2 Assessment of Information Needs and Collection of Additional Data

2.1 Introduction

Greater Cairo Area and Population

Cairo or rather the urban region of the Greater Cairo Metropolitan Area is the largest urban area in Egypt, Africa and the Middle East and amongst the most populous metropolises of the world. It occupies the 10th rank within mega cities across the world in the period between 2000 and 2015[2].

Greater Cairo has been the centre of gravity for many of Egypt's activities. It has grown mainly due to increased migration from rural areas, and high growth rates were witnessed during the second half of the 20th century vis-à-vis investments, economic activities, job opportunities and number of students.

At the turn of the 21st century, Greater Cairo started to get its contemporary structure as a "main dense urban area" with varied socioeconomic levels encircled by the Ring Road and an "outer belt" of 8 new satellite cities as shown in Figure 2.1.

In 2006, the population of Greater Cairo Area reached 17 million people spread across Cairo, Giza and Qaylobiya and the new cities listed in Table 2.1 below. The urbanization continues to progress, and the performance of the entire transport system is less than desirable, despite the massive efforts striven by the Egyptian government to tackle traffic congestion and environmental deterioration, by introducing a metro system and a comprehensive bus network.

Table 2.1: New Cities around Greater Cairo- Type and Population [3]

City	Type	Population in 2006
6 October	Industrial	500,000
Al Sheikh Zayed	Residential	48,000
15 May	Industrial	180,000
Al Oboor	Industrial	100,000
Badr	Industrial	60,000
Al Shorooq	Residential	62,000
New Cairo	Residential	302,000

[2] "World Urbanization Prospects, the 2001 Revision", Department of Economic and Social Affairs, Population Division, United Nations Publications, UN, 2002.

10 Ramadan	Industrial	500,000

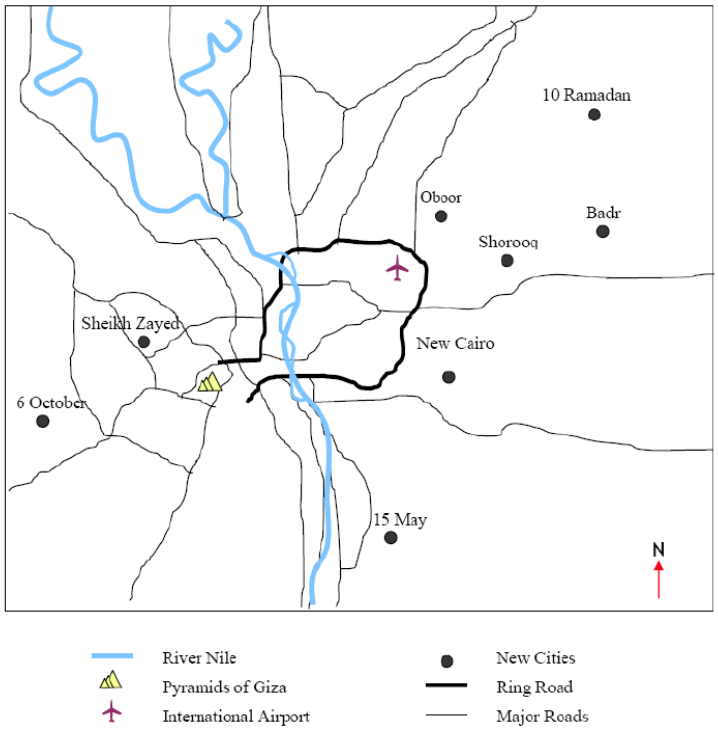


Figure 2.1: Location of the new cities around Greater Cairo[3]

Previous transport studies and relevance to this study

There exist several urban transport-related studies and development master plans for Greater Cairo to date. The most recent were reviewed by the Consultant and mainly include:

