



Kingdom Hotel Investments

Mövenpick - Ambassador Hotel, Accra Traffic Studies Report

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dar al-handasah
shair and partners

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1.0 EXECUTIVE SUMMARY

The Ambassador Hotel, one of Ghana's most vibrant hotels in the 1960s collapsed in the early 1980s. It has been sub-leased to be re-developed into a nine-storey 337-room five star hotel facility, 34 serviced apartments and a high end offices and retail facilities to be named 'Movenpick-Ambassador Hotel'.

The main objective of the traffic studies is to provide adequate traffic information to advice on the demolition of existing structures, construction and operation of the proposed hotel as well as related environmental issues.

The project is located in the central business district of Accra, the capital city of Ghana, with a population of about 3 million people. The project area, boarded by the Independence Avenue, Novotel Hotel, Cedi House, Mobil House, Food and Drugs Board and the Liberia Link, is approximately 65,898m².

The technical approach and methodology adopted in carrying out this studies involved reconnaissance survey, consultation and desk studies, field work and interviews.

There is a general traffic congestion in the CBD which has a sustained peak period from 11:30 hours to 17:30 hours. About 70% of the traffic congestion in the CBD is experienced in the immediate project environs. The general peak period on the Independence Avenue and the Liberian Link is from 7:00 hours to 8:00 hours. The level of service on the Independence Avenue, Liberia Road and Barnes Road is classified as "C": a road capacity condition with an average flow range of 750-1200 passenger's vehicles per hour in both directions. The Liberia link is under utilized

The existing traffic management system and road condition on the roads in the immediate project environs is adequate for a smooth demolition, construction and operation activities to take place. However, the existing entrance to the project site is unsafe due to its closeness to the bus-bay, the intersections at both ends of the Liberia Link make it virtually impossible for vehicles longer than 12m to turn. There is an overwhelming presence of passenger vehicles (99% and 98% on the Liberia Link and Independence Avenue respectively) which is typical of business districts in developing countries.

The average annual daily traffic (AADT) on the Independence Avenue is 14,877 vehicles whereas that of the Liberia Link is 793 vehicles. The peak period (7:00hrs-8:00hrs) is an age-old phenomenon in Accra and it will continue to stay as long as majority of workers in Ghana report to work at 8:00hrs.

At the operation stage, it is most likely that some motorists will respond to traffic bottlenecks by diverting through the hotel premise or parking at the hotel's parking facilities at the expense of customers.

The traffic growth rate in the CBD is 12% per annum whereas the national average is 8%. These growth rates may be used for up to 2019 for traffic forecasting and planning. Even though the city authorities' plans to decongest the CBD may yield some reduction in traffic, however, the exercise is most unlikely to be sustained over a long term. Therefore, it is prudent to plan or forecast with the above growth rates.

Although there is about 70% influence of congestion in the CBD on the immediate environs of the hotel, the influence can further be reduced by the introduction of new gates to Barnes Road and Liberia Link. The creation of new gates would improve on accessibility during operations and emergencies.

It is recommended that as part of the hotel's social responsibility, it should lend hand to the city authorities (AMA and DUR) in undertaking activities to decongest the hotel's immediate surroundings. The authorities of Movenpick-Ambassador Hotel (MAH) should liaise with DUR in improving the Liberia Link-Liberia Road and Barnes Road- Liberia Link junctions as well as to implement any countermeasures to control pedestrian-vehicular conflicts at the bus-bay (next to the existing entrance) and to make the project environs safer.

All attempts should be made to avoid intensive transport related activities at the demolition and construction stages during peak hours. Similar method should also be employed in timing activities/services which may be impacted upon negatively by heavy traffic during peak hour(s).

The existing entrance should be relocated, at least, 35m away from the bus-bay and should be designed to take 2-way traffic. The existing gate should be used during demolition and construction stages but along side the use of traffic warden(s) and the necessary temporary traffic signs.

At the operation stage, stringent measures should be instituted in order to prevent undeserving motorists from diverting through the hotel or using its parking space at the expense of the hotel's customers, visitor or workers.

The hotel authorities, if they choose to, should fish out all the necessary modalities to take advantage of the heavy presence of pedestrians, passengers and motorists in the CBD and turn it into publicity opportunities.

APPENDIX

- Proposed Terms of Reference
- Manual Traffic count Data
- Summary profile of consultant

2.0 INTRODUCTION

This document has been prepared in response to an invitation from Dar al Handasah, consultants to KHI (GH) 01 Limited, requesting Traffic Studies for the demolition of the existing structures, construction and operation of the Proposed Movenpick-Ambassador Hotel.

2.1 Background

The Ambassador Hotel, one of Ghana's most vibrant Hotels in the 1960s, collapsed in the early 1980s. The said hotel, located in the central business district (CBD) of Accra in Ghana, has been sub-leased to be re-developed into a Five-Star international Hotel to be named 'Movenpick-Ambassador Hotel'.

2.2 Objectives of the Assignment

The main objectives of the studies are to provide adequate traffic data/information to advise on the following:

- Demolition of existing structures
- Construction of the proposed facilities
- Operation of the proposed facilities and
- Environmental related issues.

2.3 Scope of Study

The scope of the Traffic Study included (but not limited to) the following:

- Establishing Traffic Baseline Data for the project;

- Consulting with Government agencies, NGO's and other interested members to furnish the client with traffic related data;
- Outlining or contributing to preparing management clauses in the contract documents;
- Recommending appropriate measures to be taken (traffic-wise) during the demolishing, construction and operation stages of the project and
- Providing data input for the economic analysis of the viability of the project where necessary.

3.0. THE PROJECT

3.1. The Project Location and Description.

The project is located in the central business district (CBD) of Accra, the capital city of Ghana with a population of about 3 million people.

The general traffic situation round the project on the Independence Avenue can be described as 'heavy' during peak hour period(s) with the exception of the Liberia Link.

The project location is boarded by the Independence Avenue at the south, Novotel Hotel at the west, Cedi House, Mobil House, Food and Drugs Board, all in the east and Liberia Link in the north. The project occupies a total land area of 16.53 acre (65,898m²) with only one existing entrance accessible by vehicle.

All the roads one can use to access the project area are in good condition with well defined road furniture.

3.2. The Proposed Project

The proposed project is nine-storey 337-room five star hotel facility, 34 serviced apartments and a high end offices and retail facilities to be named 'Movenpick-Ambassador Hotel' with their related public and service spaces. The main hotel building is divided into 3 main sections; the basement, the ground floor and the mezzanine (constituting a podium) which is separated from a seven-floor tower by a technical floor. Two out of the existing murals would be retained and refurbished. There are 208 proposed parking spaces available for the above project.

4. TECHNICAL APPROACH AND METHODOLOGY

4.1 Reconnaissance Survey

The consultant visited the project location and carried out reconnaissance survey. Trial traffic counts were conducted and all the possible links or accesses to the site investigated.

4.2 Consultations and Desk Studies

The consultant held discussions with the following agencies and departments in order to obtain relevant data and also to sensitize them on the project:

- Department of Urban Roads (DUR);
- Accra Metropolitan Assembly;
- The Motor Traffic and Transport Unit (MTTU) of the Ghana Police Service;
- Selected Local Consultants who have conducted traffic surveys for DUR on the roads considered under this project and
- Driver and vehicle Licensing Authority (DVLA)

Available data and documentation were reviewed as part of the desk studies.

4.3 Field Work

4.3.1 *Scoping*

A scoping exercise was undertaken by consulting with individuals behind the wall of the project area bordered by the Liberia Link to determine how their concerns should be addressed within the context of a possible location of entrance(s) to the proposed hotel affecting them.

4.3.2 *Traffic Studies and Observation*

Before the commencement of the detailed traffic survey, the consultant carried out network assessment of all the roads within the traffic catchment area of the project. The assessment was to help establish the extent and nature of the problems that the siting and construction of entrance(s) may pose to other road users within the traffic catchment area.

