APPENDIX 7

TECHNICAL ASSISTANCE FOR LAND ACQUISITION

Summary of the Obstacles inside the Construction Limit

No.	STA	LHS	RHA	Remarks
1	STA 18+020		2	House
2	STA 22+015		1	Baboo Fence
3	STA 22+100		7	House
4	STA 22+150		1	House
5	STA 22+200		1	House
6	STA 22+210	2		House
7	STA 22+350		3	House
8	STA 22+420	5		House
9	STA 22+560		1	Toilet
10	STA 22+570		1	House
11	STA 22+590	2		E. Post
12	STA 24+860		1	Toilet
13	STA 25+000	1		E. Post
14	STA 26+015		1	Wood Fence
15	STA 26+140		1	E. Post
16	STA 26+280		1	E. Post
17	STA 26+290	1		E. Post Stay Cable
18	STA 26+365		1	House
19	STA 26+400		2	Sign & Light Post
20	STA 26+510	1		House
21	STA 26+550	1		E. Post
22	STA 22+590	1		E. Post
23	STA 27+190	1		House
24	STA 29+240		1	House
25	STA 29+250	1		House
26	STA 29+260		1	House
27	STA 29+270	1		House
28	STA 34+400		1	Toilet
29	STA 42+200	1		Pipe Line
30	STA 42+370	1		Toilet
31	STA 42+400	1		Hut
32	STA 42+430	1		Toilet
33	STA 46+930	1	1	E. Post
34	STA 46+980	1		E. Post
35	STA 47+020	1		E. Post
36	STA 47+020	1		E. Post
37	STA 47+070	1		E. Post
38	STA 47+120	1		E. Post
39	STA 47+120		1	Sign Post
40	STA 47+170		1	E. Post
41	STA 47+170		1	Wood Fence
42	STA 47+220	1		E. Post
43	STA 47+120	1		Sign Post
44	STA 47+410	1		E. Post
45	STA 47+450		1	E. Post
46	STA 47+540	1		House
47	STA 47+550		16	House
48	STA 47+560	7		House
49	STA 47+700	5		House
50	STA 47+730	5		House+Con.Fence
51	STA 47+800	2		House
52	STA 47+950	1	1	E. Post
53	STA 47+950		1	House
54	STA 48+430	1		E. Post

Phase 1

No.	STA	LHS	RHA	Remarks
55	STA 61+410		1	E. Post+Wood Fence
56	STA 61+470	1		Toilet
57	STA 61+490	1		Sign Posts
58	STA 61+530	1		House
59	STA 61+530		1	Con. Fence
60	STA 61+550		3	House
61	STA 61+600		12	House
62	STA 61+630	7		House
63	STA 61+650		1	Pipe Line & Valves
64	STA 61+860	1		House & Con. Fence
65	STA 65+930		1	Busstop Shade
66	STA 65+970	1		E. Post
67	STA 66+260	2		E. Post
68	STA 70+200		1	House
69	STA 74+850	1		Busstop Shade
70	STA 77+800		1	E. Post
71	STA 77+850		1	E. Post
72	STA 70+850		3	House
73	STA 82+830	1		E. Post
74	STA 83+580	2		Toilet
75	STA 83+614		1	Pipe Line
76	STA 83+650		1	Pipe Line
77	STA 83+700	1		E. Post
78	STA 83+640	1		E. Post
79	STA 84+610		1	E. Post
80	STA 84+640	1		Wood Fence
81	STA 84+650		1	E. Post
82	STA 84+790	1		E. Post Stay Cable
83	STA 85+200	1		E. Post Stay Cable
84	STA 85+240		1	E. Post
85	STA 92+720	1		E. Post
86	STA 92+880		2	House
87	STA 92+920		1	House
88	STA 92+930		1	House
89	STA 92+940		1	House
90	STA 93+150	2		House
91	STA 93+150		1	Con. Fence
92	STA 93+180	1		House
93	STA 93+180		2	House
94	STA 93+190	2		House
95	STA 93+210	1		House
96	STA 93+210		1	E. Post
97	STA 93+240	1		Fence & Con. Step
98	STA 93+300	3		House
99	STA 93+350	1		Hut
100	STA 93+400	3		House
101	STA 93+450		7	House
102	STA 93+500	4		House
103	STA 93+520		25	House
104	STA 93+620		8	House
105	STA 93+670	4		House
106	STA 93+700	4		House
107	STA 93+710		1	Sign Posts
108	STA 93+750	1		Sign Posts
109	STA 93+750		7	House
110	STA 93+780		4	House