- "Transportation master Plan and feasibility Study of Urban Transport Project in Greater Cairo Region in the Arab Republic of Egypt" Greater Cairo Urban Transport Master Plan" (CREATS), JICA – 2002: was the first attempt to delineate a comprehensive transport master plan, covering the entire metropolitan areas of Greater Cairo Region. It adopts approaches designed to mitigate urban transport problems and contribute to the sustainable development of the Greater Cairo Region. Its key objectives are to formulate a master plan for the urban transport network in the Study Area to the year 2022; to conduct a feasibility study for the priority project(s) identified under the master plan (however, this object was to be undertaken as a follow-up effort to the master plan study); and to carry out technology transfer to the Egyptian counter personnel in the course of the study.
- "Public-Private Partnership Program for Cairo Urban Toll Expressway Network Development", JICA – 2006. The study's main objectives are to review and update the traffic demand, routing and development phasing plan of the Cairo urban expressway network proposed in the CREATS Master Plan of 2002; set up the toll

[3] Research Study on Urban Mobility in Greater Cairo, Trends and Prospects, Final Report, February 2009 – by the Development Research and Technological Planning Center, Cairo University

road system for the sustainable development of the proposed Expressway network; and formulate a comprehensive strategy for the introduction of a PPP program for the development of the Expressway network.

- "Strategic Urban Development Master Plan Study for Sustainable Development of the Greater Cairo Region in the Arab Republic of Egypt", JICA – 2008 (Updated in 2009). The objectives of the study include: formulating a strategic development master plan for the study area in the target year of 2027 to achieve the sustainable social-economical development through well-balanced urban development; formulating an implementation scheme for priority development corridor(s), considering the effective urban development being integrated with transportation development; and exchanging experience related to urban planning and urban development.
- "Research Study on Urban Mobility in Greater Cairo, Trends and Prospects", Development Research and Technological Planning Center, Cairo University – 2009. This study mainly covered evolution trends of urban development, transport and energy/environment in Greater Cairo area so as to call attention of decision-makers and other stakeholders to the related effects on sustainable development and sustainable transport.
- "Greater Cairo: A Proposed Urban Transport Strategy", Urban & Transport Unit, Middle East and North Africa Region, World Bank – 2006. The study provided an assessment of the urban transport system in Greater Cairo, identified the most pressing urban transport problems, and proposed a framework for urgent policy actions and investment priorities that would be the basis of a formal transport strategy to be adopted and implemented by the authorities of the metropolitan area of Cairo.
- "Proposed Cairo Urban Transport Strategy & Priority Program", Greater Cairo Development Project, Ministry of Housing and the World Bank – 2010. This study includes a short and medium term priority program, which depends on institutional strengthening, development of public transport system, traffic management and enforcement, toll roads facilities and sustainable funding.

In addition to the above-mentioned studies, the following attempts to develop a transport master plan for Greater Cairo were made:

- A study dating back to 1973 undertaken with French support under Transport Planning Authority (PTA), MOT, focusing on the Metro Line Development
- A study conducted in 1989 with the technical support of JICA under Cairo Governorate
- The "Public Transport Study" with French support in 1999 under NAT.

The Egyptian Government also issues Five Years Plans for the nation as a whole and for the Governorates, which include the projects and the programs to be implemented in the various sectors during the upcoming five years in consideration.

The World Bank has been assisting the Egyptian Government in elaborating its urban transport policy and prioritizing interventions and has committed financing to urban transport projects from IBRD, the Clean Technology Fund, and Carbon Finance sources to contribute to the cost of short-term investment needs based on the above government plans.

Nevertheless, part of the problem for properly addressing urban congestion, in most countries, arises from the lack of appropriate technical studies with clear methodologies, specifically aimed at assessing the economic costs of congestion. There is therefore a critical need to assess the magnitude of the problem, its types, and locations, therefore providing a solid ground for developing appropriate policies and investments recommendations.