The following traffic counts and surveys were carried out on the roads within the traffic catchment area:

- Manual Classified Traffic Count;
- Turning Movement Count/Studies at Junctions (by observations) and
- Parking Studies (parking facilities in the immediate project environs and at the bus-bay near the existing entrance). Parking facilities of hotels of similar characteristics in the Accra Metropolis to the proposed hotel were also studied.

The nature of manoeuvres of motorists, cyclists and pedestrians at the existing entrance gate and at the bus-bay were carefully studied.

The days for the studies were chosen based on their relevance to the hotel project while paying particular attention to trends already established by other studies. The Consultant's own experience in similar projects was brought to bear in the selection of the 'counting' days.

4.3.3 *Trial Trips and Interviews*

Several trial trips were organized in the immediate environs of the project area to locate the existing entrance of the hotel from all the various points of entry. The consultant organized these trips (with each trip in a different taxi) in order to obtain first hand information on how local drivers (especially taxis drivers) would fare in locating the hotel from various directions. The driver of each taxi hired was interviewed to find out whether they preferred an alternative entrance to the project area and their reasons for their choices/answers.

Following the responses of the various taxi drivers the Consultant, with the assumption that all the proposed entrances (as indicated in Appendix B) were functional, drove to each entrance during peak hours from all the possible angles to determine the nature of impedance any individual trying to locate Movenpick-Ambassador Hotel from any part of Accra may encounter within 1km radius.

Special attention was also paid to traffic signals, signs and road markings including the general road condition of the following roads:

- Liberia Road;
- Independence Avenue;
- Barnes Road and
- Liberia Link.

The possible negative impacts the existing traffic situation and the road network may have on the future traffic management and safety within the hotel premise during the demolishing, construction and operational stages were also assessed.

5. ANALYSIS AND DISCUSSION OF RESULTS

5.1 General Traffic Conditions in the CBD

Accra, the capital city of Ghana, has a population of about 3 million people. However, records obtained from DVLA and other sources do not reveal the exact numbers of vehicles in Accra. The motorization (total number of vehicles) in the metropolis can be estimated to be about 8.2% of the total population in Accra by the extrapolation of time series data on traffic volumes on existing roads [9].

The traffic growth rate in the central business district (CBD) of Accra is estimated to be about 12% per annum, well above the national average of 8%.

There was no record available on the traffic mix in the entire business district. However, studies conducted on similar roads to those considered by the Consultant revealed that 62% of total vehicles thronging the streets of the CBD are commercial vehicles (mainly passenger vehicles) with the rest being private vehicles for individuals and institutions.

There is a general traffic congestion/saturation on the western side of the proposed site (mainly in Makola, Okaishie and Kinbu areas) due to pedestrian-vehicular conflict and the intense commercial activities that go on there. The peak period for this sustained saturation starts from 11:30 hours to 17:30 hours.

Any time there is a 'heavy' traffic on the Independence Avenue (National Theatre-Novotel Hotel direction) due to traffic congestion in the CBD, hawkers and beggars take advantage of the traffic situation to sell and to beg for alms respectively. This situation normally occurs during weekdays and on Saturdays. It is interesting to note that the presence of the

hawkers and beggars create a pedestrian-vehicular conflict which in turn contributes to the traffic congestion.

5.2 Traffic Management System, Accesses and Safety Concerns

The existing traffic management system put in place on the Liberia Road, Independence Avenue, Barnes Road and the Liberia Link are adequate for a smooth demolition, construction and operational activities to take place. The existing traffic flow direction depicts the aforementioned roads as if they all form a large rotary intersection. This situation gives the proposed site an advantage since any motorists (depending on the length of vehicle) existing from any part of the project site can join such a 'circle' at any vantage point. See Appendix A for the existing traffic management layout.

The layout for the proposed traffic management and flow outside and into the hotel premises is as shown in Appendix B.

The locations of the proposed entrances were established based on the following considerations:

- Easy accessibility to the hotel during demolition, construction and operation stages;
- Alternative entrance for emergencies and for customers/individuals during peak hours and
- Safety and cost of implementing the proposed entrances.

For example, during peak hours on the Independence Avenue, vehicles entering the hotel premises from its northern side can avoid the heavy traffic by entering through the Liberia Link and exiting unto Barnes Road.

Currently, the intersection between Barnes' Road and the Liberia Link has an island with kerbs. Therefore, using a standard vehicle of over 12m to turn right from Liberia link to join Barnes Road is virtually impossible.

Consultation with the Department of Urban Roads (DUR) reveals that the island can be changed into road marking instead of the kerbs. This proposal, when implemented, would make turning movements of 'longer vehicles at that intersection a lot easier than it is now.

From a careful study of the traffic flow and driver behaviour on the Independence Avenue (National Theatre – Novotel direction), the current entrance to the project site is unsafe. The said entrance is too close (2.0m) to the only bus-bay on the Independence Avenue after crossing the Independence Avenue–Liberia Road intersection.

During the demolition, construction and operation stages, the traffic indicators/signals of motorists intending to use the bus-bay may be misconstrued as intending to enter the hotel: this misinterpretation of the signals is further reinforced especially when motorists also slow down considerably as they approach the existing entrance or the bus-bay. In traffic engineering, intentional reduction of one's speed towards a hazard is seen as the clearest indication of one's intention to stop than the mere use of traffic indicators. In view of the aforementioned situation, any "reasonable" motorist exiting Movenpick-Ambassador Hotel, who, usually, may not be aware of the presence of the said bus-bay may attempt or move to join the main stream traffic on the Independence Avenue. A situation such as described above is most likely to result in an accident.

Throughout all the traffic studies conducted at the bus-bay, it was observed that 2 out of 10 instances that the traffic signals (on the left of the existing entrance) gave way to vehicles who are Novotel bound via Independence Avenue, an "overflow" of commercial passenger vehicles at the bus-bay occurred. This situation almost always compelled some of the motorists to either use the existing entrance as an extension of the bus-bay or alight passengers while still occupying the outermost lane.

All the passenger commercial vehicles assessing the CBD via Independence

Avenue do not have any defined bus-bay or lay-by until they have reached their destinations or various transport terminals. This makes the bus-bay next to the existing entrance of the project site a busy one with a very high turnover: passengers must either alight at the bus-bay or remain in their respective vehicles till the vehicles get to their various transport terminals.

Information gathered from the Ghana Police Service does not indicate any of the roads under question as an accident *black spot*. However, the police advised that the traffic situation at the bus-bay would need a special attention when works on Movenpick-Ambassador Hotel commences; be it demolition, construction or operation of the hotel.

The Police also disclosed that, even though the project site used to be a shelter for some criminals, it has in recent times been safe since the Police intensified its fight against crime.

5.3 **Other Observations**

The existing entrance (4.2m wide) is not large enough to accommodate a two-way traffic during demolition and construction phases.

The current road markings (see picture 1 of Appendix C) in front of the existing entrance does not give enough indication of the presence of a facility such as proposed. This is obviously so since, according to the DUR, the project site has been an open space for a very long time. It was disclosed to the Consultant that upon consultation with the DUR, the markings can be altered to suit the proposed project.

5.4 **Road Condition**

All the roads forming the large rotary intersection (see section 5.2) are in very good conditions with well defined drainage facilities and road furniture with fair levels of lighting.

5.5 **Scoping**

The scoping exercise, which was conducted to determine how the individuals behind the wall along the Liberia Link would want their concerns addressed in case of a possible location of an entrance to the proposed hotel affecting them, indicates that the occupants would resist the proposed entrance if, to borrow their words, the appropriate procedures are not followed. Responses gathered from some of the occupants reveals that most of them have been there since the early 1990s. The occupants are mostly retired civil servants.

5.6 **Standard Vehicle for Demolition Work**

For a demolition work involving about $10,000\text{m}^3$ of debris, using a standard vehicle of 12m^3 filled to about 80% of its capacity will generate approximately 667 trips. Therefore, considering 12 standard vehicles (12m^3) with each making 4 trips per day, approximately 14 days are required to transport all the estimated debris from site.