APPENDIX 8

TRAFFIC SURVEY AND FORECAST

APPENDIX 8

TRAFFIC SURVEY AND FORECAST

A8.1 Traffic Survey

To determine the present traffic volumes, on the project road, traffic count surveys for 24 hours of two successive working days were conducted at the different road sections. Then, counted volumes were calibrated by applying daily variation and monthly fluctuation factors to estimate the average daily traffic volumes of the year 2002.

In accordance with the specification of traffic surveys for the Study, traffic counts were carried out at 4 stations, including the four legs of two roundagouts, along the project road. Counting was conducted on the 2 days of May 30 and 31 for the following categories:

1. Motorbike
2. Taxi
3. Car
4. Pick-up/Van
5. Small Bus
6. Medium Bus/Mummy Wagon
7. Large Bus
8. Light Truck
9. Medium Truck
10. Heavy Truck
11. Light Semi-Trailer
12. Heavy Semi-Trailer
13. Truck Trailer
14. Extra Large Truck/Others

The results of the traffic counting surveys are presented in Table A8-1 (1~4) for the four stations of:

1. Kasoa (KM18+000)
2. Makessim Roundabout
3. Winniba Roundabout
4. Yamoransa Junction

REHABILITATION OF ACCRA - YAMORANSA ROAD

24 HOUR CONTINOUS MANUAL TRAFFIC COUNT

CENSUS POINT: KASOA (KM 18+

DIRECTION: ACCRA - YAMORANSA (BOTH DIRECTIONS) **DAY:** THURSDAY - FRIDAY

DATE: 30/5/2002 - 01/06/2002 **COMMENT:** KASOA MARKET DAY ON FRIDAY

VEHICLE TYPE	6-7am	7-8am	8-9am	9-10am	10-11am	11-12pm	12-1pm	1-2pm	2-3pm	3-4pm	4-5pm	5-6pm	6-7pm	7-8pm	8-9pm	9-10pm	10-11pm	11-12am	12-1am	1-2am	2-3am	3-4am	4-5am	5-6am	ADT 2002
MOTOR BIKE	2	9	9	9	6	6	8	7	7	4	8	7	4	2	1	2	1	0	0	0	0	1	0	3	93
TAXIS	121	171	165	137	158	123	137	135	133	139	134	132	147	102	66	61	39	25	18	7	8	11	18	61	2,249
CARS	77	97	94	93	116	95	94	107	111	129	120	134	114	93	59	57	25	17	7	3	3	3	15	62	1,709
PICK- UP/VAN	35	47	52	62	58	66	64	72	73	61	54	73	57	39	21	10	7	7	1	1	2	3	1	15	872
SMALL BUS	122	121	122	115	137	128	102	116	105	91	108	104	88	63	28	23	17	8	7	5	1	5	17	63	1,675
MED BUS/MUMMY WAGONS	38	43	31	42	52	50	79	76	93	105	93	99	75	70	58	35	16	6	8	4	5	4	14	36	1,121
LARGE BUS	8	5	7	4	5	3	7	8	9	6	5	6	6	4	10	7	6	2	1	1	2	3	1	5	113
LIGHT TRUCK	17	24	26	20	20	26	10	16	7	12	19	15	7	6	4	4	2	3	1	2	1	1	2	6	246
MEDIUM TRUCK	15	23	21	22	17	27	29	41	42	44	34	30	26	18	12	2	2	2	2	2	1	0	6	6	429
HEAVY TRUCK	11	15	12	10	13	9	9	9	14	10	8	8	10	6	11	11	11	5	4	4	7	11	6	8	218
SEMI- TRAILER (LIGHT)	0	0	0	2	0	0	1	0	0	0	2	0	2	1	1	1	2	1	1	2	1	0	4	3	21
SEMI- TRAILER (HEAVY)	5	5	3	1	3	4	6	8	5	6	9	11	4	4	2	1	4	2	2	1	6	2	5	3	101
TRUCK TRAILER	3	5	4	5	4	4	3	3	5	2	4	2	4	3	1	2	3	2	1	2	10	6	4	2	77
EXTRA LARGE TRUCK & OTHERS	1	2	4	1	3	2	1	0	1	1	2	1	2	1	0	0	0	0	0	2	0	2	0	1	24
TOTAL	452	562	547	520	589	540	547	597	603	607	596	620	542	409	270	213	133	77	50	34	43	48	90	273	8,948

