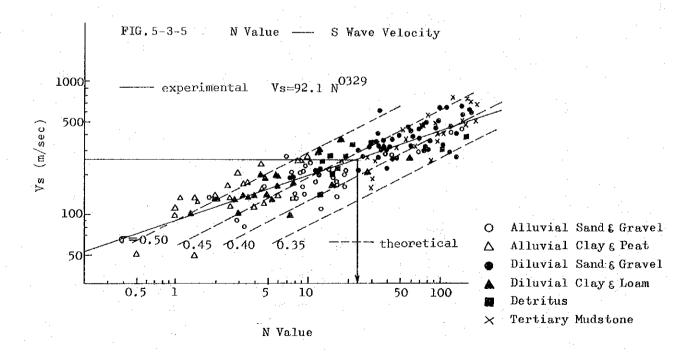


FIG. 5-3-6 LOCATION MAP OF MATERIALS

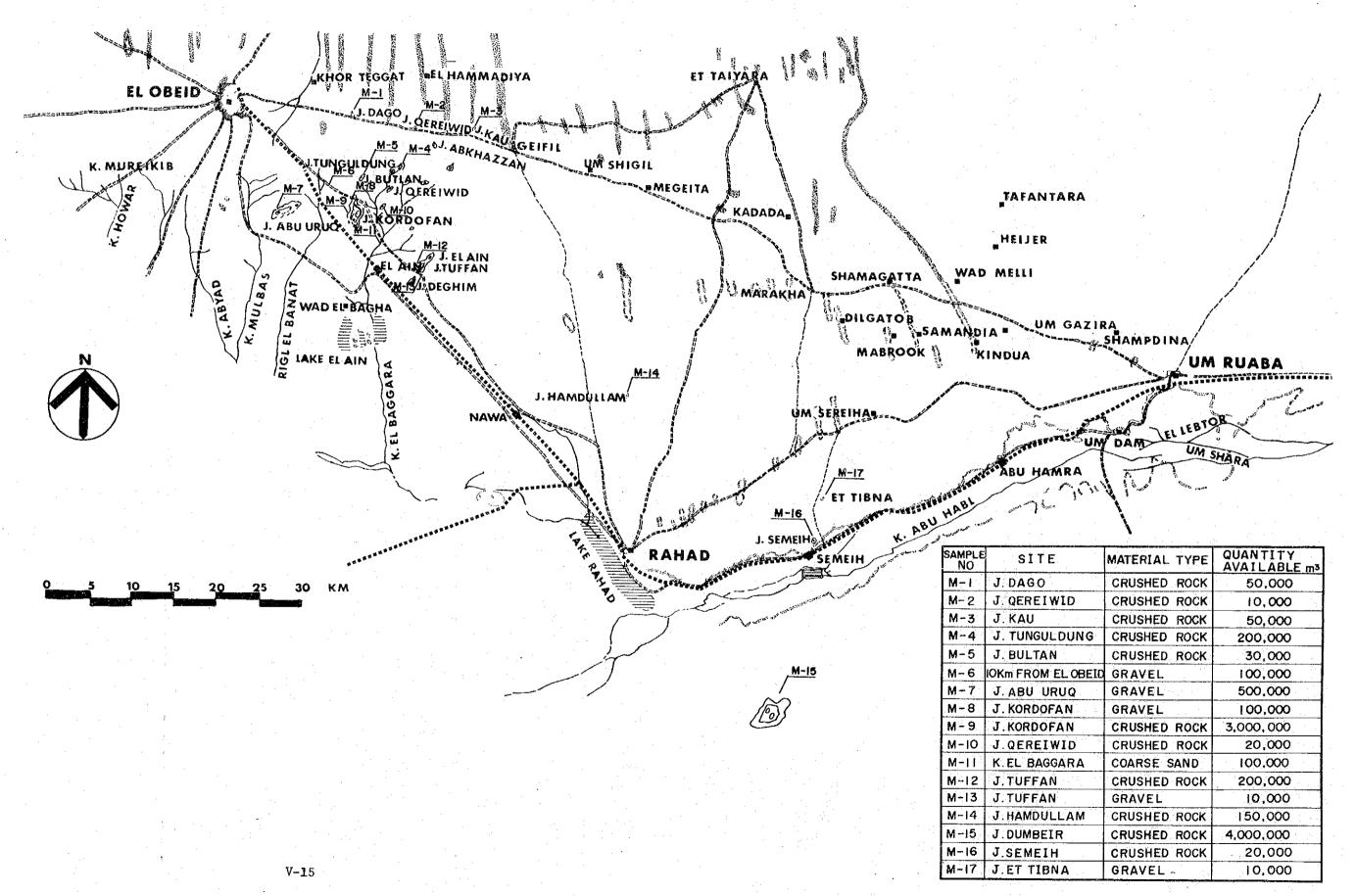


TABLE 5-5 SUMMARY OF MATERIAL TESTS

Crushed Rock and Sand

					Suitabili	ity for
Sample No.	<u>Site</u>	Specific Gravity	Absorption	Los Angeles Abrasion	Surface Course	Concrete Aggregate
M-1 J	I. DAGO	2.63	0.6	26.2	GOOD	GOOD
.M-9 - J	, KORDOFAN	2.61	0.9	37.9	GOOD	GOOD
M-10	J. QEREIWID	2.62	1.4	44.7	POOR	POOR
M-12 3	I. TUFFAN	2.56	1.4	50.3	POOR	POOR
M-14 d	J. HAMDULLAM	2.53	3.0	14.1	GOOD	GOOD
M-16	J. SEMEIH	2.88	0.8	18.3	GOOD	GOOD
N-11 }	K. EL BAGGARA	2.62	0.6	- .	POOR	GOOD

Grave1

			* * *					Suitabili	ty for
Sa	mple No	<u>.</u>	Site	Specific Gravity	Absorption	Los Angeles Abrasion	CBR Modified	Subbase Course	Base Course
	M-7	J.	ABU URUQ	- -	-	-	88 1)	GOOD	GOOD
	M -6		km from OBEID	2.62	0.75	23.4	28.3	FAIR	POOR
	M-8	J.	KORDOPAN	2.65	0.38	33.2	14.2	POOR	POOR
	M-13	J.	TUFFAN	2.55	0.69	35.4	33.3	GOOD	POOR
	M-17	J.	ETTIBNA	2.61	0.70	31.9	40.8	GOOD	POOR

Note: 1) The test result carried out for EL OBEID Airport Construction by R B P C 's laboratory.

General Rating as Aggregate

		Sul	base Cou	ırse	Base	Course	Surface	Course	Concrete	Aggregate
Item		GOOD ¹⁾	FAIR ¹⁾	P00R ²)	GOOD 1)	POOR ²	GOOD ¹⁾	POOR ²	COOD _T)	POOR
Absorption	8	<3	3	3	<3	3	<3	≥3	<3	<u>≥</u> 3
Los Angeles Abrasion	8	<50)	<u>≥</u> 50	< 50	≥50	<40	≥40	<40	<u></u> 240
C.B.R. Modified	g	>30	25-30	<25	≥80	< 80	- .			-

Notes: 1) The rating as "GOOD" or "FAIR" should meet the three conditions listed in each column.

2) The rating as "POOR" comes when one condition in each column is satisfied.

TABLE 5-6 RESULT OF CEMENT STABILIZATION TEST

Cement Contents	%	2	4 6	8 10)
Unconfined Comp Strength Kg/cm		4.2	4.9 10.8	23.7 25	5.4
CBR Val	ue %		203 254	266 312	 }
, Compaction Test	OMC %	12.2	11.3 11.0	10.5 10	. 2
	Ødmax g/cm ³	1.75	1.77 1.81	1.83 1	.85

Note: When the cement is added at 6% or more, cracking is likely to occur while other test results are acceptable. When the cement is added at 5% or less, cracking will not occur while other test figures are not acceptable. It is concluded the cement stabilization is not included in the engineering plan.