Based on the above, the scope of the current study includes the following activities (amongst others):

- **Assessing information need, and collecting additional data as necessary (Task 2):** After review of the existing studies on urban transport in Greater Cairo, the consultant shall assess the data collection needs and methodologies to obtain the necessary information for carrying out this assignment and shall perform additional data collection where needed, including site surveys, to update and complement the existing information.
- **Identifying the causes, types and locations of traffic congestion (Task 3):** The consultant shall identify the locations, types and causes of traffic congestion in metropolitan Cairo.

2.2 Task Description/Objectives

Chapter 2 of this report presents a comprehensive assessment of the data and information needs of this study, in line with Task 2 of the study, identifying sources and samples of existing data and describing additional data that were collected. The chapter also provides a detailed description of the Floating Car Survey (FCS) which the study team conducted on 11 principal corridors in the Greater Cairo Metropolitan Area (GCMA).

In addition to the FCS, the study team conceived a detailed plan for collection of traffic counts; however this plan faced prolonged delays in obtaining the required security clearances for the field surveyors, despite persistent efforts to secure the clearances from the responsible authorities in a timely manner. The traffic counts were finally conducted in July, and are reported in Section 2.10 and Annexes 6 and 7.

2.3 Study area

Previous studies in Greater Cairo and local ministries have been using different study areas or planning boundaries, making it difficult to compare the study results on the same ground. In other words, there is no clearly defined boundary for the Greater Cairo Region or Greater Cairo Metropolitan Area.

For the purpose of this study, the scope will relate to the study area defined by the JICA study (Greater Cairo Urban Transport Master Plan - CREATS, 2003), as recommended in the project's Terms of Reference. The Study Area therefore consists of the Greater Cairo Region, including the new cities of New Cairo City, 6th of October City, 15th May City, 10th of Ramadan City, El-Obour City and Badr City, as shown in the Figure 2.2 below.

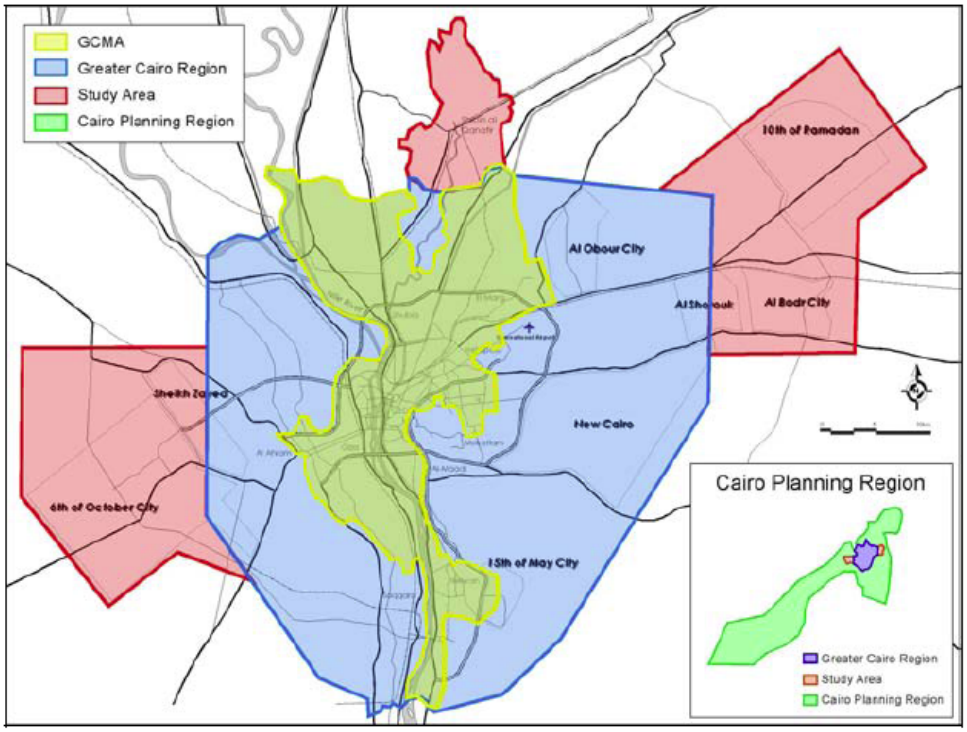


Figure 2.2: Administrative and Planning Boundaries in the Study Area (CREATS, 2003)