Table A8-1 Traffic Survey Results (1/4)

REHABILITATION OF ACCRA - YAMORANSA ROAD

24 HOUR CONTINOUS MANUAL TRAFFIC COUNT

CENSUS POINT: MAKESSIM ROUNDABOUT

DIRECTION: ACCRA - YAMORANSA (BOTH DIRECTIONS) **DAY:** THURSDAY - FRIDAY

DATE: 30/5/2002 - 01/06/2002 **COMMENT:** KASOA MARKET DAY ON FRIDAY

VEHICLE TYPE	6-7am	7-8am	8-9am	9-10am	10-11am	11-12pm	12-1pm	1-2pm	2-3pm	3-4pm	4-5pm	5-6pm	6-7pm	7-8pm	8-9pm	9-10pm	10-11pm	11-12am	12-1am	1-2am	2-3am	3-4am	4-5am	5-6am	ADT 2002
MOTOR BIKE	8	12	14	16	12	14	7	15	10	8	32	23	14	9	2	2	2	1	1	0	0	0	0	0	198
TAXIS	71	47	44	53	50	39	49	37	40	49	65	61	64	61	38	30	23	10	9	4	4	5	12	18	876
CARS	40	65	55	53	52	58	53	59	79	80	102	91	75	58	40	29	12	12	7	4	3	2	12	17	1,054
PICK- UP/VAN	20	30	35	45	33	35	42	39	42	51	48	51	30	29	16	12	10	5	2	1	4	7	7	6	595
SMALL BUS	62	65	69	72	65	58	73	85	79	92	101	95	97	61	40	14	19	8	6	3	5	8	17	41	1,229
MED BUS/MUMMY WAGONS	10	21	10	18	15	19	16	18	28	37	31	33	30	24	21	13	7	8	7	5	7	3	7	6	388
LARGE BUS	2	3	3	3	3	4	4	5	6	6	7	5	6	7	6	2	1	2	2	2	3	2	3	3	82
LIGHT TRUCK	5	10	8	8	6	9	6	7	7	8	9	10	3	6	3	4	1	2	1	0	1	1	2	2	113
MEDIUM TRUCK	9	9	8	9	5	9	9	9	8	9	13	10	14	8	6	8	5	0	3	5	5	3	4	4	164
HEAVY TRUCK	7	8	1	4	8	8	7	4	5	10	12	10	8	7	4	6	5	8	2	3	1	3	4	2	131
SEMI- TRAILER (LIGHT)	0	1	0	0	1	2	3	1	2	1	1	0	1	1	1	1	1	0	1	2	0	0	0	1	17
SEMI- TRAILER (HEAVY)	5	6	4	2	1	1	1	4	4	7	4	3	2	2	1	1	1	2	0	1	1	2	3	4	58
TRUCK TRAILER	3	1	0	0	0	1	1	1	2	3	3	4	2	1	3	0	2	3	2	3	1	0	0	3	35
EXTRA LARGE TRUCK & OTHERS	0	0	0	1	1	0	1	2	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	6
TOTAL	239	275	249	282	248	255	268	284	310	358	425	393	343	270	178	118	87	58	41	30	33	33	68	103	4,943

Table A8-1 Traffic Survey Results (2/4)