5.6 Baseline Traffic Information and Characteristics

5.7.1 *Level of Service*

The level of service for the Independence Avenue, a two-way dual carriage, can be categorized as 'C': a road capacity condition with an average flow range of 750–1200 passenger vehicles per hour in both directions.

The Liberia Link, a two-way single carriageway, is virtually underutilized (operating below capacity): it has an average passenger cars per hour in both directions of 52.

From the network analysis carried out on roads in the project environs, Liberia and Barnes roads have similar levels of service to that of the Independence Avenue.

5.7.2 *Vehicular Traffic Analysis*

Results of Traffic Counts

The results of the classified traffic counts have been converted to average annual daily traffic (AADT) using factors derived from the desk study, past and current traffic surveys. The total Base Year AADT was determined as the sum of the normal, diverted and generated traffic (See Table 5.1).

Expansion Factors

The Consultant derived factors for adjusting 12 hour traffic data to 24 hour daily traffic with data obtained from the traffic counts and desk study without any misleading influence from any special activities in the project environs.

Monthly variation factors were also derived from past traffic data obtained from DUR.

Table 5.1: Results of Classified Counts Converted to AADT (Year 2005)

VEHICLE CLASSIFICATION	BASE YEAR AADT	
	<i>Independence Avenue</i>	<i>Liberia Link</i>
Car	7,583	699
Pick-ups/4WD vehicles	2,655	55
Small Bus	3,359	27
Medium Bus	351	3
Large Bus	307	1
Light Truck	143	5
Medium Truck	65	1
Heavy Truck	9	1
Semi-Trailer (Light)	5	0
Semi-Trailer (Heavy)	5	0
Truck Trailer	3	0
Extra Large Vehicles & Others	1	0
Total	14,487	793

The average annual daily traffic (AADT) of the various roads and vehicle classifications are as shown in the table above.

Passenger vehicles on the Independence Avenue and the Liberia Link constitute 98% and 99% of total vehicular traffic respectively. The complete absence of vehicles classified above heavy trucks on the Liberia Link is strictly due to the 'tight' nature of junction curvatures at both ends of the road which makes turning movements of vehicles longer than 12m virtually impossible.

The overwhelming presence of passenger vehicles and pedestrians is a confirmation of the commercial activities taking place in the central business district (CBD).

Peak Periods and Related Traffic Volumes (Vehicles Only)

The various peak periods and corresponding traffic volumes on the Independence Avenue and the Liberia Link are as shown in the table below:

Table 5.2: Peak Periods and Traffic Volumes (Vehicles).

ROAD NAME	PEAK PERIOD & VOLUME			
	<i>Weekday</i>		<i>Weekend</i>	
	<i>Period(s)</i>	<i>Volume (hourly)</i>	<i>Period(s)</i>	<i>Volume (hourly)</i>
Independence Avenue	7hrs-8hrs & 11hrs-12hrs	1,607	14hrs-15hrs	1,235
Liberia Link	11hrs-12hrs	214	11hrs-12hrs	73

Note: traffic volumes are in averages

See section 5.7.4 for details of peak period for pedestrians.

5.7.3 *Directional Distribution and Mix of Traffic*

Directional Split/Distribution

The directional distribution of vehicular traffic on the Independence Avenue and the Liberia Link are shown in table 5.3 below.

Generally, the vehicular traffic leaving the CBD through these routes transcends those entering it. The Liberia Link is largely used as a by-pass to link Liberia Road from Barnes Road.

Table 5.3: Directional Split/Distribution of Vehicular Traffic

<i>Road Name</i>	<i>% Directional Dist. or Split</i>	
	A	B
Independence Avenue	48.46	51.54
Liberia Link	29.24	70.76

Note: See Appendix D for details of Directions

Traffic Mix

The traffic volumes used in estimating the traffic mix were based on traffic situations during typical weekdays and weekends. The overwhelming presence of passenger vehicles and pedestrians is indicative of the brisk commercial activities going in the immediate surroundings of the project site. See tables 5.4, 5.5, 5.6 and 5.7 for further details.

Table 5.4: General Traffic Mix on the Independence Avenue

<i>No.</i>	<i>Classification</i>	<i>Traffic Volume/Trips</i>	<i>% of Total Traffic</i>
1	Pedestrians	15,565	26.66
2	Bicycle	357	0.61
3	Motor Bicycle	828	1.42
4	Cars	22,006	37.69
5	Pick-ups/4WD vehicles	7,533	12.90
6	Small bus	9,564	16.38
7	Medium bus	991	1.70
8	Large Bus	877	1.50
9	Light truck	410	0.70
10	Medium truck	193	0.33
11	Heavy truck	27	0.05
12	Semi trailer(light)	11	0.02
13	Semi trailer(heavy)	11	0.02
14	Truck trailer	10	0.02
15	Extra large truck & others	2	0.00
	TOTAL	58,385	100.00

Table 5.5: Vehicular Traffic Mix on the Independence Avenue

<i>No.</i>	<i>Classification</i>	<i>Traffic Volume/Trips</i>	<i>% of Total Traffic</i>
1	Cars	22,006	52.85
2	Pick-ups/4WD vehicles	7,533	18.09
3	Small bus	9,564	22.97
4	Medium bus	991	2.38
5	Large Bus	877	2.11
6	Light truck	410	0.98
7	Medium truck	193	0.46
8	Heavy truck	27	0.06
9	Semi trailer(light)	11	0.03
10	Semi trailer(heavy)	11	0.03
11	Truck trailer	10	0.02
12	Extra large truck & others	2	0.00
	TOTAL	41,635	100.00

Table 5.6: General Traffic Mix on the Liberia Link

<i>No.</i>	<i>Classification</i>	<i>Traffic Volume/Trips</i>	<i>% of Total Traffic</i>
1	Pedestrians	6,781	69.50
2	Bicycle	283	2.90
3	Motor Bicycle	125	1.28
4	Cars	2,264	23.20
5	Pick-ups/4WD vehicles	178	1.82
6	Small bus	89	0.91
7	Medium bus	11	0.11
8	Large Bus	4	0.04
9	Light truck	16	0.16
10	Medium truck	3	0.03
11	Heavy truck	3	0.03
12	Semi trailer(light)	0	0.00
13	Semi trailer(heavy)	0	0.00
14	Truck trailer	0	0.00
15	Extra large truck & others	0	0.00
	TOTAL	9,757	100.00

Table 5.7: Vehicular Traffic Mix on the Liberia Link

<i>No.</i>	<i>Classification</i>	<i>Traffic Volume/Trips</i>	<i>% of Total Traffic</i>
1	Cars	2,264	88.16
2	Pick-ups/4WD vehicles	178	6.93
3	Small bus	89	3.47
4	Medium bus	11	0.43
5	Large Bus	4	0.16
6	Light truck	16	0.62
7	Medium truck	3	0.12
8	Heavy truck	3	0.12
9	Semi trailer(light)	0	0.00
10	Semi trailer(heavy)	0	0.00
11	Truck trailer	0	0.00
12	Extra large truck & others	0	0.00
	TOTAL	2,568	100.00

Independence Avenue

The average hourly pedestrian/cyclist traffic of 262 during weekdays on the Independence Avenue in one direction alone (National Theatre-Novotel) indicates a high volume of pedestrian/cyclist passing in front of the project site. The pedestrian flow on the road in question peaks off between 7:00hrs and 8:00hrs at 727ped/hr. 7:00hrs to 8:00hrs is the period within which majority of workers report to work. Over 90% of the pedestrians under consideration were passengers who had alighted at the bus-bay next to the existing entrance of the project site.