TABLE 5-7 RESULT OF LIME STABILIZATION TEST

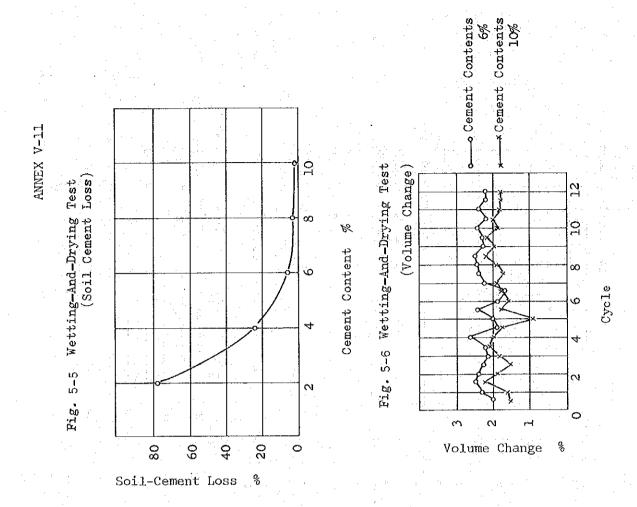
Lime Contents %		5	10	15
Unconfined Compression	Medium curing		0.4	0.6
Strength Kg/cm ²	Rapid curing	<u>.</u> :	2.8	2.8
Compaction Test	OMC %	11.0	10.5	10.0
- Joseph Tob	√dmax g/cm ³	1.80	1.87	1.94

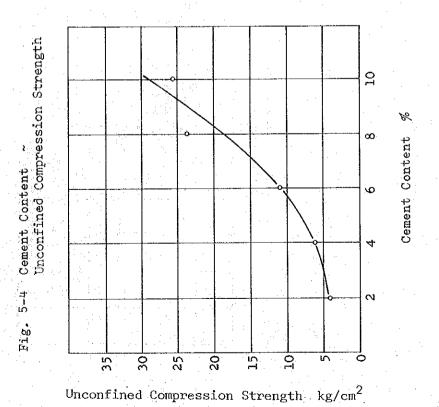
TABLE 5-8 RESULT OF ASPHALT STABILIZATION TEST (Hubbard-Field Stability)

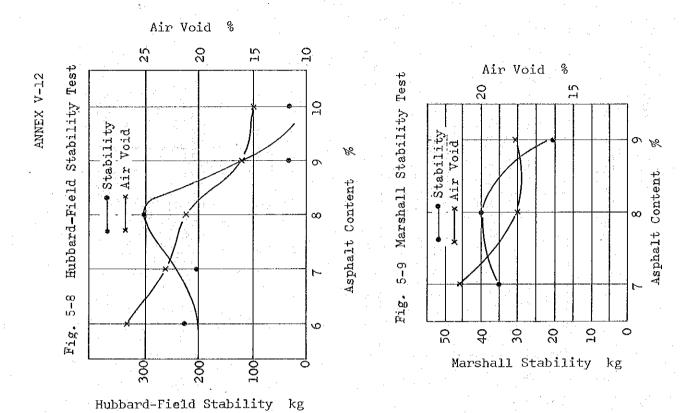
Asphalt Contents %	6	7	8	9	10
Air Void %	25.3	23.3	21.8	16.4	15.3
Hubbard-Field Stability Kg	220	200	300	30	30

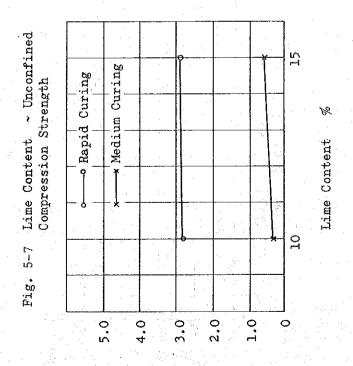
TABLE 5-9 RESULT OF ASPHALT STABILIZATION TEST
(Marshall Stability)

Asphalt Contents	%	7	8	9	
Air Void %		21.2	18.0	18.1	
Marshall Stabili	ty Kg	35	40	20	









Unconfined Compression Strength kg/cm²

Wells

Fig. 5-10 Location Map of Reservoirs and Wells

5 - 10 m 5450, 4360, 2270 3180, 4360, 4360 A/X GENETX 4360 - 13640 5460, 5460 1180, 2270 4180, 4180 2270, 2270 5450, 4360 5450, 4090 4670, 4670 5680, 1820 2550, 2950 13640 3180 9090 5,500,000 26,000,000 CAPACITY NO.OP Reservoirs W- 7 UM SERBIEA UM GENERALS 4-11 ABU HAMBA W-13 UN GEZTEA LOCATION W- 8 NAD MELLI W-12 KOANAHUSA W-16 UN RUABA LOCATION DILGATOB W-10 SAMANDIA 1-4 NARAKBA V- 5 ABU SAD W-14 GADADIM V- 9 KINDOA Y V I RAHAD RAMAD W- 3 KADADA WW Proposed Temporary Dam Reservoir

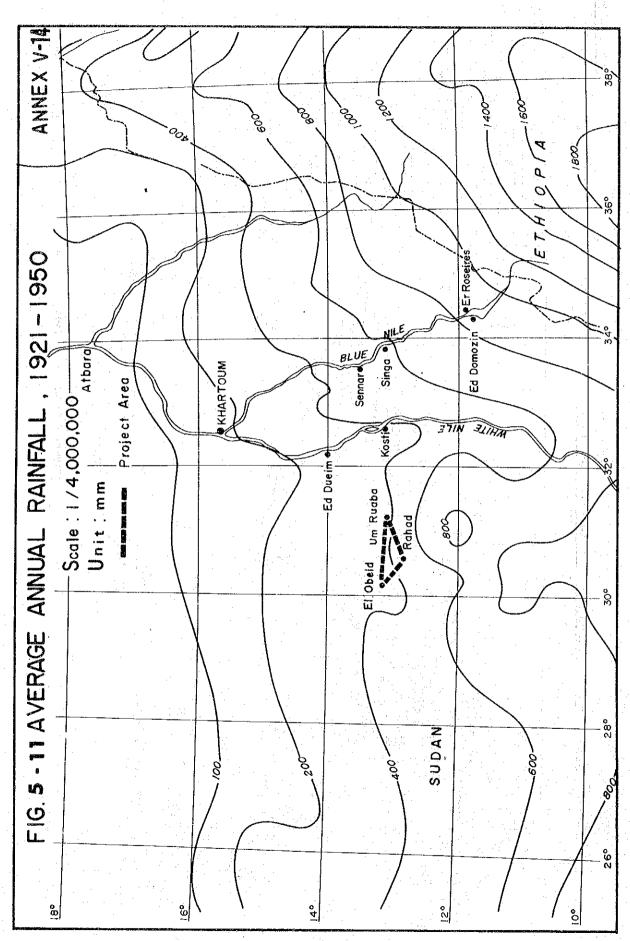


TABLE 5-10 ANNUAL MAXIMUM DAILY RAINFALL, EL OBEID, 1943 - 1976

						-		
	67.5	76						
	34.2	75		57.3	49		56.2	വ
	40.7	74		T.48	ဗ		68.2	52
	1	73		73.6	62		69.1	വ
	t	72		50.9	1 9		9.04	20
		71		2.45	9		35.6	6 1
	36.2	70		78.1	29		50.7	## \$\times
	±.00 0 −	တ ဖ		0.99	58		7.44	747
	45,6	89		26.7	57		7.96.7	45
	24.7	67		6.7	26		81.2	54
	53.2	99		56.2			5. 5.	त्रा
	0.84	1965		75.0	1954		4.2	1943
(mm/Day)	Daily Rainfall (mm/Day)	Year	(mm/Day)	Daily Rainfall (mm/Day)	Year	(mm/Day)	Daily Rainfall (mm/	Year

Source: Meteorological Department, Sudan ..