REHABILITATION OF ACCRA - YAMORANSA ROAD

CENSUS POINT: WINNIBA ROUNDABOUT — **24 HOUR CONTINOUS MANUAL TRAFFIC COUNT**

DIRECTION: ACCRA - YAMORANSA (BOTH DIRECTIONS) — **DAY:** THURSDAY - FRIDAY

DATE: 30/5/2002 - 01/06/2002 — **COMMENT:** KASOA MARKET DAY ON FRIDAY

VEHICLE TYPE	6-7am	7-8am	8-9am	9-10am	10-11am	11-12pm	12-1pm	1-2pm	2-3pm	3-4pm	4-5pm	5-6pm	6-7pm	7-8pm	8-9pm	9-10pm	10-11pm	11-12am	12-1am	1-2am	2-3am	3-4am	4-5am	5-6am	ADT 2002
MOTOR BIKE	2	4	4	3	4	6	3	3	5	7	5	4	3	2	1	0	1	0	0	0	0	0	0	1	53
TAXIS	172	193	213	210	179	190	182	166	187	189	201	193	192	149	105	82	47	27	16	6	2	9	17	79	2,880
CARS	63	95	106	107	96	101	106	110	114	110	118	122	92	72	42	40	22	16	9	6	2	4	9	36	1,527
PICK-UP/VAN	24	41	35	46	59	61	54	48	63	60	66	63	61	37	27	13	10	5	2	2	2	4	4	14	759
SMALL BUS	73	70	72	81	85	77	105	103	81	87	102	88	75	52	39	18	16	7	4	1	5	5	14	58	1,261
MED BUS/MUMMY WAGONS	33	46	37	39	37	50	53	45	51	61	62	64	50	56	49	31	14	13	16	10	5	11	14	34	839
LARGE BUS	4	3	7	7	4	16	10	7	6	5	6	4	12	8	24	2	3	3	5	3	3	3	3	3	138
LIGHT TRUCK	7	11	10	8	9	9	8	14	8	23	12	14	9	5	6	3	1	3	2	3	2	1	1	5	161
MEDIUM TRUCK	7	24	17	12	17	23	26	15	13	14	25	21	16	14	12	10	7	6	7	5	3	1	2	7	287
HEAVY TRUCK	9	5	1	2	5	6	3	6	3	5	7	5	2	6	6	8	2	3	5	3	2	5	3	2	95
SEMI- TRAILER (LIGHT)	3	1	0	0	0	0	0	2	3	1	2	2	2	1	1	1	0	0	1	0	0	1	1	1	17
SEMI- TRAILER (HEAVY)	2	3	2	2	3	2	3	5	3	5	3	5	5	2	4	1	1	4	3	2	2	1	1	4	60
TRUCK TRAILER	2	1	2	2	2	4	1	1	6	9	5	3	3	2	2	2	1	2	1	0	1	1	0	3	48
EXTRA LARGE TRUCK & OTHERS	4	5	3	2	5	3	2	1	2	2	4	1	3	2	1	0	0	1	0	0	0	0	0	0	36
TOTAL	402	498	507	518	502	544	552	523	543	575	615	585	523	404	316	209	123	87	68	39	26	44	67	245	8,160

Table A8-1 Traffic Survey Results (3/4)