Due to the location of the bus-bay, motorists entering the Movenpick Hotel (whether at the demolishing, construction or the operation stages) would have little conflict with the pedestrians. However, the situation of those exiting the hotel facility is the reverse: the pedestrians cross the Independence Avenue near the bus-bay haphazardly even though there is a pedestrian crossing and traffic signal just some few metres away.

Table 5.8: Average Hourly/Annual Pedestrian and Cyclist Traffic on the Independence Avenue

<i>Pedestrian/Cyclist</i>	<i>Average Hourly Traffic (AHT)* 06-18 hrs</i>		<i>Average Annual Daily Traffic (AADT)</i>
	<i>Weekday</i>	<i>Weekend</i>	
Pedestrian	256	185	4,911
Cyclists	6	3	209
TOTAL	262	188	5,120

* National Theatre-Novotel direction only.

Liberia Link

Pedestrian/cyclist hourly flow on the Liberia Link is 113 ped./hr during weekdays and 94 ped./hrs on weekends (see table 5.9). The peak volume of 269 ped./hr occurs between 11:00hrs and 12:00 hrs: this is the period within which many public/civil servants, especially from the Trades Union Congress (TUC), go out for break.

There are adequate walkways for pedestrians on the Independence Avenue and the Liberia Link.

Table 5.9: Average Hourly/Annual Pedestrian and Cyclist Traffic on the Liberia Link.

<i>Pedestrian/Cyclist</i>	<i>Average Hourly Traffic (AHT) 06-18 hrs</i>		<i>Average Annual Daily Traffic (AADT)</i>
	<i>Weekday</i>	<i>Weekend</i>	
Pedestrian	105	89	183
Cyclists	8	5	135
TOTAL	113	94	318

Table 5.10: Peak Periods and Traffic Volumes (Pedestrians).

ROAD NAME	PEAK PERIOD & VOLUME			
	Weekday		Weekend	
	Period(s)	Volume (hourly)	Period(s)	Volume (hourly)
Independence Avenue	7hrs-8hrs	727	6hrs-7hrs	500
Liberia Link	11hrs-12hrs	269	9hrs-10hrs	157

5.7.5 *Responses to Traffic Impedance*

During the traffic studies, it was observed that some motorists in the project environs responded to traffic bottlenecks by parking at private parking facilities which were not meant for them: they were neither customers/visitors nor workers to the owners of those facilities mentioned. For example, some motorists park inside Novotel Hotel, Ghana Highway/AESL, Ghana Law School, Accra Polytechnic, etc, due to inadequate parking facilities in the CBD and the parking fees charged which some motorists refer to is as exorbitant.

5.7.6 *Traffic Growth and Projections*

Growth Rates

Based on the comparison of traffic volumes (AADT) for all categories of vehicles with the current traffic obtained in 2005, it was also observed that the growth rates varied considerably for various classes of vehicles.

Traffic Forecast necessitates the consideration of various factors including the following:

- Normal, Diverted, Generated and Development Traffic;
- Growth in Vehicle Fleet;
- Population Growth;
- Economic Growth;
- Trends in target and actual GDP growth rates and
- Development of Industry.

The Consultant was not able to obtain information on all the above factors pertaining to the project corridor. Data obtained from the National Statistics regarding GDP growth factors of the relevant economic sectors was assumed to give a reflection of what pertains within the project environs.

The composition of GDP by sector has also not changed significantly since 1997 (State of the Ghanaian Economy in 2001 & 2005-Institute of Statistical, Social and Economic Research (ISSER)).

Traffic is generally assumed to grow at a percentage higher than the GDP. The growth rates (GDP) of the economic sector in Ghana between 1997 and 2005 are as tabulated below.

Table 5.11: Percentage Growth Rates of the Economic Sector

	<i>1997</i>	<i>1998</i>	<i>1999</i>	<i>2000</i>	<i>2001</i>	<i>2002</i>	<i>2003</i>	<i>2004</i>	<i>2005</i>
Average (GDP)	5.7	4.5	4.6	3.7	4.0	5.2	5.1	5.8	5.8

Source: State of the Ghanaian Economy in 2001 & 2005-Institute of Statistical, Social and Economic Research (ISSER).

Data from ISSER show that the real GDP growth rates have varied between 4.0%-5.8% from 1995-2005. The highest growth rate of 5.8% was achieved in the years 2004 and 2005.

Apart from the years 2001 and 2003, where the actual GDP slightly exceeded the targeted GDP, for the rest of the years

between 1995-2004, actual GDP had always fallen below targeted GDP.

Census data from the Ghana Statistical Service (GSS) shows that Population growth of Ghana averaged about 2.7% between 1984 and 2000, while the urban growth rate, is 3.3% per annum.

Comparison of traffic data in the Accra Metropolis show that within the past 5 years, the actual average total traffic growth in vehicular traffic has been 8.9% (lower than the estimated CBD's traffic growth of 12%).

Based on the proposal of the GPRS (2002-2004) an accelerated economic growth strategy will initially be based on an initial phase of macroeconomic stabilisation. Thereafter, an improved performance in the agricultural sector is expected to stimulate growth in other sectors such as transport, processing and marketing. Improvement of the transport infrastructure, including roads and bridges, is an important component in this. An accelerated growth in the economy will result in a growth in both passenger and freight traffic.

The Consultant has reviewed various forecasts of economic growth (medium/long term) made by the Government, other Consultants and International Organizations. The GPRS, for example suggested optimistic growth rates of 5.5% per annum between 2000 to 2005. This growth rate is expected to peak off at 8.6% by 2010. The Highway Network Master Plan (2000-2001) envisaged a growth rate of 8.0% in traffic per annum.

Considering the projected targets of economic growth rates and its immediate relation to passenger and freight transport, the estimated traffic growth rate of 12% in the CBD, a traffic attraction zone, is realistic.

Traffic Forecast

Traffic for each vehicle type on the roads under review can be estimated for any particular year by the following equation:

$$T_N = T_j \times (1 + t_j)^{N-j}$$

Where:

T_N is the forecasted AADT in year N

T_j is the AADT in year j

t_j is the growth rate between j-N years

N is number of years

5.8 Policy Framework Affecting Traffic in the CBD

The Accra Metropolitan Assembly's (AMA's) plan to relocate street hawkers from the CDB to the Kwame Nkrumah Circle (about 2.0km north of the CBD) by the end of March 2006, when implemented, will contribute significantly towards decongesting the city centre, thereby reducing the vehicular-pedestrian conflicts which is a major contributor towards traffic congestion in the CBD.

There is also an on-going debate concerning a possible relocation of the Makola Bulk Breaking Market (a food stuff market in the CBD) to help rid the city centre of filth. Although the intention, when carried out, is to reduce filth in the CBD, it has a derived advantage of reducing traffic congestion in the CBD drastically.

With regard to the above policy direction of the city authorities, it is obvious to forecast a reduction in traffic volumes. A forecast of this nature may only be partially reliable in the short term. In the long term, history and statistics on the CBD proves otherwise due to the following conditions which are most probable:

- Lack of political will to sustain the decongestion exercise;
- Inadequate funding and law enforcement to sustain the decongestion exercise;
- Metamorphosis of street hawking into 'mobile-van trading' (a trading method by which wares are displayed in vans with customers patronizing the goods whiles the van moves slowly in traffic) which is increasingly becoming the order of the day in the CBD;
- Attractiveness of the newly decongested roads/streets to commuters resulting in diverted, induced or generated traffic and
- Economic growth and population explosion vis-à-vis lack of room to expand the carriageways.

All or combinations of the above conditions would bring back the traffic congestion into the CBD.

In view of the foregoing discussion, one cannot easily conclude that there would be a sustained traffic decongestion in the CBD. This means that it is extremely relevant to plan and work with the projections made above.

5.9 Challenges and Assumptions

5.9.1 Challenges

During the traffic studies, analysis and reporting, the following major challenges were encountered:

- Inability to conduct 24hr counts due to the unsafe nature of the place at night;
- Difficulty with public officials in disclosing information to the public;
- Lack of coordination on the part of information sources and
- Long and unnecessary bureaucracy and procrastination in the delivery of information in the public offices contacted.