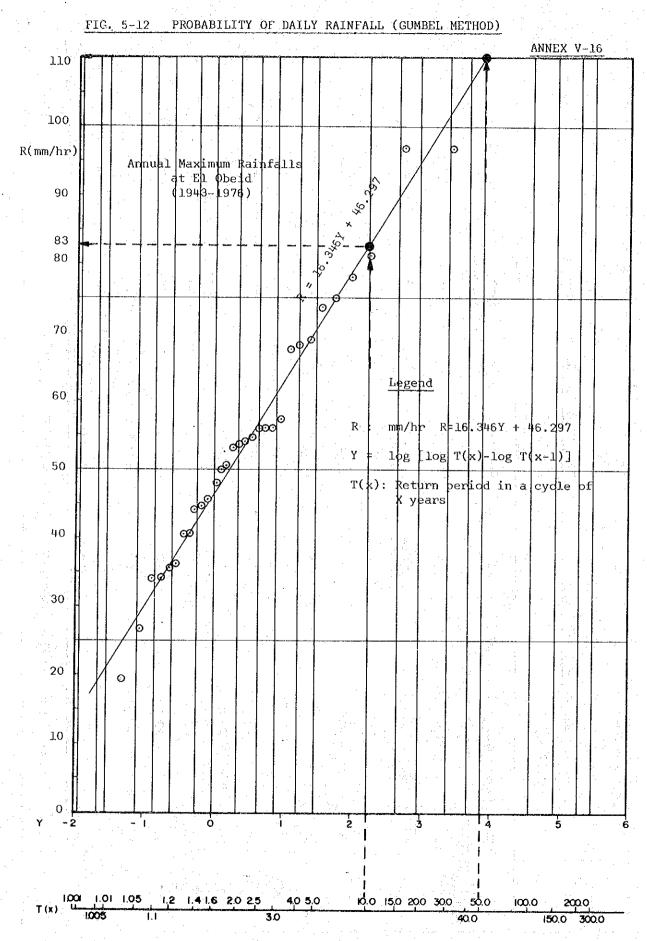
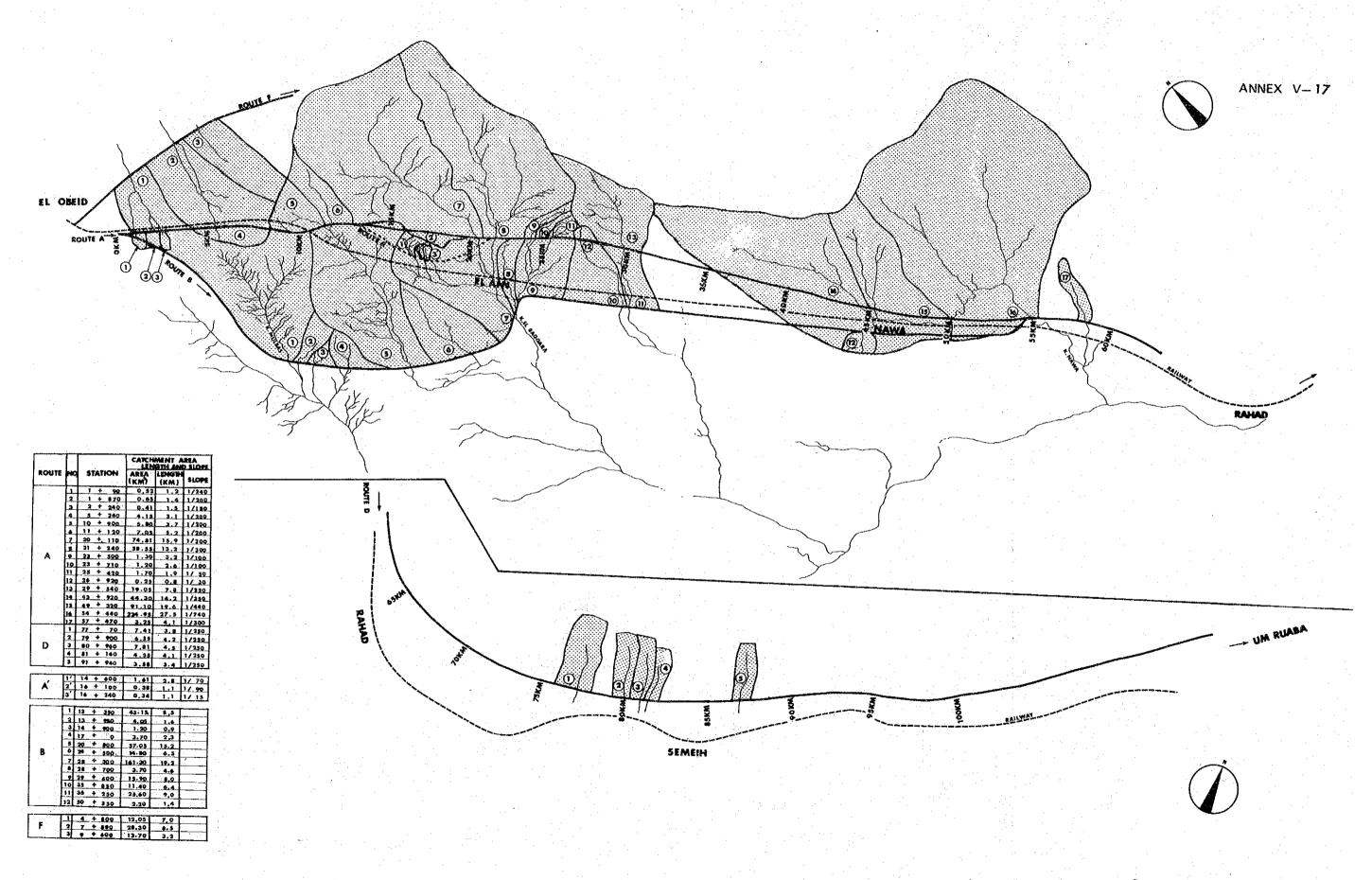
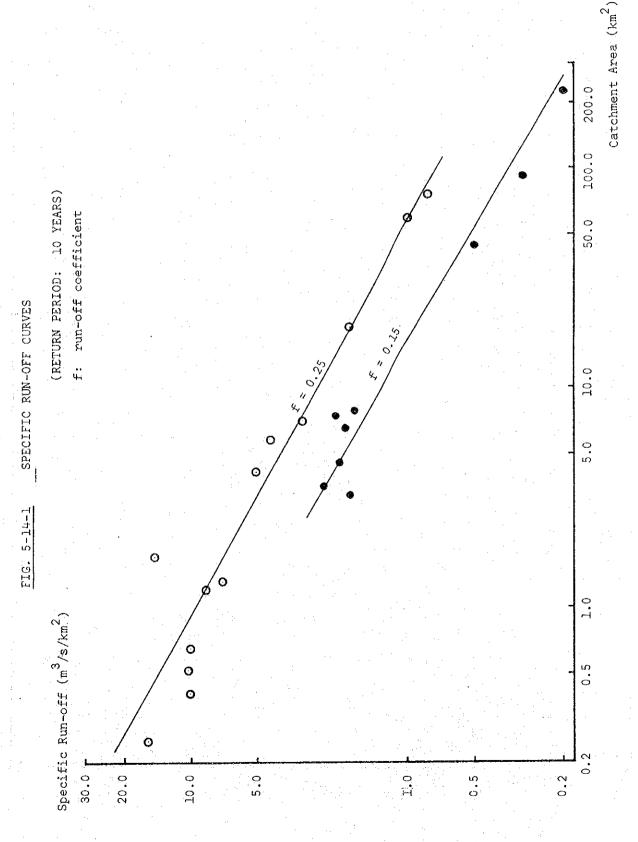
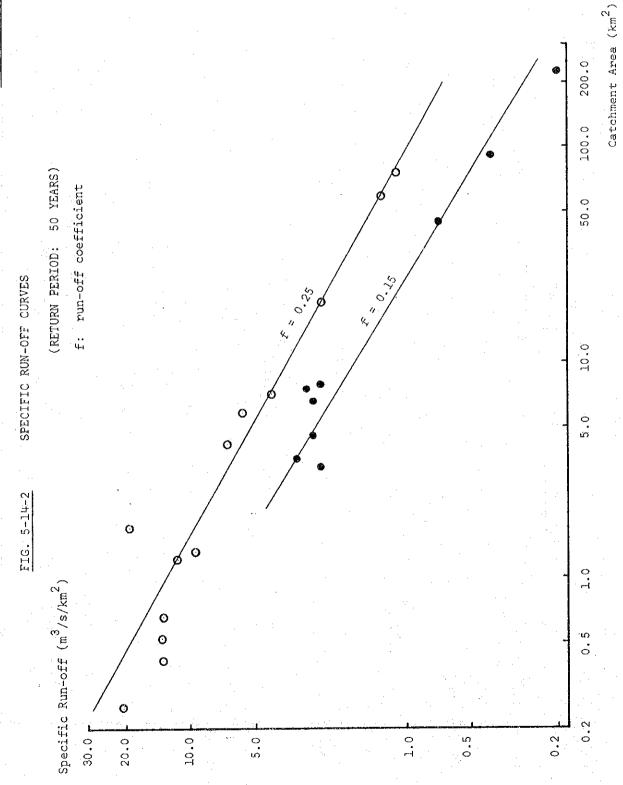