REHABILITATION OF ACCRA - YAMORANSA ROAD

24 HOUR CONTINOUS MANUAL TRAFFIC COUNT

CENSUS POINT: YAMORANSA JUNCTION

DIRECTION: ACCRA - YAMORANSA (BOTH DIRECTIONS) **DAY:** THURSDAY - FRIDAY

DATE: 30/5/2002 - 01/06/2002 **COMMENT:** KASOA MARKET DAY ON FRIDAY

VEHICLE TYPE	6-7am	7-8am	8-9am	9-10am	10-11am	11-12pm	12-1pm	1-2pm	2-3pm	3-4pm	4-5pm	5-6pm	6-7pm	7-8pm	8-9pm	9-10pm	10-11pm	11-12am	12-1am	1-2am	2-3am	3-4am	4-5am	5-6am	ADT 2002
MOTOR BIKE	0	2	2	2	1	1	3	0	1	2	2	1	0	0	0	1	0	2	0	0	0	0	0	1	16
TAXIS	11	22	23	27	28	36	31	15	19	27	22	17	21	21	12	12	11	5	4	2	1	1	1	10	373
CARS	30	49	52	62	61	68	70	79	84	82	74	66	72	48	32	23	24	12	8	6	6	5	9	18	1,033
PICK- UP/VAN	18	23	22	26	31	25	26	23	33	28	38	41	25	17	14	12	4	2	2	0	1	0	2	11	419
SMALL BUS	57	66	85	78	84	74	65	60	75	70	69	73	62	38	17	13	3	2	2	2	1	3	12	34	1,038
MED BUS/MUMMY WAGONS	20	23	26	30	36	34	40	33	38	38	39	44	40	29	26	26	16	13	9	9	6	3	5	16	589
LARGE BUS	3	2	3	1	4	6	5	7	7	13	15	13	6	5	4	2	1	3	1	1	8	6	6	9	124
LIGHT TRUCK	7	8	9	8	5	11	6	6	6	7	8	5	11	7	3	2	3	1	1	2	1	1	2	2	114
MEDIUM TRUCK	11	10	12	14	17	14	16	11	14	8	3	5	12	6	8	10	6	9	3	5	2	2	3	5	201
HEAVY TRUCK	1	4	2	1	3	0	3	0	3	9	10	10	2	2	1	4	2	3	2	3	5	2	3	7	76
SEMI- TRAILER (LIGHT)	0	1	0	0	1	0	0	1	0	1	0	0	2	0	0	0	1	1	0	1	0	1	0	0	6
SEMI- TRAILER (HEAVY)	7	4	7	3	4	4	5	5	12	5	6	5	3	2	2	2	2	2	1	1	2	1	1	3	80
TRUCK TRAILER	4	1	2	2	2	2	3	3	5	3	8	4	2	1	1	0	2	1	2	1	2	0	1	3	49
EXTRA LARGE TRUCK & OTHERS	0	1	1	1	2	0	0	1	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	1	6
TOTAL	166	214	243	251	276	272	270	242	294	288	290	280	255	174	117	104	72	51	33	31	32	24	44	116	4,123

Table A8-1 Traffic Survey Results (4/4)

A8.2 Future Traffic Volume Forecast

To determine the present traffic volumes, on the project road, traffic count surveys for 24 hours of two successive working days were conducted at the different road sections. Then, counted volumes were calibrated by applying daily variation and monthly fluctuation factors to estimate the average daily traffic volumes. To estimate future traffic volumes on the road, the past trend of traffic growth was investigated, and growth factors and forecast approaches applied on other sections of the road were reviewed. In addition, growths in social and economic parameters that affect traffic growth were taken into consideration with expected shifted and induced traffic due to road improvement.

1) Past Trend of Traffic Growth:

In order to develop a growth factor that can be applied to forecast future traffic volumes on the project road, previously collected traffic volume data on the road (1995 – 2001) were reviewed to estimate the growth rate of traffic. Data disparity, however, was so high to show a reasonable or applicable trend of traffic growth as shown in Figure A8-1.

2) Traffic Growth on Other Sections

Applied growth factors on other sections of the ECOWAS Highway, which are presented in Table A8-1, were reviewed for reference purposes. The following is a summary for the forecasting approach used by other donors for the sections composing the ECOWAS Highway.

Table A8-1 Growth Rates of Traffic Volumes on ECOWAS Highway

Section	Mallam (Accra) - Kasoa JBIC / IDA	Yamoransa - Takoradi GOG	Takoradi - Agona DANIDA, Denmark	Tema - Sogakope KfW, Germany
Growth Rate	1998-2008: 8% 2009-2018: 6%	1998-2013: 5.5%	1999-2008: 5% 2009-2017: 4%	2000/2005/2010/2015 Car: 3.0% - 8.6% - 7.3% Bus: 3.0% - 7.6% - 6.8% Truck: 3.0% - 4.9% - 4.0% (The growth rate of 3% is used only during construction period)

a. Mallam – Kasoa (IDA – Previously JBIC)

The detailed design report of Accra - Yamoransa Road states only that the applied growth rates for traffic volumes on the highway section are 8% for the first 10 years (1998 – 2008) and 6% for the second 10 years (2009 – 2018).

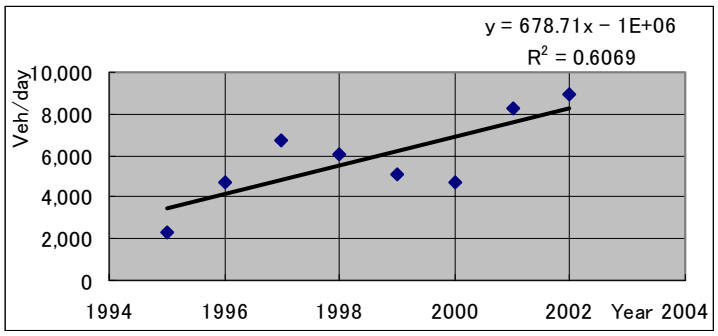
b. Yamoransa – Takoradi (GOG)

This section of the highway was subject to an overlay project by the consolidated fund of the Government of Ghana. For the purpose of pavement design, a traffic volume growth rate of 5.5% was applied for a period of 15 years (1998 – 2013).