5.9.2 Assumptions

Even though part of the traffic studies was conducted in January 2006, for the purposes of traffic analysis and availability of statistics, it is assumed that all the studies were carried out in 2005.

6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

Based on the analysis of results and discussions, the following conclusions can be drawn:

1. a. The traffic growth rate of 12% per annum in the CBD is very high as compared to the normal traffic growth rate (10%) in similar developing countries.
- b. There is a general traffic congestion in the entire CBD. However the strategic location of the proposed hotel will make it experience about 70% of the congestion.
2. a. The existing traffic management system put in place on the Liberia Road, Independence Avenue, Barnes Road and the Liberia Link are adequate for a smooth demolition, construction and operational activities to take place.
- b. The location of the proposed hotel is very advantageous. This would be further enhanced when other proposed entrances are constructed.
- c. The non-mountable kerbs bordering the island at the Barnes Road-Liberia Link and Liberia Road- Liberia Link intersections make it virtually impossible for vehicles larger than 12m to turn. This makes the Liberia Link unattractive to vehicles longer than 12m. Even when an entrance is constructed to link the hotel premise to the Liberia Link without the necessary measures taken, that entrance may be unattractive to vehicles longer than 12m.
- d. The existing entrance to the project site is unsafe, especially, during peak hours. This is due to its closeness to the busy bus-bay which is plagued with a lot of vehicular-

- pedestrian conflicts and noise levels.
- e. Even though the likely misinterpretation of signals and misbehaviour on the part of some motorists in front of the existing entrance is a common place in the CBD, all the necessary measures to avoid a likely accident must be identified and implemented. The absence of such countermeasures would, of a certainty, dent the image of an international hotel such as Movenpick-Ambassador Hotel.
 - f. The traffic conditions on the roads studied, based on which accident statistics do not identify any of them as a "black spot", would change upon the coming into operation of the proposed hotel.
- 3.
 - a. The existing entrance (4.2m wide) is not large enough to accommodate two-way traffic: it can accommodate one vehicle at a time.
 - b. Traffic signs indicating the presence of a major hotel facility and its related markings are missing simply because the facilities for which they show their importance are non-existent.
 - 4. All the roads forming the large rotary intersection are in very good conditions with fair levels of lighting in the night. This is safe enough to be used in the nights for demolition and construction activities.
 - 5. Construction of a new entrance to the project site or hotel premise to link the Liberia Link and Barnes Road will go a long way to increase accessibility to the hotel facility during the demolition, construction and operation stages. However, the individuals currently occupying the place where the proposed entrance would be do not intend to quit the place easily.

6. Although 12 standard vehicles of 12m^3 making 4 trips each in a day require approximately 14 days to dispose off debris of about $10,000\text{m}^3$, the exact location of the disposal site, the efficiency levels of the vehicles, traffic conditions en route, etc, would interplay to give the actual days required for the disposal.
7.
 - a. The Liberia Road and the Barnes Road have similar levels of service and traffic characteristics as the Independence Avenue.
 - b. There is an overwhelming presence of passenger vehicles (99% on Liberia Link and 98% on the Independence Avenue respectively) which is typical of business districts in developing countries.
 - c. The peak period for vehicles and pedestrians in the mornings (7:00hrs-8:00hrs) is an age-old phenomenon. This is the period within which majority of workers in Ghana report to their various work places. It must be noted that this peak period has come to stay as long as 8:00hrs remains the reporting time for most workers in the public and private sectors.
 - d. The average annual daily traffic of 14,877 vehicles on the Independence Avenue is high enough to command the attention of any developer along it.
 - e. Generally, the vehicular traffic leaving the CBD through the Independence Avenue and the Liberia Link transcends those entering the CBD through same.
 - f. Due to the haphazard manner in which most pedestrians cross the Independence Avenue near the bus-bay, lots of pedestrian-vehicular conflicts are generated.
 - g. During the operational stage, it is most likely that some motorists will respond to traffic/parking bottlenecks in the CBD by either diverting through the hotel (once the Liberia Link or Barnes Road entrance is opened) or use the parking facilities inside the hotel premise at the expense of customers, workers or

visitors.

- h. Based on the population growth in the metropolis, the economic growth rate, traffic growth trends in the CBD and national traffic growth rate (8%), the growth rate (12%) in the CBD can be relied upon to make projections for up to 2019.
- 8. Even though, AMA's plans to decongest the city centre, when implemented, would result in considerable reduction in traffic congestion, it is however very prudent to plan, especially at the operational stage, with the traffic growth rates stated above.
- 9. The proposed 208 spaces provided for parking (and associated land for further expansion) during the operation stages of the project is adequate; taking into consideration parking requirements of staff, clients/customers and visitors.

6.2 Recommendations

The following recommendations can be made based on the studies:

1. Although there is a general traffic congestion in the CBD, the estimated 70% of influence on the proposed hotel can further be reduced when there are alternative entrances available. Therefore, it is recommended that new entrances to Barnes Road and Liberia Link should be created. This recommendation, when implemented, would provide alternative routes to customers, visitors and workers as well as for emergencies.

It is also recommended that as part of the hotel's social responsibility, its authorities, during the operational stage, should extend a lending hand to the city authorities (AMA and DUR) in undertaking activities to decongest the city centre, especially in the immediate environs of the proposed hotel. This recommendation, when implemented, would make the project environs safer and improve on the patronage and consequent viability of the project.

2. During demolition and construction stages, all attempts should be made to avoid or minimize any intensive transport related activities that could be impacted on negatively by heavy traffic during peak hour(s). The same method can be employed at the operational stage in timing the organization of special activities or services so as to avoid a possible negative impact of the peak hour congestion.
3. The existing entrance to the project site should be shifted, at least, 35m away from the bus-bay in order to make it safe by avoiding all the unnecessary pedestrian-vehicular conflicts and congestion at the bus-bay.

4. The hotel authorities should liaise with the DUR and AMA to put the necessary pedestrian control measures at strategic locations on the Independence Avenue to curb the pedestrian-vehicular conflicts. The new entrance should be designed with the capacity to take a 2-way traffic.

Hawking at the bus-bay close to the existing entrance should be halted as it has the potential to create further traffic conflicts.

5. In order to make the proposed Liberia Link entrance attractive and convenient to vehicles longer than 12m, the Liberia Link-Barnes Road and Liberia-Link-Liberia Road intersections should be modified by simply changing the kerb islands into road marking ones. In order to achieve this, the hotel authorities should make the necessary consultations or arrangements with the Department of Urban Roads (DUR) in Accra.
6. At the operational stage of the Movenpick-Ambassador Hotel, necessary consultations with DUR should be pursued so as to have the necessary traffic signs and road markings for smooth, efficient and safe movement of traffic on roads in the immediate environs of the project.
7. The existing entrance can be used during the demolition and construction works. However, due to its small size (inadequate for 2-way traffic) and closeness to the bus-bay, traffic warden(s) and the necessary temporary traffic signs at the entrance should be sought and its cost included in the bill of quantities for demolition and construction works.
8. In constructing the proposed Liberia Link gate, conscious effort should be made in addressing the ejection of those currently occupying the space so as to avoid any unnecessary rancor.

9. In the disposal of debris generated from demolished structures from site, it is recommended that high capacity vehicles (12-28 cubic metres) should be used: this would require fewer days to complete the transportation of debris.
10. During the operation stage, stringent measures should be instituted to prevent diversion of traffic through the hotel premise. Similar efforts should be made to prevent motorists who are not customers, visitors nor workers from using the hotel parking facilities.
11. The traffic growth rate should be used for traffic projections only up to 2019.
12. Even though Accra Metropolitan Assembly's (AMA's) plans to decongest the city centre, when implemented, would result in a considerable reduction in traffic, it is recommended that planning at the operation stage should be done with the traffic growth rates provided in sub-section 5.7.6. This is due to the fact that current trends show that any decongestion exercise in the CBD is most unlikely to be sustained over a long term.
13. The hotel authorities, if they choose to, should fish out all the necessary modalities to take advantage of the heavy presence of pedestrians, passengers and motorists in the CBD and turn it into publicity opportunities.
14. Although the parking spaces and the room for expansion provided during the operation stages is adequate, pragmatic measures to control, guide and direct internal traffic are extremely necessary. Security measures to keep vehicles and their contents safe must be employed.