FIG. 5-13 CATCHMENT AREA







ESTIMATED DISCHARGE OF 10 YEAR'S RETURN PERIOD AT THE LOCATION OF STRUCTURE TABLE 5-11-1

Specific run-off (m3/s/km2) 10,2 е О 10.01 t ,3 0,5 0,2 2,0 10.01 8,5 14.5 15.6 Run-off coefficient, Discharge and Specific run-off 5006 Discharge. (m3/s)Ħ 59,4 10,2 24,6 3,9 35.6 22.9 16.4 က မာ 6.5 20.9 24.9 62.9 30.0 38°4 6.1 11.0 2.4 2.0 2.0 4.0 ۲ı coefficient Run-off 0,25 0,15 Rainfall intensity (mm/hr) and Rainfall intensity 147.2 143.0 143.0 72.6 61.8 102,2 122,1 208,6 227,5 12,4 7,9 53.2 48.6 45.5 Time of concentration 45.1 12.1 14.6 4,1 L ++ Time of conc. (mim) 42 34 17 398 96 28 62 74 74 104 90 n 630 782 27 337 207 ω 1/240 1/200 1/180 1/250 Slope .250 1/250 1/200 1/350 1/200 1/300 1/300 20 30 1/440 .00T/ 1/740 1/300 1/250 Length and Slope Catchment area Length (Km) 14.2 15.9 13,2 3,2 0 1.0 7.8 19,6 3.8 3,1 3.7 1.20 1.70 0.25 19.05 224.95 3, 25 0.52 0.41 44,30 5,80 7,05 58.55 7.8L 4.55 Area (Km2) 1.30 \Box 81k + 160m 91k + 940m 260ш 57k + 470m + 090m 2k + 240m 900m 26k + 920m 29k + 540m 43k + 920m 49k + 320m 54K + 440m 77k + 070m 1k + 870m 11k + 120m 20k + 110m 21K + 240m 23k + 500m 23k + 710m 25k + 420m 80k + 960m #006 + Route A and Station 5X + 10k 79k No တ် 97 **+** ω ത

ω ω

1/250

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Коите

TABLE 5-11-2 ESTIMATED DISCHARGE OF 50 YEAR'S RETURN PERIOD AT THE LOCATION OF STRUCTURE

								وسننه			···	بنن		وك	``` ,			·	٠.,					
7.0	coefficient, Discharge Specific run-off	Specific run-off (m3/s/km2)	13.5	13.2	13,2	6.7	5.7	4.2	1,1	1,3	ተ 6	11,3	19,2	20.8	2,5	0,7	ተ 0	2.00.000	2,5	2.9	2.7	2.5	2.7	3.2
$r = \frac{6635}{t + 7}$		Discharge (m ³ /s)	7.0	8°6	it ° ic	27.7	33°0	29.3	83.6	78,5	12.2	13.5	32.6	5.2	47.2	30°3	39,5	51.6	8.0	21,8	17.6	19,6	12,5	11.6
	Run-off an	Run-off coefficient	0.25	2 t	11	11	11	11	11	11	11		11	i.	١٤	0,15	11	11	11	la de	41	A	11	=
	of concentration Rainfall intensity	Rainf síty	195,1	189.6	189.6	96.2	81.9	59.8	16.1	19.3	135°4	161,8	276.5	301.8	35 . 7	16,4	10.4	5°5	59°2	70.6	t° †9	60.3	65.7	78,1
	Time of co and Rainfa	Time of conc. (min)	27	28	28	62	7.	70₹	90 h	337	42	ħε	1.7	1.5	179	398	630	1207	105	87	96	103	†16	78
	area Slope	Slope	1/240	1/200	1/180	1/200	1/200	1/200	1/300	1/300	1/100	1/100	1/50	1/ 30	1/250	1/350	1/440	1/240	1/300	1/250	1/250	1/250	1/250	1/250
	Catchment an Length and S.	Length (Km)	1,2	3.4	1,5	3.1	3.7	5.2	15.9	13.2	3,2	2.6	1,9	8,0	7.8	14.2	19.6	27,5	T° †	3.8	4.2	ES of	T°+	3.4
	Cat	Area (Km2)	0.52	0.65	0.41	4,15	5.80	7.05	74.81	58°22	1,30	1.20	1.70	0,25	19,05	44,30	91,10	224,95	3,25	7,41	6,55	7,81	4.55	3,58
Route A and D		Station	1K + 090m	1k + 870m	2k + 240m	5k + 260m	10k + 900m	11k + 120m	20k + 110m	+	23k + 500m	23k + 710m	25k + 420m	26k + 920m	29k + 540m	43k + 920m	49k + 320m	54K + 440m	57K + 470m	77k + 070m	79k + 900m	80k + 960m	81k + 160m	91k + 940m
<u>æ</u>	22	g Non	r-1	7	က	#	Ŋ	ω	7	ω	6 V	07	177	12	133	1,4	12	16	17	7	2	D	-	5.
	1	БО	1												- 1 - 1 				-					

TABLE 5-11-3 ESTIMATED DISCHARGE OF 10 YEAR'S RETURN PERIOD AT THE LOCATION OF STRUCTURE BY SPECIFIC RUN-OFF CURVES

Route 1

Run-off coefficient, Discharge and Specific run-off	Specifi (m3/								-				* * 1
Run-off coeff and Spec	Run-off Discharge coefficient (m ³ /s)	50.1	17,8	10.2	17.0	58,8	37.7	E 06	17.0	32.6	27.9	4.04	13°ET
Time of concentration and Rainfall intensity	Rainfall intensity (mm/hr)												
Time of co	Time of conc. (min)												
Catchment area Length and Slope	Length Slope (Km)	8.5	1,6	6°0	2,3	5.2	6.5	19,2	4 , 0	8.0	₽°9	0.6	1 T
Catchme Length	Area Ler (Km2) (1	43.15	.05 ±	1,20	3.70	57.05 15.2	14,80	161.30	3.70	15,90	11.40	2560	2.00
	Station	13k + 350m	13k + 950m	14k + 900m	17k + 000m	20k + 800m	24k + 500m	28K + 300m	28K + 700m	29k + +00m	35k + 850m	36k + 250m	nON H SAOm
	Š.	æ	Ċ	က	+	Ŋ	ပ	-	80	σ	TO	[7	0

Soute F

2,40	1,50	2,20	
28.9	42,5	30°⊥	
7.0	28,30 8,5	3.2	
12,05		13.70	
4× + 800m	7k + 800m	9k + 600m 1	
_	2	ო	1

Remarks; Discharges are obtained from FIG. 5-14-1 SPECIFIC RUN-OFF CURVES.

TABLE 5-11-4 ESTIMATED DISCHARGE OF 50 YEAR'S RETURN PERIOD AT THE LOCATION OF STRUCTURE BY SPECIFIC RUN-OFF CURVES

Route B

	44 44			<u> </u>								<u> </u>	
, Discharge un-off	Specific run-off (m3/s/km2)	1,57	5,90	11,50	6,20	7,34	2,85	0,74	6,20	2,72	3,25	2,10	8,20
Run-off coefficient, Discharge and Specific run-off	Discharge (m3/s)	67.7	23,9	13,8	22.9	76.4	42.2	119.4	22,9	43.2	37,1	53,8	18,0
Run-off an	Run-off coefficient												
Time of concentration and Rainfall intensity	Rainfall intensity (mm/hr)												
Time of cor and Rainfa	Time of conc. (min)				-								
ea ope	Slope										1		
Catchment area Length and Slope	Length (Km)	8.5	1,6	6°0	2,3	15,2	6.5	19,2	4,6	0,8	±°.0	0.6	1.4
Catcl Length	Area (Km2)	13,15	4.05	1,20	3°20	57,05	14,80	161,30	3,70	15,90	11,40	25,60	2.20
	Station	13k + 350m	13k + 950m	14k + 900m	17k + 000m	20k + 800m.	24k + 500m	28k + 300m	28k + 700m	29k + 400m	35k + 850m	36k + 250m	50k + 350m
	No.	[2	3		5	9	7	8	თ	10	11	12

Route F

3,20	2,00	3,00
38.6	56.6	41.01
0°2	3	.2
12.05	28,30 8	13,70 3
4k + 800m	7k + 800m	9k + 600m
H	5	e

Remarks; Discharges are obtained from FIG. 5-14-2 SPECIFIC RUN-OFF CURVES.

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			그 하는 어디에 있는데 한 과 얼마라면 그리지 않고	
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			그는 경기 병에는 그렇게 되었다. 그 사람들은 사람들은 사람들은 사람들은 사람들은 사람들은 사람들이 되었다.	