Traffic Volumes on National Highway No. 1 (Kasoa – Yamoransa Section)

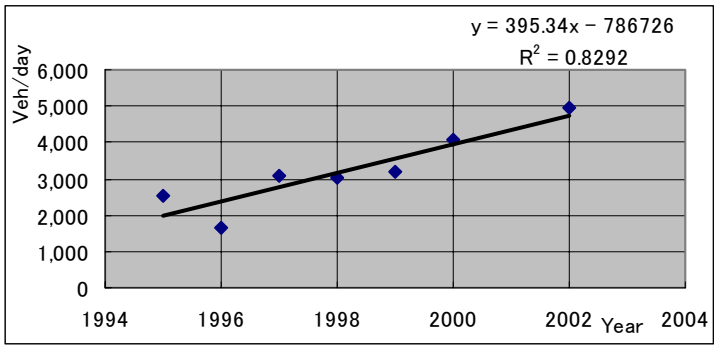
Year	Kasoa - Winneba	Winneba - Mankessim	Mankessim - Yamoransa
1995	2,316	2,549	1,908
1996	4,706	1,666	1,972
1997	6,771	3,097	2,039
1998	6,091	3,032	3,190
1999	5,055	3,209	1,987
2000	4,749	4,048	2,191
2001	8,244	-	5,067
2002	8,948	4,943	4,123

Kasoa - Winneba



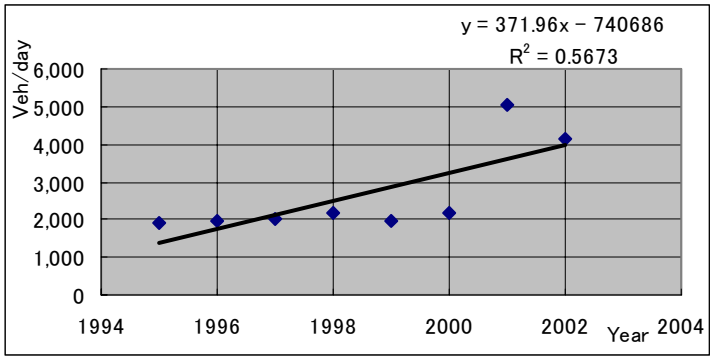
Annual Average Growth Rate: 12.1 %

Winneba - Mankessim



Annual Average Growth Rate: 13.5 %

Mankessim - Yamoransa



Annual Average Growth Rate: 16.1 %

Figure A8-1 Past Trend of Traffic Growth on the Project Road

c. Takoradi – Agona (DANIDA)

In the design review report for this section of the highway (1999), the past growth rates were estimated based on daily counts carried out by three consultants in 1993, 1997 and 1999. The results showed different values at seven locations on the road, ranging between –7.2% and 18.8%.

The approach of estimating the growth factor for traffic on the road is based on the assumption that areas in the western region are the main generators for traffic on the road. Also, the agricultural, forestry and mining sectors are the dominant sectors in these areas. As there are no indications for higher growth in these sectors, a central scenario growth rate of 5% (1999 – 2008) and 4% (2009 – 2017) is adopted for both commercial and private traffic.

d. Tema – Sogakope (KfW)

To estimate future traffic growth on this road section, the following indicators were used:

- For passenger vehicles: growth in population and per capita income
- For freight vehicles: growth in agricultural, industrial and mining/service sectors

Based on the likely performance at the various sectors within the regions relevant to the project road, Sectorial growth rates were estimated and applied in two equations for each of the passenger and freight vehicles for the periods (2006 – 2012). For the period of during construction (2001 – 2005) a nominal annual traffic growth rate of 3% has been used for all vehicles. The applied equations are:

Passenger Vehicles: $D = [(1+g_p)\ (1+g_{rpc1}) – 1.0] \times 100 \times E$
Freight Vehicles: $D = 1/2\ (g_{ag} + g_{1m}) \times 100 \times E$