7.0 REFERENCES

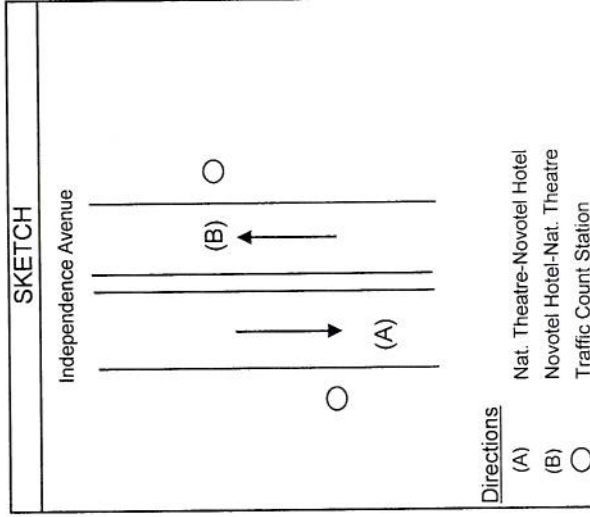
1. Accra Metropolitan Assembly, Accra, Ghana.
2. Department of Urban Roads (DUR), Accra, Ghana.
3. Ghana Highway Authority, Highway Master Plan of Ghana.
4. Ghana Police Service, Accra, Ghana.
5. Ghana Poverty Reduction Strategy (GPRS), 2002-2004.
6. Ghana Statistical Service (GSS), Accra, Ghana.
7. Institute of Statistical, Social and Economic Research (ISSER), Accra, Ghana.
8. Messrs GIBB (UK), Feasibility Studies for the Achimota-Anyinam Road in 1998.
9. Thagesen, B. *Highway and Traffic Engineering in Developing Countries*, 1998.
10. The Budget Statement and Economic Policy of Ghana, 2003-2005.

APPENDICES

MOVENPICK-AMBASSADOR HOTEL 4-DAY 12 HOUR CONTINUOUS MANUAL TRAFFIC COUNT

ROAD NAME: Independence Avenue DAY: Sunday
 DIRECTION: National Theatre-Novotel Hotel (A) SHEET NO. 13
 DATE: 22nd January, 2006 COMMENT:

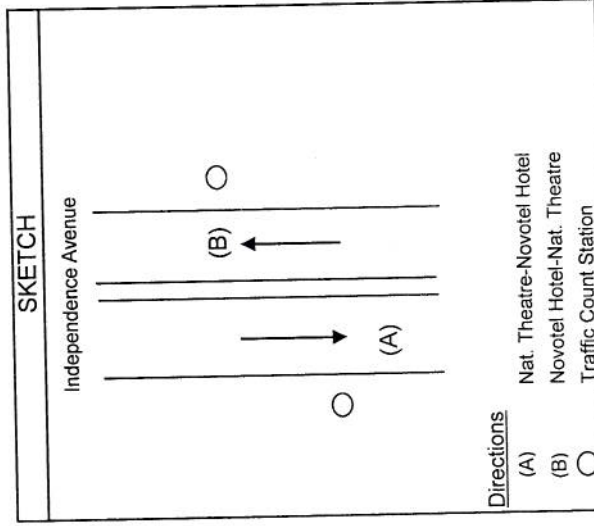
PEDESTRIAN/VEHICLE TYPE	HOURLY INTERVALS													TOTAL
	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18		
Pedestrians	200	195	217	105	92	98	122	135	99	97	53	29	1442	
Bicycle		1	1			1						1	4	
Motor Bicycle	1	5		2	3	6	2		3	1	2	1	26	
Cars	121	201	192	194	198	148	102	100	95	85	98	76	1610	
Pick up and vehicle	15	35	35	48	20	22	25	12	9	4	2	3	230	
Small bus	102	121	102	121	100	90	92	87	85	46	42	37	1025	
Medium bus	8	12	18	10	3	11	7	5	4	1	4	1	84	
Large Bus	2	2	1	4		5	4	2		1	3	2	26	
Light truck	1	2	2	3	1	2	1		1		1	2	16	
Medium truck		1	1	2		2	1	1			2	1	11	
Heavy truck		1						1	1				3	
Semi trailer(light)				1									1	
Semi trailer(heavy)					1								1	
Truck trailer													0	
Extra large truck and others													0	
TOTAL (VEH.)	250	381	352	385	326	287	234	208	198	138	155	123	3037	



MOVENPICK-AMBASSADOR HOTEL 4-DAY 12 HOUR CONTINUOUS MANUAL TRAFFIC COUNT

ROAD NAME: Independence Avenue DAY: Sunday
 DIRECTION: Novotel Hotel-National Theatre (B) SHEET NO. 14
 DATE: 22nd January, 2006 COMMENT:

PEDESTRIAN/VEHICLE TYPE	HOURLY INTERVALS												TOTAL
	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	
Pedestrians	73	72	64	51	21	25	18	22	20	14	25	26	431
Bicycle	6	3	2	3	1	4	1		2	1	2	4	29
Motor Bicycle	3	3	5	3	1	2	3	5	2	1	3	2	33
Cars	34	43	58	55	59	63	81	70	89	61	64	40	717
Pick up and vehicle	6	14	18	15	14	12	35	40	43	62	60	58	377
Small bus	20	30	45	43	40	35	38	29	22	29	33	30	394
Medium bus	1	6	11	8	2	2	7	4	3	1	2	4	51
Large Bus		3	5	4	2	2	4	1		2	4	2	29
Light truck	1	3		1	2		1	2	2	4	4	1	21
Medium truck		2	1		1		1		1		1		7
Heavy truck						1							1
Semi trailer(light)							1	1	1				3
Semi trailer(heavy)													0
Truck trailer											1		1
Extra large truck and others													0
TOTAL (VEH.)	71	107	145	132	122	121	172	152	165	161	174	141	1663



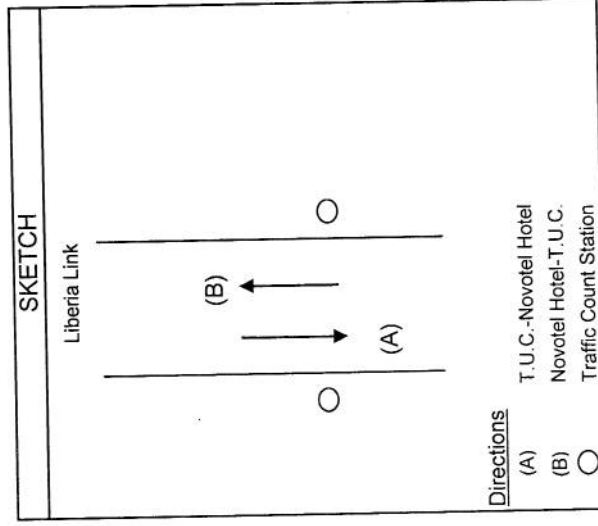
MOVENPICK-AMBASSADOR HOTEL
4-DAY 12 HOUR CONTINUOUS MANUAL TRAFFIC COUNT

ROAD NAME:
DIRECTION:
DATE:

Liberia Link
T.U.C.-Novotel Hotel (A)
22nd January, 2006

DAY: Sunday
SHEET NO. 15
COMMENT:

PEDESTRIAN/VEHICLE TYPE	HOURLY INTERVALS													TOTAL
	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18		
Pedestrians	20	21	33	38	28	32	22	20	18	34	41	39	346	
Bicycle		1	3	2	1						2		9	
Motor Bicycle			1	1									2	
Cars	1		1			1	2				2		7	
Pick up and vehicle			1										1	
Small bus													0	
Medium bus													0	
Large Bus													0	
Light truck													0	
Medium truck													0	
Heavy truck													0	
Semi trailer(light)													0	
Semi trailer(heavy)													0	
Truck trailer													0	
Extra large truck and others													0	
TOTAL (VEH.)	1	1	6	3	1	1	2	0	0	0	4	0	19	



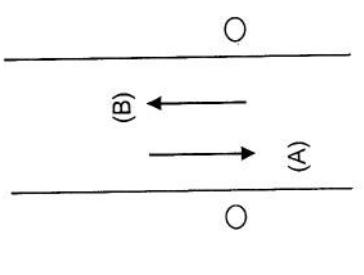
MOVENPICK-AMBASSADOR HOTEL 4-DAY 12 HOUR CONTINUOUS MANUAL TRAFFIC COUNT

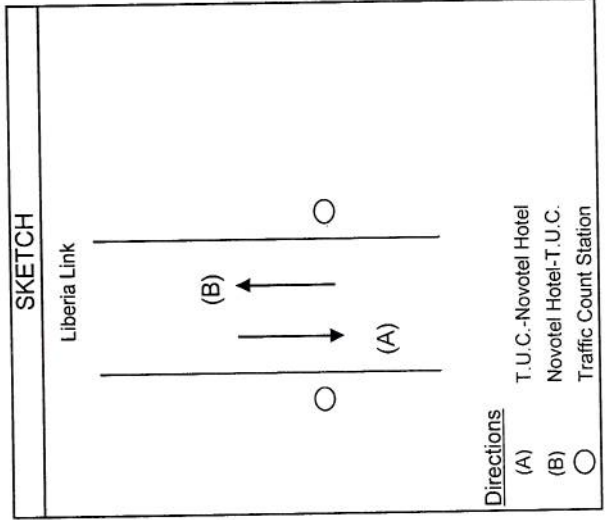
ROAD NAME:
DIRECTION:
DATE:

Liberia Link
Novotel Hotel-T.U.C. (B)
22nd January, 2006

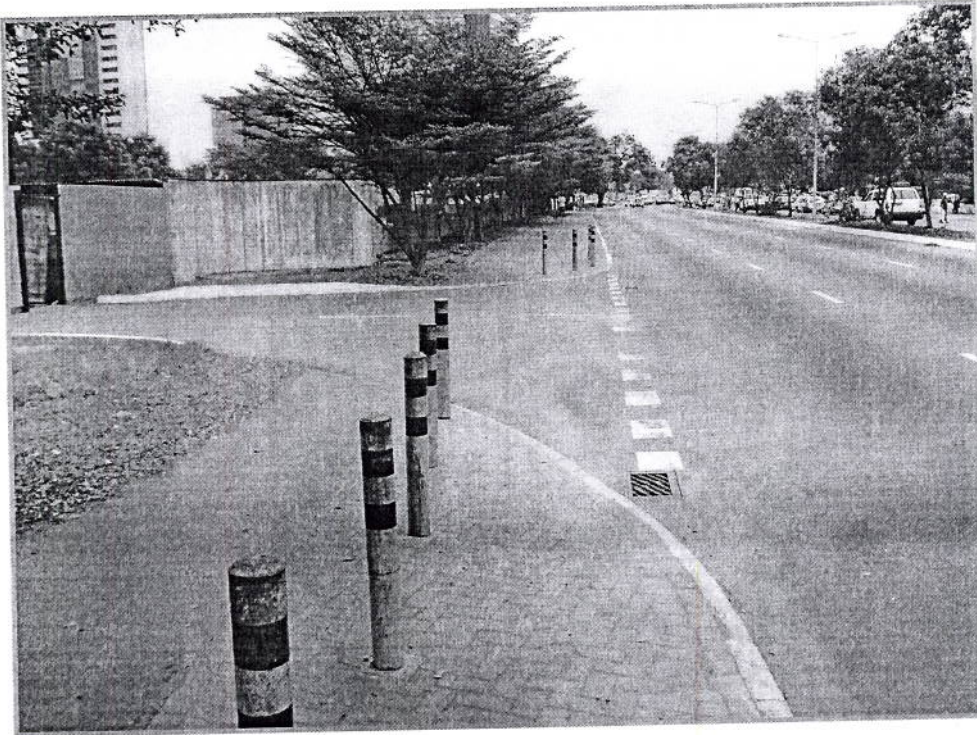
DAY: Sunday
SHEET NO. 16
COMMENT:

PEDESTRIAN/VEHICLE TYPE	HOURLY INTERVALS													TOTAL
	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18		
	12	16	32	37	21	18	30	35	29	15	18	10		
Pedestrians													273	
Bicycle	1	1	3	4	1	2	2	1		1	2		18	
Motor Bicycle		1		1				1	2		1	1	7	
Cars	4	7	12	16	13	15	16	10	8	5	9	7	122	
Pick up and vehicle			1	1	1	1			1		1		5	
Small bus	1		1							1			3	
Medium bus													0	
Large Bus													0	
Light truck													0	
Medium truck													0	
Heavy truck													0	
Semi trailer(light)													0	
Semi trailer(heavy)													0	
Truck trailer													0	
Extra large truck and others													0	
TOTAL (VEH.)	6	9	17	22	14	18	18	12	11	7	13	8	155	

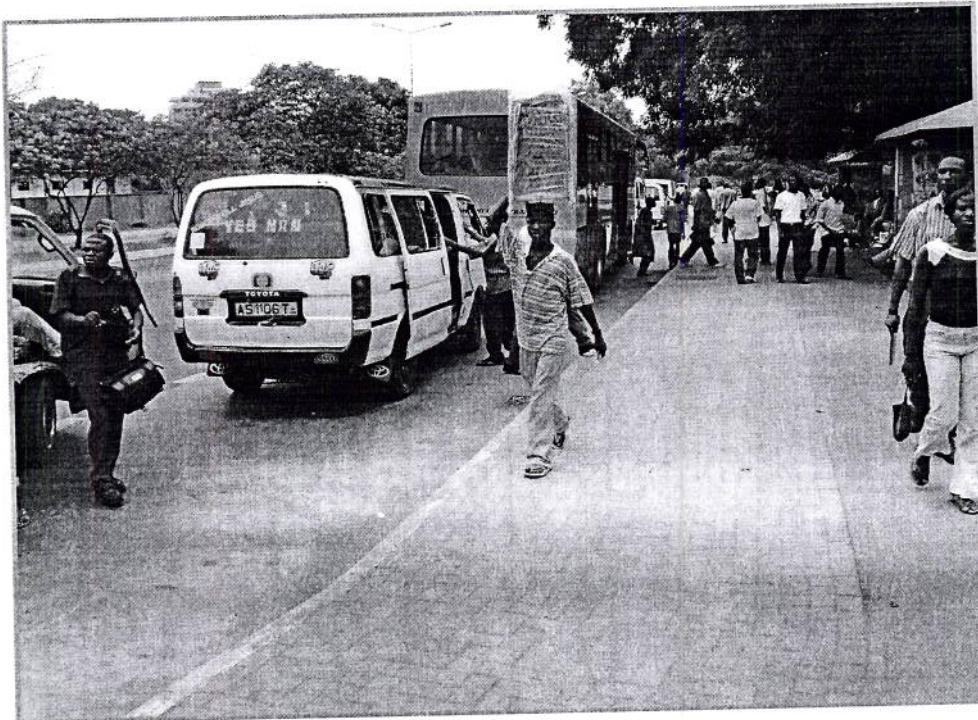
SKETCH	
Liberia Link	
Directions	T. U. C. - Novotel Hotel (A) Novotel Hotel - T. U. C. (B) Traffic Count Station ○