Station No.			Name	Name of interviewer	j.	1 Time o	Time of interview	>	2	Type of venicle	icle				, is a second
Date of interview		(A)			Sheet No.	1 7-	88	7 13~14	-	Car, taxi		6.	Truck-trailer		
Weather						2 8~	6	8 14~15	,	Cad	***************************************	1	2		
	-	I	Name	Name of Surveyor		3 9~10		9 15~16	T-L-	1			3		
iö	Direction					4 10~11		10 16~17	23	Van, pick-up		ω;	Motor cycle		
¥		<u> </u>				5 11~12		11. 17~18	4	Medium truck	.	o,	Animal-drawn vehicle	vehicle	
						6 12~13		12 18~19	5	Heavy truck		10	Others		
Model of The vehicle	5 Origin	6 Destination	^	Trip purpose		Passenger cars				Trucks			14 Fuel used	15 Ave	5 Average
4	Name of the	Name of the	ψ	Work	80	6		10	11	12	5.			annua	
Model/ Age	place where	place where	6	To home	Capacity	No of		No. of	Loading	Type of		Weight of	1 Gasoline	E .	mileage
Make	you start	you finally	т	Shopping	(No. of	passed	passengers	wheels	capacity	commodities	ities	commodity	╂	5 E	of the car
	the trip	finish the trip	ā 4	Social intercourse	e persons)	1923			(tons)	carried		(tons)	Diesei Diesei) oer	(Anometer)
				recreation						:			C.	i 	
			ß	Others						-	• •••				
2	m	4		rc.	9		7	8	10	11	12		13	14 15	
Time Type of N	Model/make	Q		Crisio	Destination			Capacity No. of	of No. of	Loading	Types of commodity	ymodity	weight Fuel	- Te	
vehicle	of the vehicle	u 66	:				(T	pass	wheels	capacity	carried		<u></u>	nseo	2)
-								:							- Fa-to-tal
							-	•—			-				
										<u> </u>					-
										-					

Notes: 1) Travel Time

2) Fuel Consumption

TABLE 6-2 TRAFFIC COUNT SURVEY SHEET

ANNEX VI-2

Station No.		Dai cou	te of					Wea	her					Sheet No.
	Direction					Neme	of Surve	eyor		Name	of Supe	rvisor	-	
		7	8	- 9	10	11	12	13	14	15	16	. 17	18	
Type of vehicle	ri e	≀ 8	₹	10	11	12	13	14	15	-} 16	≀ 17	18	19	Total
1. Car, taxi		-	<u> </u>		<u> </u>		 `` -		1					
4										-				
2. Jeep	 	<u> </u>						 				 		
		İ				: .								
										:				
				ļ <u>.</u>				<u> </u>						
3. Van, pick-up														
							٠.							1.5
4. Medium truck						ļ		1	ļ .	1975	-			
4. Wedium Muck		·							,					
A STATE OF THE PARTY OF THE PAR														
5. Heavy truck	·				 -			 						
_/1														, e e
6. Truck-trailer		-					-		<u>i</u>	· · · · ·				
										211				
7. Bus			 				ļ	ļ						
				.: -:										
B. Motor cycle	U _y ii						<u> </u>			12				
9. Animal drawn vehicle	,							<u> </u>						
9. Animai drawn venicie														
									v 1					
10. Others				·		. 1				1.05	ļ			
, ,									, i					
				-						٠.				1.1
Total	. k							,		<u> </u>				:
i Otai												75	.:	

TABLE 6-3 DAILY TRAFFIC AT SURVEY STATIONS, EL OBEID

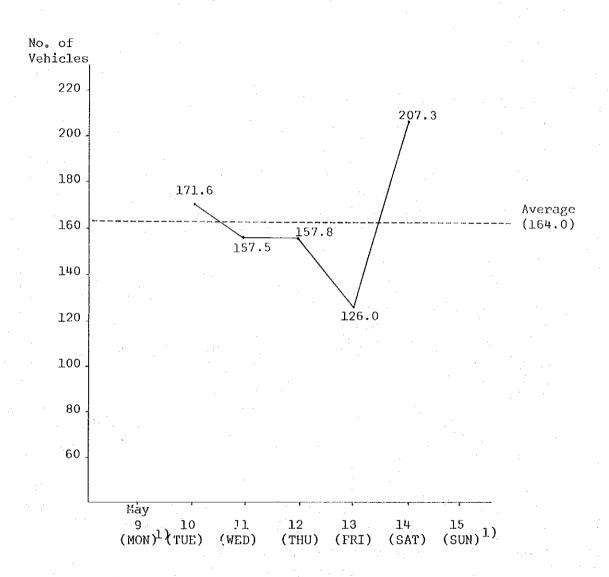
	•			•					
	M Vehicle Type	lay 9 ²⁾ (MON)	10 (TUE)	11 (WED)	12 (THU)	13 (FRI)	14 (SAT)	15 ²) (SUN)	Average1)
	Station 1-1								yaanijanadista da
	Van/pick-up	1.2	- · · · ·	3.6		<u></u>	-	1.2	0.7
	Medium Truck	56.4	43.2	49.2	42.0	34.8	82.8	20.4	50.4
•	Heavy Truck	1.2	2,4	4.8	1.2	1.2	2.4		2,4
	Bus	1.2	_		· 			_	
-	Total	60.0	45.6	57.6	43.2	36.0	85.2	21.6	53.5
	Station 1-2							•	
	Van/pick-up	3.6	4.8	2.4	1.2	15.6	-	12	4,8
	Medium Truck	20.4	48.0	34.8	48.0	34,8	45.6	21.6	42.2
	Heavy Truck		<u> </u>		1.2	1.2	 .		0.5
	Bus		1.2	1.2	1.2	2.4		1.2	1.2
	Total	24.0	54.0	38.4	51.6	54.0	45.6	24.0	48.7
	Station 1-3								
	Van/pick-up	-		1.5	1.5		1.5	3.0	0.9
	Medium Truck	25.5	22.5	30.0	30.0	19.5	48.0	18.0	30.0
	Heavy Truck	-	3.0	1.5	3.0	3.0	1.5	1.5	2.4
_	Bus			-	-				,
	Total	25.5	25.5	33.0	34.5	22.5	51.0	22.5	33.3
	Station 1-4								
	Van/pick-up	4.5	16.5	7.5	6.0	6.0	9.0	••	9.0
	Medium Truck	7.5	22.5	12.0	16.5	3.0	13.5	eter .	13.5
	Heavy Truck	-		3.0		1.5		_	0.9
_	Bus	4.5	7.5	6.0	6.0	3.0	3.0		5.1
	Total	16.5	46.5	28.5	28.5	13.5	25.5	-	28.5
	•								

Notes: 1) This figure is an average of Tuesday to Saturday.

²⁾ The survey did not cover the traffic for 24 hours.

FIG. 6-1 DAILY VARIATION OF ROAD TRAFFIC, EL OBEID, MAY, 1977

(ALL TYPES OF VEHICLES)



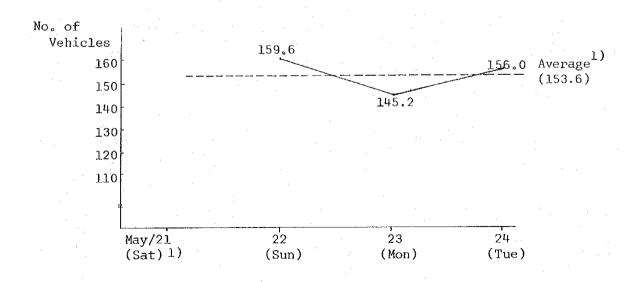
Note: 1) Survey was not conducted for a full day.

TABLE 6-4 DAILY TRAFFIC AT SURVEY STATIONS, UM RUABA

Vehicle Type	May 21 (Sat) 2)	22 (Sun)	23 (Mon)	24 (Tue)	Average 1)
Station 2-1	. 2)				
Van/pick-up	6.0	1.2	4.8	7.2	4.4
Medium Truck	38.4	38.4	28.8	27.6	31.6
Heavy Truck	:	-		***	-
Bus		-	-		
Total	ццоц	39.6	33.6	34.8	36.0
Station 2-2					
Van/pick-up	1.2	_	-	1.2	0.4
Medium Truck	69.6	117.6	104.4	117.6	113.2
Heavy Truck	_	2,4	7.2	2.4	4.0
Bus	1.2	_	P-4		name .
Total	72.0	120.0	111.6	121.2	117.6

ANNEX VI-6

FIG. 6-2 DAILY VARIATION OF ROAD TRAFFIC, UM RUABA, MAY 1977
(ALL TYPES OF VEHICLES)



Notes: 1) This figure in an average of Sunday to Tuesday.