In administrative terms, the Study Area covers Cairo Governorate, Giza Governorate and part of Qalubia and Sharqia Governorates. Alternatively, the study area is identified as the envelope of the 11 major districts identified by the JICA study, as follows (Figure 2.3):

1- Central Cairo
2- Central Giza
3- Heliopolis/Nasr City
4- Shoubra/Shoubra El Kheima
5- Mataryia
6- Maadi/Qatamiya Road
7- Shibin El Qanater/ El Obour
8- 10th of Ramadan/Badr/El Shorook
9- New Cairo
10- Helwan/15th of May
11- 6th of October/El Sheikh Zayed

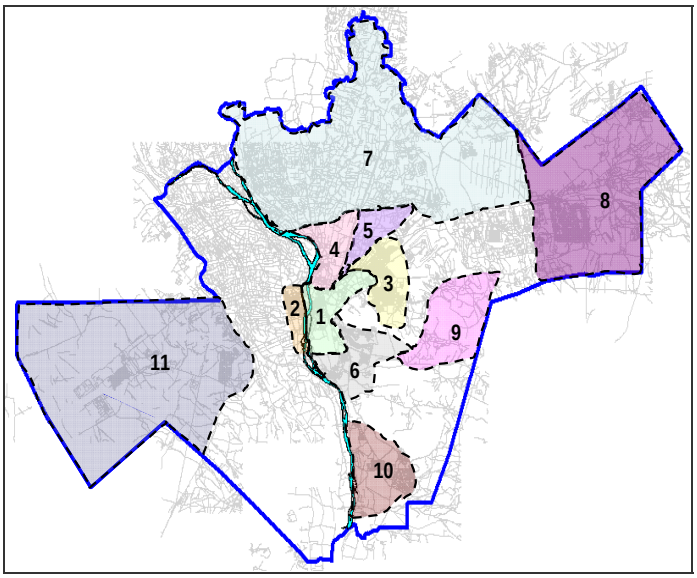


Figure 2.3: Greater Cairo Region Major Districts (CREATS, 2003)

2.4 Assessment of Data and Information Needs

The table below outlines the data and information needs. The table includes the potential sources of this data and their relevance to the assignment.

Table 2.2: Study Data and Information Needs

Data/ Information item	Source/ method
Origin/Destination (O/D) matrices by traffic mode	Derived from the results of the study of "Public Private Partnership Program for Cairo Urban Toll Expressway Network Development"
GIS maps of network characteristics	Ministry of Housing, Ministry of Transport
Current traffic volumes	Field traffic counts at selected corridors
Current traffic speeds	Floating car surveys at selected corridors
Difference between design capacity and actual capacity	Based on noted observations made by floating car survey personnel
Frequency of incidents (at an appropriate level of disaggregation)	Based on noted observations made by floating car survey personnel
Locations, types and causes of congestion	Analysis of collected data plus two workshops with MOI personnel and traffic experts
The total number of vehicles (by type)	Egypt Government, offered by the WB
Public transport capacity, fleet composition & age	Egypt Government, offered by the WB
Accident data and information	Egypt Government, offered by the WB
Unit vehicle operating cost	Based on an analysis of actual performance data collected from different transport operators, as well as automobile dealers
Fuel cost	Obtained by interviewing gasoline stations and some car dealers
Household income and value of time	Based on a household opinion poll survey that was carried

	out in the Cairo master plan in June and July 2007
Percentage of daily traffic in peak hour	Based on the Public Private Partnership Program for Cairo Urban Toll Expressway Network Development study
Passenger Car Unit (PCU)	Based on the strategic urban development master plan study for sustainable development of the greater Cairo region in the Arab republic of Egypt (March 2008)
Vehicle Occupancy Factor	Based on the strategic urban development master plan study for sustainable development of the greater Cairo region in the Arab republic of Egypt (March 2008)