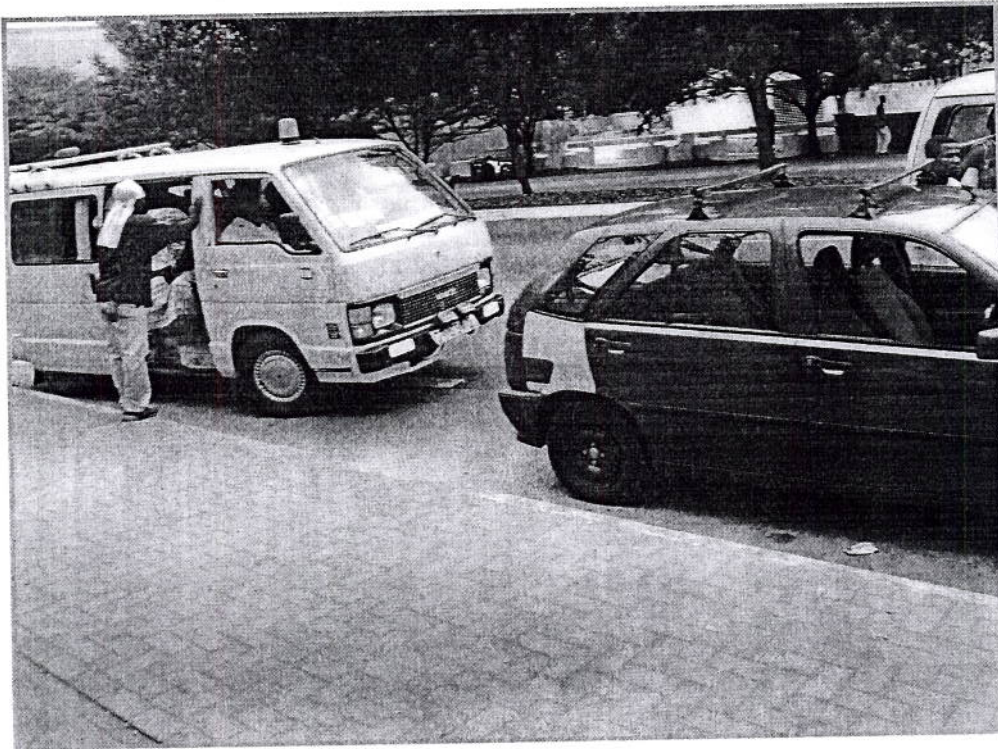
8.3 **APPENDIX D:** PICTURES SHOWING EXISTING CONDITIONS



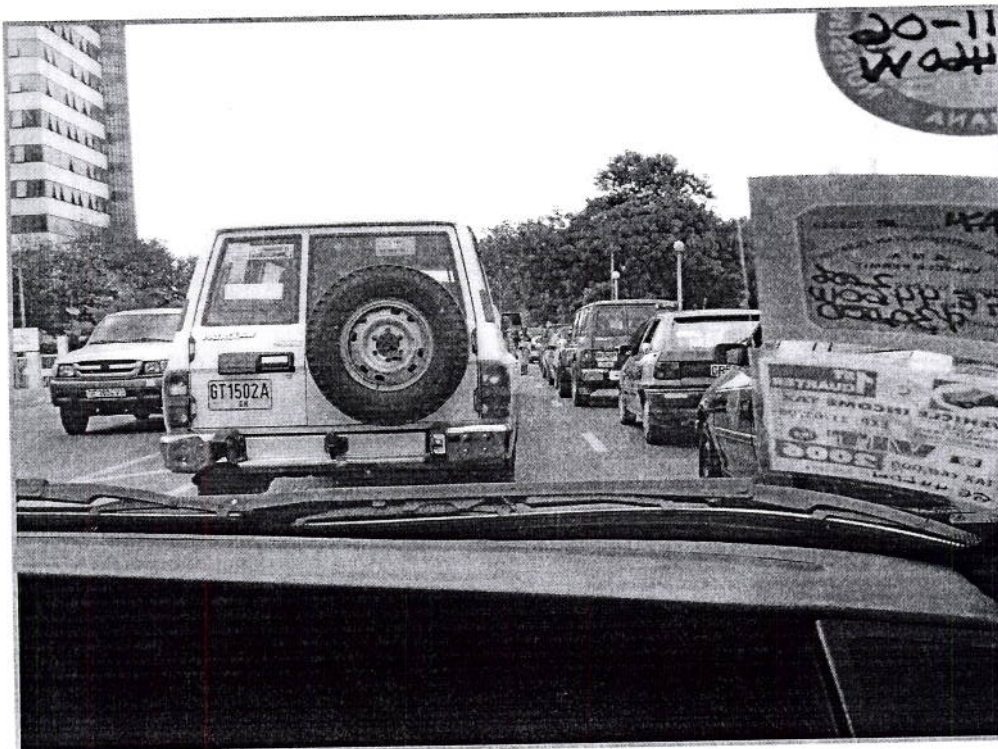
Picture 1: Existing Entrance



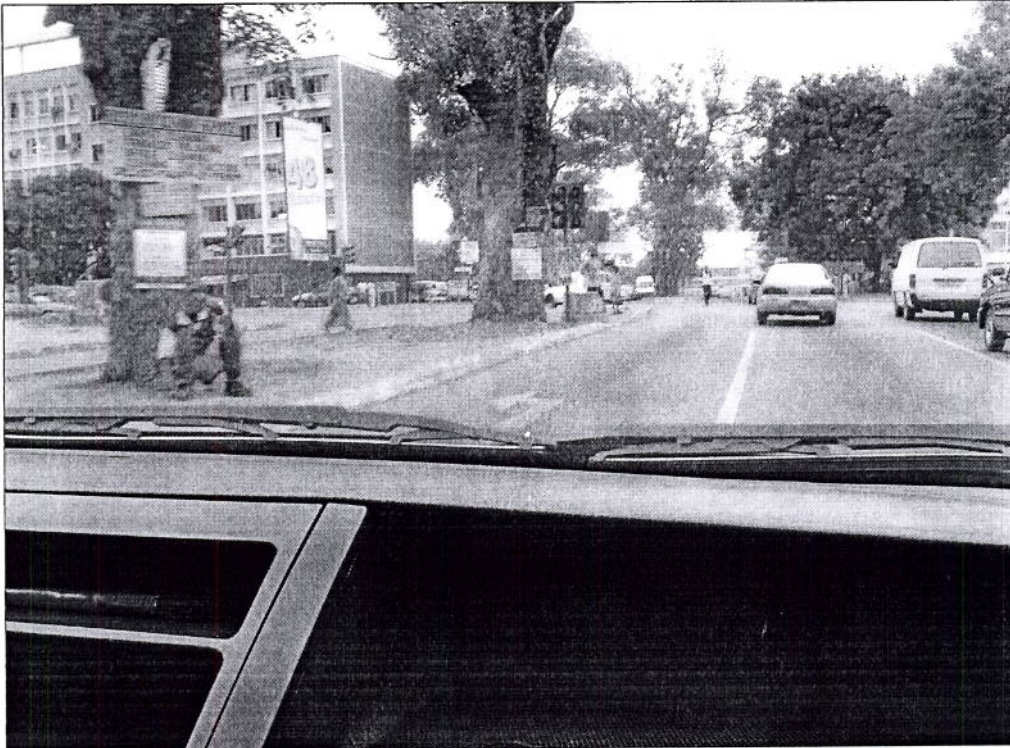
Picture 2: Bus-bay (adjacent to the existing entrance)



Picture 3: A small bus forced to park half-way on the road due to congestion at the bus-bay



Picture 4: A typical traffic condition on the Liberia Road (7:00hrs-8:00hrs) when the Consultant tried to access the existing entrance to the project site.



Picture 5: A trial trip organized to access the impedance any potential customer may encounter in accessing proposed Movenpick-Ambassador Hotel from the