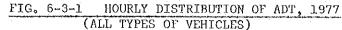
2) The survey did not cover the traffic for 24 hours.

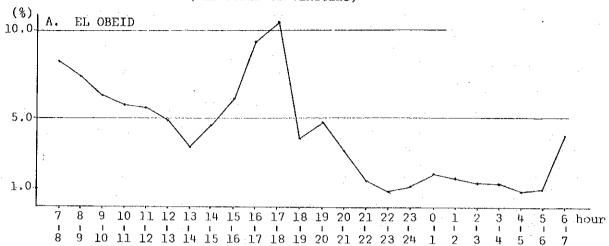
TABLE 6-5-1 HOURLY DISTRIBUTION OF ADT, EL OBEID AREA, MAY, 1977

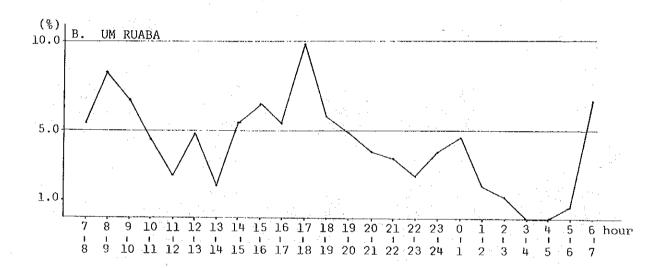
					:	
	Van/	Medium	Heavy		Tota	
Hour	pick-up	Truck	Truck	Bus	Vehicles	%
7 - 8	1.5	11.1	0.4	0.2	13.2	8.3
8 - 9	1.7	7.9	0.2	2.0	11.8	7.4
9 - 10	0.5	8.4	0.4	0.8	10.1	6.3
10 - 11	0.2	8.3	0.6	0.2	9.3	5.8
11 - 12	0.9	7.5	0.6		9.0	5.6
12 - 13	0.7	6.6	0.6		7.9	4.9
13 - 14	0.4	4.6	0.5	_	5.5	3.4
14 - 15	0.6	6.6		0.2	7.4	4.6
15 - 16	-	6.2	0.6	3.0	9.8	6.1
16 - 17	1.8	13.2		_	15.0	9.4
17 - 18	1.5	14.6	0.4	0.2	16.7	10.5
18 - 19	0.2	5.9	0.2	-	6.3	3.9
19 - 20	1.2	6.3	0.2	· -	7.7	4.8
20 - 21	1.0	4.1			5.1	3.2
21 - 22	0.5	1.9	i	_	2.4	1.5
22 - 23	0.4	1.1		<u></u> .	1.5	0.9
23 - 24	0.4	1.5	· · · -	· —,	1.9	1.2
0 - 1	1.1	1.9		, '- '-	3.0	1.9
1 - 2	0.6	1.9)		2.5	1.6
2 - 3	· · · · · ·	2.2	₩	-	2.2	1.4
3 - 4	0.2	1.6	 .	0.2	2.0	1.3
4 - 5		1.4	-	-	1.4	0.9
5 - 6	_	1.6	. -	-	1.6	1.0
6 - 7	-	6.3	0.2	· –	6.5	4.1
					· · · · · · · · · · · · · · · · · · ·	
Total	15.4	132.7	4.9	6.8	159.8	100.0

TABLE 6-5-2 HOURLY DISTRIBUTION OF ADT, UM RUABA AREA, MAY, 1977

			•			
	Van/	Medium	Heavy		Total	
Hour	<u>pick-up</u>	Truck	Truck	Bus	Vehicles	8
7 - 8	-	6.9	1.2	_	8.1	5.4
8 - 9	0.3	12.0	· <u> </u>	0.3	12.6	8.3
9 - 10	0.9	9.3		_	10.2	6.7
10 - 11	0.3	6.3		. –	6.6	4.4
11 - 12	0.3	3.3		_	3.6	2.4
12 - 13		6.9	0.3		7.2	4.8
13 - 14		2.4	0.3		2.7	1.8
14 - 15	1.2	6.6	0.3	· 	8.1	5.4
15 - 16		9.9	:	→	9.9	6.5
16 - 17	0.3	7.8	~	-	8.1	5.4
17 - 18	1.2	13.8	. =	-	15.0	9.9
18 - 19	0.9	7.2	0.6	.	8.7	5 8
19 - 20	· <u>-</u> ·	7.5		-	7.5	4.9
20 - 21	· 5	5.7		_	5.7	3.8
21 - 22	-	5.1		_	5.1	3.4
22 - 23	-	3.3	0.3		3.6	2.4
23 - 24	_	5.7	-	_	5.7	3.8
0 - 1	· -	6.9	_	_	6.9	4.6
1 - 2	_	2.7	- :	· .	2.7	1.8
2 - 3	· -	1.8	<u> </u>	-	1.8	1.2
3 - 4	- · · · · · · · · · · · · · · · · · · ·		-		<u>-</u>	· · · · · · · · · · · · · · · · · · ·
4 - 5	. * -	_		-	-	_
5 - 6	0.3	0.6	-	-	0.9	0.6
6 - 7	.	10.2	· <u> </u>		10.2	6.7
Total	5.7	141.9	3.0	0.3	150.9	100.0







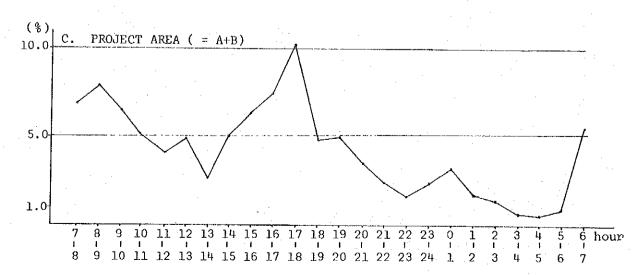


TABLE 6-6-1 SEASONAL VARIATION OF RAILWAY
GOODS TRAFFIC AT EL OBEID STATION, 1976

Month	Forwarded	Received	Total
1976			
JAN.	11,580	8,417	19,997
FEB.	8,936	7,232	16,168
MAR.	6,952	6,499	13,451
APR.	11,507	7,067	18,574
MAY	9,672	8,254	17,926
JUN.	9,249	7,349	16,598
JUL.	9,356	8,476	17,832
AUG.	9,401	9,244	18,645
SEP.	7,390	8,466	15,856
OCT.	6,317	7,254	. 13,571
NOV.	8,425	7,753	16,178
DEC.	8,766	7,249	16,015
	107,551	93,260	200,811
Total Average	8.963	7.772	16.735
	the state of the s		

Source: Sudan Railways Corporation, 1977

FIG. 6-4-1 SEASONAL VARIATION OF RAILWAY GOODS TRAFFIC AT EL OBEID STATION, 1976

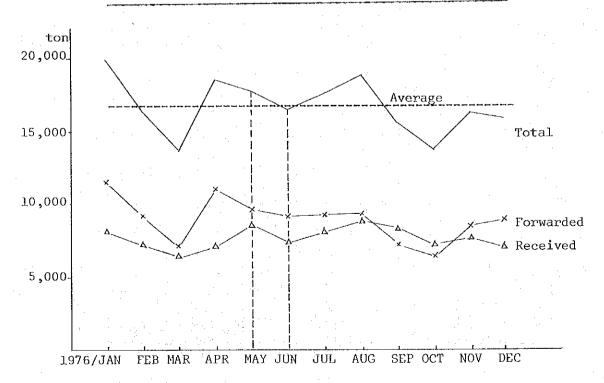


TABLE 6-6-2 SEASONAL VARIATION OF TONNAGE OF CROPS HANDLED AT EL OBEID CROP MARKET, 1976

Montl	<u>n</u>	Tons
JAN.	1976	104,000
FEB.		95,000
MAR.	*	87,000
APR.		69,000
MAY		74,000
JUN.		44,000
JUL.		17,000
AUG.		4,000
SEP.		1,000
OCT.		27,000
NOV.		99,000
DEC.	* .	87,000
	Total	708,000
	Average	59,000