Where;

D: growth rate of demand
E: income elasticity of demand
g_p: estimated growth rate of population
g_{rpc1}: estimated growth rate of per capita income
g_{ag}: estimated growth rate of agricultural sector
g_{1m}: estimated growth rate of industrial/mining/service sectors

3) Future Traffic Volumes on the Project Road (Kasoa – Yamoransa Section – JICA B/D)

Forecasting future normal traffic, or future growth in traffic volumes, depends mainly on the growth in different social and economic sectors including such factors as GDP (Gross Domestic Products) and population. The following steps compose the procedure applied in determining the annual average traffic growth

rate to be used estimating the future daily traffic volumes:

a. GDP Growth:

In Ghana the annual growth of GDP is 3% between 1980 and 1990, 4.1% between 1990 and 2000, and is estimated to be 4.8 between 2000 and 2004. The Medium Term Development Plan (1996-2001) put a target GDP annual growth rate of 7.8%, but the actual average growth rate was only 4.3%.

b. Population Growth:

In the period from1984 to 2000 the annual average growth rate of population in Ghana was 2.56%, with a lower rate of 2.05 in the Central Region where the project road is located, while Greater Accra Region had the highest rate of 4.53%.

c. Highway Network Master Plan:

Results of the Highway Network Master Plan, prepared in 2000 under a technical cooperation fund by JBIC, show that average growth rates of traffic on highways are approximately 1% higher than the GDP growth in the same period. The proposed rate by the Preparatory Study Team, which is 5.5%, is estimated based on the Master Plan's resulted relationship between GDP and traffic growth as a reasonable value for the future growth of normal traffic on the highway.

Other results of the Master Plan show that the annual average traffic growth on national roads is about 4.5%. Accra and the Central Region are expected to have the highest rates in the country due to concentration of population and economic activities in the area.

d. Induced and Shifted Traffic:

Additional traffic volumes are expected to generate on the road after completion of improvement works. This additional traffic is composed of the induced traffic that will be newly generated after improving the road, and the shifted traffic that will be attracted from other bad-condition roads and shifted to the improved road.

e. Annual Average Growth Rate:

Based on the above-mentioned factors, an annual growth rate of 6% is applied to estimate future traffic volumes on the road.

f. Future Traffic Volumes:

Applying the concluded growth rate of 6%, future average daily traffic volumes on the road sections are estimated for the target year 2020 as presented in Table A8-2.

Table A8-2 Present and Future Traffic Volumes on Project Road

Year	Average Daily Traffic (ADT)			Growth Rate (2002)
	Kasoa ~ Winneba	Winneba ~ Mankessim	Mankessim ~ Yamoransa	
2002	8,948	4,943	4,123	1.00
2007	11,974	6,615	5,518	1.34
2010	14,262	7,878	6,571	1.59
2015	19,085	10,543	8,794	2.13
2020	25,541	14,109	11,768	2.85

APPENDIX 9

TRAFFIC ACCIDENTS

APPENDIX 9

TRAFFIC ACCIDENTS

A9.1 Traffic Accidents in Ghana

The issue of providing traffic safety on roads in Ghana should be seriously considered. The year 2002 is expected to show about 1,000 fatalities and 5,000 injuries due to traffic accidents. Table A9-1 shows the number of traffic accidents by severity type in the period from 1988 to 1996 together with available data of population and registered vehicles. The accident data are plotted graphically in Figure A9-1.

Table A9-1 Traffic Accidents in Ghana

Year	Total Accidents	Fatal	Injury	Damage Only	Population	Registered Vehicles
1988	4,406	597	2,518	1,291		105,666
1989	7,547	708	4,072	2,794		124,898
1990	8,376	747	4,431	3,198	14,470,000	134,235
1991	8,375	724	4,145	3,506	14,485,000	131,973
1992	6,924	718	3,800	2,406	15,240,000	137,966
1993	6,463	701	3,415	2,347	15,960,000	157,782
1994	6,608	637	3,471	2,500	16,680,000	
1995	9,538	1,002	4,831	3,705	17,200,000	
1996	8,490	831	4,135	3,524	17,740,000	