Source: El Obeid Crop Market, 1977

FIG. 6-4-2 SEASONAL VARIATION OF TONNAGE OF CROPS HANDLED AT EL OBEID CROP MARKET, 1976

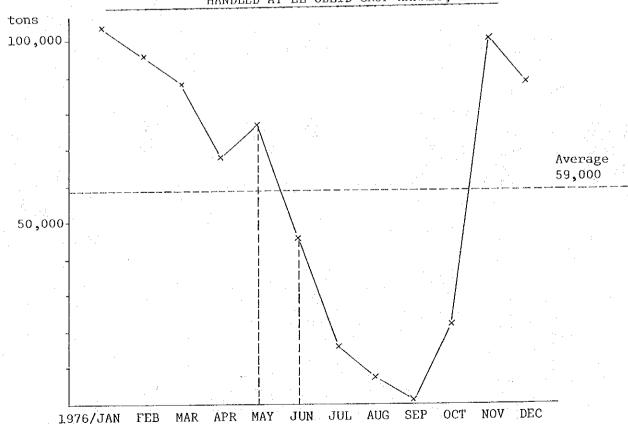


TABLE 6-7 VEHICLE MAKE AND YEARS IN SERVICE

			%	0.2	디디	1.6	1.2	0.3	17	0.6	7.7	2.1	13.7	7.7	29.7	12.3	0.2	10.4	ი ი	2.8	0.1	0.0	1.5	0	ا ا	e 0	0.2	0.2	† さ	0.00	
		Total	No.	3.0	18.0	26.7	19.2	5.1	18.6	10.2	18.9	34.8	225.9	126.9		22	3.6	170,7	163.8	46.2	2.4	7,11	24.6	2.4	1.2	5.1	3.9	3.6	0.9	647.9 100.0	100.0
			}	-	1.2	┢			3.0				3.6	+	1.2				_				-	-						11.41	0.7
		1	ŀ ł	-														-													
) 									1.2					1	1.2												2.4	0.1
		0,	7.								12	2.4	1.2	7.5	1.2	1.2			1.2											ნ ნ	0.6
		· -	1		1.2							1.2			2.4															8 †	0.3
		C	1		1.2		1.2		3.0	1.2	:		3.6		ተተፒ	2.4		4.2												34.2	2.1
		σ	,					2.7	51		1.5		2.4		7 8			3.0												22.5	T t
	ļ 	α)		1.2				1.5	1.5		4.2	9.0	7	i1	5		ထံ	1.5		1.2										3.0
				5	2.4		5		1.5	5			2.7		10.	9.9		8 9.3	3.0									1.2		38.7	2,3
		ω	,		1.2	5	г- і	2	0	Ţ	5	1 5.		2 6.0	3 43.2	5 16.2		5 19.8	3.9											107.1	6.5
		ഗ			2 2.4	2 4.5		1.2				ഹ	ώ	5 10.2	6 42.3	5 22.5	†	0 19.5	5 15.9							10				144.9	8.8
		<i>=</i>			2 L 2	7.	5 1.		5 1.3	2		7	32.	9	2 87.6	3 52.	2.1		9 22,			1	7			2 L5	_	7		CA	3 16.7
		m			-1	7.	-1		1	러	ហ	2		ထံ	97.	30.		52	42.	0		ភ	2				10	4		1:1	တံ
					3.6	6°E †	5 3.6		5	1.2		- 1	ı	- 1		9 52.5				2 27.0			4 15.	+	2	2.1	7	7	ဖ	וניי	+! 21.5
		-	· 	_	2	2 2	7.	2	긤		리	i	- 1	8 34.2	1 43	15.9	1.2	±•	0 22.5	19.2	1.2	2	υ. Τ	2.	리		7			α	4 13.4
		0	$\frac{1}{\sqrt{2}}$,- i	-1		ri 					15	16.8	1		1		ပ		-	-	ri —		-		\downarrow	-5. -		54,	3.4
J	Years in	Service	/ake	t) 1)		er(1.0)	com(1.5)	.5)	(3.0)	(0)		(0)	(0)	0)	6.0)		onal(6.0		0)	3.0)			\sim l	12.0)	0)	(0)	5.0)	(o)	6)	Number	9/0
	/	/ :	Vehicle Make	Volga(1/4	Jeep(0.5)	Land Rover(1.0	Ford Custom	Toyota(1.5	Mercury (Commer(3.0		Commer(5.	Austin(5.0	Austin(6.0)		Ford(6.0)	International	Ford(7.0)	Nissan(8.0	Mageros(8	Fuso(8.0)			Leyland(1	Super(15.0	Scania(16.0	Nissan(16.	Bassit(6.0	Liner(16.0	10L	,

Note: 1) Figures in parenthesis indicate loading capacity in tons.

TABLE 6-8 YEARS IN SERVICE OF VEHICLES BY TYPE 1)

ANNEX VI-13

vice	H	9.0	0	Φ	3.7
	72.0 4	_	46.8 2 (2.9)	39.6 5 (2.5)	! ! .
. 1		1,1	7 >		11.4 1,601.7
	т.	OT .		•	78
77	t	1 .	1		1 1
13	1	2.7	1	t	2.4
12	1	ິດ ທ	1	i	9.9 2.4 (0.6) (0.1)
7	1.2	3.6	4	ŀ	4.8 (0.3)
07	2.4	27.0	ı	± 8	34.2 (2.1)
တ	2.7	19.8	1	ı	22.5 34.2 (1.4) (2.1)
ω	1.2	45.0	I	2.7	48.9 (3.1)
7	2.4	32.1	1.2	O π	38.7
ω	4.2	98.7	i	t.	107.1
ιΩ	12.0	118.2		14.7	144.9 (9.0)
t	ຫ ຫຼຸ.	. 0.853	7.5	5.7	275.1
က	10.2	5 4 . 662	٦ ٦	0°0	54.9 201.6 327.6 317.7 275.1 144.9 107.1 (3.4)(12.6)(20.5)(19.8)(17.2) (9.0) (6.7)
2	11.1	290.4	26.1	1	327.6 (20.5)
٦	თ თ	80.3	11.4	1	01.6 12.6)(
0	დ დ	48.3	ب ب	1.5	54.9 2 (3.4)(
e Type	ck-up	Truck	Truck	·	
Vehicl	Van/pi	Medium	Heavy	Bus	Total (%)
	6 7 8 9 10 11 12 13 14 15 Total Servic	0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 Total Service (%) 3.6 9.9 11.1 10.2 9.9 12.0 4.2 2.4 1.2 2.7 2.4 1.2 1.2 72.0 4.1 (4.5)	0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 Total Service 3.6 9.9 11.1 10.2 9.9 12.0 4.2 2.4 1.2 2.7 2.4 1.2 1.2 72.0 4.1 (4.5) 48.3 180.3 290.4 258.0 118.2 98.7 32.1 45.0 19.8 27.0 3.6 5.9 2.4 - 10.2 1,443.3 3.6 (90.1)	0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 Total Service (%) (%) (%) (%) (%) (%) (%) (%) (%) (%)	cole Type 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 14 15 17 4 17 4 17 2 2 4 1 2 2 4 1 2 2 4 1 2 2 4 1 2 2 4 1 2 2 4 1 2 2 4 1 2 2 4 1 2 2 4 1 2 2 4 1 2 2 2 4 1 2 2 2 4 1 2 2 2 4 1 2 2 2 2 2 2 2 2 2 2 2 2 3 3 2 4 1 2 2 3 2 2 2 2 3 2 3

Note: 1) Vehicles for military use are excluded.

TABLE 6-9 DISTRIBUTION OF VEHICLES BY LOADING CAPACITY 1)

Vehicle Type	Van/pick-up	ck-up			Med	Medium Truck	ruck				Heavy Truck	y Tru	, sek		TOTAL
city (ton)	Capacity (ton) 0.25 0.5 1 1.5 Total	1.5 Total	က	.	رم د	ဖ	7	. &	Total 11	7	12	15 1	်ဖ	Total	
er of Vehicle	Number of Vehicle 3.0 18.0 26.7 24.3 72.0	7 24.3 72.0	18.8	18.9	18.8 18.9 260.7	793.5	170.7	170.7	7 793.5 170.7 170.7 1,443.3 24.6 2.4 1.2 18.6 46.8 1,562.1	24.6	7.	1.2	18.6	46.8	1,562.1
Average Capacity (ton)	٦.0					-	о Ф					13.1			0.1

Note: 1) Vehicles for military use and buses are excluded.

TABLE 6-10 DISTRIBUTION OF VEHICLES BY LOAD CONTENT 1)

4	Numb	er of Vehicl	les	
	Van	Medium	Heavy	(Vehicles)
	Pick-up	Truck	Truck	Total (%)
Commodities only		83.7	6.4	90.1 (6)
Commodities & Passengers	9.4	1,166.7	31.8	1,207.9 (77)
Passengers only	55.8	173.9	7.3	237.0 (15)
Empty	6.8	19.0	1.3	27.1 (2)
Total	72.0	1,443.3	46.8	1,562.1 (100)

Note: 1) Vehicles for military use and buses are excluded.

TABLE 6-11 LOADING CHARACTERISTICS OF VEHICLES 1)

•	× .	Туре	of Vehic	les	
		Van Pick-up	Medium Truck	Heavy Truck	<u>Total</u>
Average	Commodities only	2	4.91	8.43	5.15
Loaded Tonnage (ton)	Commodities & Passengers	0.73	4,78	9.04	4,84
(((()))	Average	0.73	4.79	8.93	4.87
	Av.Incl. empty Veh.	0.11	4.14	7.19	4.03
Average Loaded	Commodities & Passengers	4.37	9,49	9.03	9,44
Passengers (persons)	Passengers only	5.35	14,63	4.20	12.08
(Porosito)	Average	4.71	9.44	6,54	9.13
	ta en				
Average	Commodities only		80	60	77
Loading Rate (%)	Commodities & Passengers	53	78	72	78
(4)	Average	53	78	70	77
	Av. Incl. empty Veh	. 09	68	54	67

Note: 1) Vehicles for military use and buses are excluded.

TABLE 6-12-1 OD TABLE OF ROAD VEHICULAR TRAFFIC, 1977

(All types of vehicles)

0.1 0.9 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3	<u> </u>	01		02 0	03 0	0.4	05	0 90	07 0	60 8	1	0 11	12	13	14	1.5	16	17	3.5	19	20	21	22	23	24	25	TOTAL
10 10 10 10 10 10 10 10	├	1	-	2		đ	6	-	1		 -			1	9	+-	13		2 7	0	d					1	9.801
03		12	<u> </u>	7		0	ဖ	<u> </u>		-		 		J											 	 	4.7
0.4	_	3				-	-				<u> </u>	_													-	+-	
05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 19 10 10 10 10 10 10 10 10 10 10		14				9	5			_		_			9.0												37.7
10 10 10 10 10 10 10 10	3	15.				/_		6												6	2		1,0	6.0			59.2
00 00 10 11 12 13 14 15 16 17 18 18 19 19 10 10 10 10 10 10 10 10 10 10	\neg	9					_						<u> </u>														6.6
10		17	-					/	7				_		6	_									-	-	3.4
11 0.2 0.2 0.6 0.2 0.1 1.1 1.2 0.2 0.1	3	81				\dashv			4			1.5		_	3.0								7.0				41.0
10 11 12 13 14 15 16 17 18 19 19 19 19 19 19 19 19 19 19	-	- 61								<u> </u>			_	_	-											-	1.0
11	-	0									/				0.2										1	†	,
13 14 15 16 17 18 19 19 19 19 19 19 19 19 19 19		귀							-			\angle								6.0	0.6		6.		-		3.7
13		7	_	-		-							\angle							3	9		0.2	0 1		سنت	24.6
14 0.4 1.8 15.6 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		<u></u>						_		_				\angle							0.9						7.1
15 16 0.3		4				_									_					9	ا تا		ω	S			68.2
16		5.																									0.1
12 10 <td< td=""><td>\dashv</td><td>9</td><td> </td><td>-</td><td></td><td></td><td>\dashv</td><td>_</td><td></td><td></td><td></td><td></td><td></td><td>-</td><td></td><td></td><td>Z</td><td></td><td></td><td></td><td></td><td></td><td></td><td>0.3</td><td></td><td>_</td><td>6,1</td></td<>	\dashv	9		-			\dashv	_						-			Z							0.3		_	6,1
18 3.19 6, 20 21 22 23 24 25 24 25 25 26 27 28 29 20 21 22 23 24 25	-	7			—									_													
2.2 2.1 2.2 2.3 2.4 2.5 2.5 2.6 2.7 2.8 2.9 2.9 2.1 2.2 3.3 2.4 2.5		8									_		_												ļ	1	2.7
		δ,									-															-	8.6
	-S-	22	\pm	_	_			-					<u> </u>		_						Z						1 4 E
	', 1	71																				/			-	-	
	. 4	2	_									<u> </u>			_	_										<u> </u>	
	(1)	<u></u>		-			-					<u> </u>														_	4
	-"	4			- /									ļ												-	
392.8		5;	- 27	-	_	-		-				-												(na ss.	1	/	
	:		·	.	:								·												-	1	392.8

TABLE 6-12-2 OD TABLE OF ROAD VEHICULAR TRAFFIC, 1977

(Van Pick-up)

																							_	veni	(Venicles	s per	r day)
ZONE		ទី	02	.03	0.4	0.5	90	0.1	08	60	10	11	12	13	1.0	15	16	17	31	13	20	21	22	23	24	25	TOTAL
EL OBEID	01		ر د			1.1		0 2	1.2	0	Э Н	_	0 3		2				C	,	u c						,
GEIFIL	0.2							-		1											;						0.2
ET TAIYARA	.03	. !		/																							
SHAMAGATTA	0.4				<u>/</u>	, ,,	8		_			_	_		_												0.6
UM RUABA	90					\angle			0.3	<u> </u>		<u> </u>			<u> </u>								,	-			
ABU HAMRA	90	7					Z	ļ.,		<u> </u>		_	_										7	2			2)
SEMEIH	07						_	K	ļ.,	_		_	_														(
RAHAD	0.8				ļ. <u>.</u>			<u> </u>	Z		ļ.,.		_														7.0
NAWA	60						_		ļ	V																	
EL AIN	10								L		V					<u>L</u>						T					7,
TENDELTI	11																						1	1			
KOSTI-SENNAR	12						_			_			\angle	L													0.3
WAD MEDANI	13											_											+				
KEARTOUM	1.4																						1	T-			,
KASSALA	15											_	_						Γ								
PORT SUDAN	16					:						L															
MALAKAL	17																1	/						-'].			
EL ABBASIYA	8 1																	1	/	la de	Ī						
NUBA MOUNTAIN	19						ď.		_										1	/						-	7
KADUGLI-DILING 20	G 20															Γ					/			1			7
WAU-JUBA	21																				1	/	 	1			9
EN NAHUD	22											<u> </u>										1		1			0.1
NYALA	23																		1	T	_	1	1	/			6.0
BARA	24						i.														1			1			
ATBARA	25		:																		1	 	-	-	1	/	
TOTAL	_			- : [:											 				 		 	-	1	21.4
				٠,												ı						-	-		-	-	

TABLE 6-12-3 OD TABLE OF ROAD VEHICULAR TRAFFIC, 1977

(Medium Truck)

:	-		ACCRECATE OF	a majura		- Barreland			2000			, was also	and the same	COMMO	and private in	+0.00	A)		ownerson	-+	U)			LO.	CERTIFICATION OF THE PERSON OF		0
day)	TOTAL	8-96	7.2	۲°0	14.7	0° 4S	6°E	2.8	37.8	0.8	0.6	3.7	24.0	1.7	62.7	τ•0	2.2		2.3	†•8	14.9	0	3.0	15.6			357.8
per	25	-		wee and	ara mara and								on the second		and a second								:				
les	24												+64444						-					******			
(Vehicles	23					9.0				-			r1 0]4.6		-3								٠,,,,,		
٠ .	22						-					0.3	0.2		1.8.1								/				
	2.1								-						7.0							\overline{Z}		-	-		
	20	0.2	-			2.1	_					9.0	6.3	6.0	œ 						$\overline{/}$						
	19	 				S S			_			8 0	က ပ	٦	0.6	-			_	$\overline{/}$	Z					~~~~	
	3.5	2.3	_			<u>.</u>							- 0						/						_		_
	17	2			-				7										_							7	
	16	9			0.3										7			۷									
	15	0.1												_		7	-										
• .	1.4	36.4			9.0		-	0.3	0		0.2				$\overline{/}$	<u></u>	-										
:	13	.8																									
	12	3.0			0.3				2,4				/														******
	=	0							1.5		7.	$\overline{/}$															
	10	.0															2										
·	60	0																				·					
	80	19.4				10.8																					
	0.7	1				2.1		\overline{Z}														•		1			
	90					3.9				-					:												7
	0.5	13.4	0		13.5	/																					
	0.4	- 1			/	Coupras																				-	
	03				-		:							* .							-						
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MBLE 6-12-4 OD TABLE OF ROAD VEHICULAR TRAFFIC, 1977

(Heavy Truck)

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TABLE 6-12-5 OD TABLE OF ROAD VEHICULAR TRAFFIC, 1977

(BCCS)

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