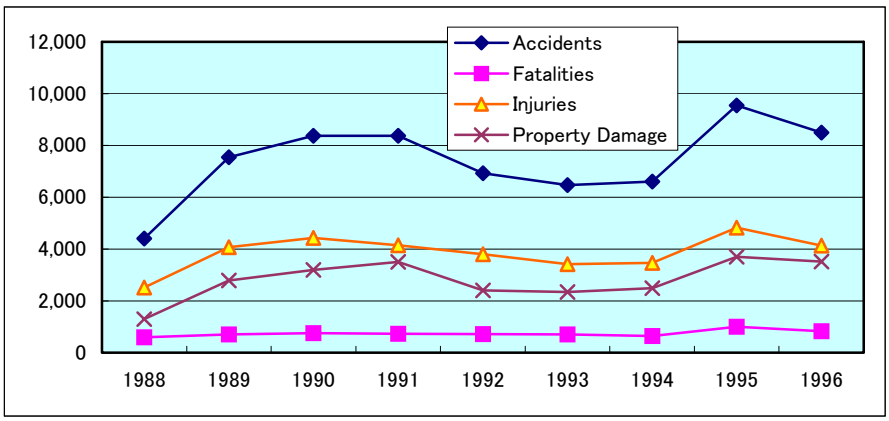


Figure A9-1 Traffic Accident Pattern in Ghana

A9.2 Present Safety Conditions of Project Road

The existing safety level of the project road is considered as poor that makes driving unsafe and inconvenient. The road surface is deteriorated and sight distance is not enough at some sections in rolling areas. Pedestrian walkways, road markings and traffic safety devices are virtually non-existent. In the built-up populated areas, sidewalks and crossing areas are mostly not provided. In addition,

motorized traffic is mixed with pedestrian movements, which create dangerous situations especially during market days. Analysis of accident records of the project road between Kasoa and Yamoransa identified 13 black spots with high accident rates that require careful considerations in providing safety facilities. Table A9-2 presents the number of accidents by severity type at black spots.

Table A9-2 Black Spot Accidents on Kasoa – Yamoransa Road (1996 – 2000)

No.	Station (km)	Total Accidents	Fatalities	Injuries	Damage Only
1	18+050	58	13	97	20
2	22+000	21	3	33	7
3	26+600	48	11	51	18
4	29+200	26	5	32	11
5	47+500	49	1	43	29
6	61+600	21	10	74	6
7	82+800	27	5	45	10
8	84+700	22	6	37	5
9	93+400	20	1	19	5
10	93+800	23	7	30	1
11	104+800	22	6	20	4
12	107+000	25	10	35	4
13	114+400	25	9	42	7
Total		387	87	558	127

In addition to the above-mentioned black spots, there are many settlements and areas with dense concentration of socioeconomic activities along the Project Road, especially schools and health centers. Such areas require providing necessary safety facilities to protect people from cars. Speed signs and humps should be installed to reduce vehicular speeds from 100 km/hr in flat areas and 80 km/hr in rolling areas to 50 km/hrs in built-up areas. In addition, guardrails are required to be provided along roadsides with such activities.

A9-3 Required Safety Measures

In general, traffic accidents are caused due to any malfunction in one or more components of the "Road User – Vehicle – Roadway" System. In particular, improving and rehabilitation of roads without applying appropriate safety measures is anticipated to cause considerable increase in both accident rates and accident severity. It is a fact that improved and wide roads encourage drivers to increase their driving speeds. Therefore, measures and precautions under the 4 Es of engineering, education, enforcement and environment should be developed and applied to all the system components to assure safety on roads.

The project road is the main road along the area and it is used for daily life activities as well as the main trunk road connecting many regions and ECOWAS countries. It is expected that a conflicting demand may be generated between the local traffic and through traffic. Speeds on the road will be much higher than those speeds which people have been accustomed to in the past. In addition, there are

many at-grade uncontrolled junctions and intersections. The road cuts through agricultural lands and many farmers need to cross at-grade with their equipment, produce and livestock. School children also have to cross the road to go to their schools. To assure safety on roads in Ghana, the following safety components should be taken into consideration.

- Inspection System of Vehicle Conditions
- Driver Licensing System
- Safety Education
- Traffic Safety Campaigns and Seminars
- Enforcement and Traffic Police Enhancement
- Laws and Regulations
- Engineering Improvements
- Safety Facilities