2.5 Floating Car Survey and Traffic Counts

2.5.1 Data Collection Objectives

The floating car survey and collection of traffic counts were intended to:

- Fill major data gaps identified upon consolidation of traffic data from previous studies;
- Facilitate the development of growth factors that could be used to update traffic data from previous studies; and
- Enable the quantitative assessment of congestion levels, locations and causes along selected travel corridors.

2.5.2 Data Collection Techniques

- Floating Cars: test drives along selected routes where travel distances as well as qualitative observations are recorded at specified time intervals.
- Traffic Counts: manual classified traffic counts at selected locations.

2.5.3 Technical Plan Development Methodology

Study Area and Road Classification

The focus of this study is for the within ring road area. However the main corridors connecting all external cities to the within ring road area are included: 26th of July corridor carrying traffic from 6th of Oct city; Cairo/Suez Desert road carrying traffic from new Cairo, ElShorouq, and Badr; Cairo/ Ismailia Desert road carrying traffic from Obour, 10th of Ramadan, and Elshorouq; Cairo/Alex agriculture road carrying traffic from El-Qalyoubya; and Cornish El-Nile carrying traffic from 15th of May city.

According to the JICA study, the roadway network of the GCR is classified into 7 categories/levels as shown in Figure 2.4 and listed next.

1- Inter-Urban Primary Arterial Highway
2- Regional Primary Arterial Highway
3- Urban Expressway
4- Urban Primary Arterial Street
5- Urban Secondary Arterial
6- Collector/Distributor Street

7- Local Street

Due to budget and time constraints, the scope of our data collection is limited to levels 1, 2, 3, and 4.

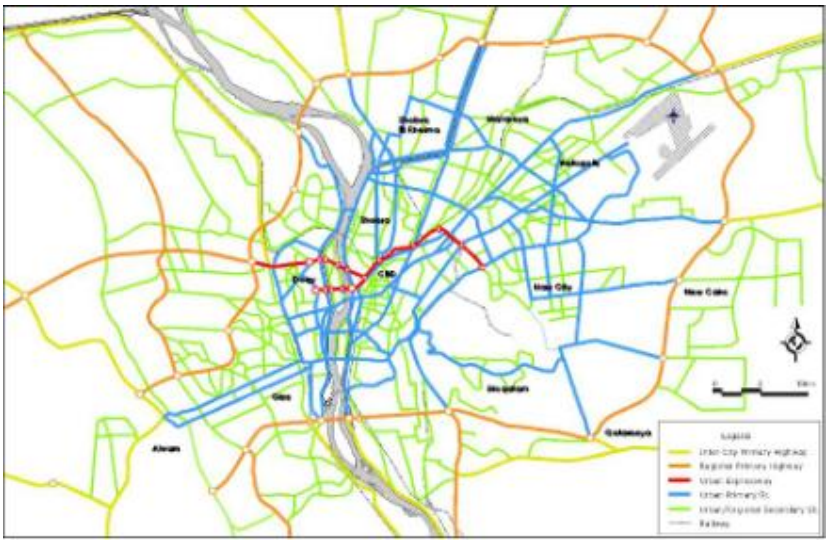


Figure 2.4: Greater Cairo Region Roadway classification (CREATS, 2003)

Consolidation of traffic data from previous studies

The JICA study of 2005 (Cairo Urban Toll Expressway Network Development) conducted traffic surveys at 28 locations within the GCR. Traffic counts as well as classification data were collected at the 28 locations, for both travel directions, for 16 hrs. The observation locations and peak hour traffic volumes are shown in Figure 2.5 and Figure 2.6, respectively.

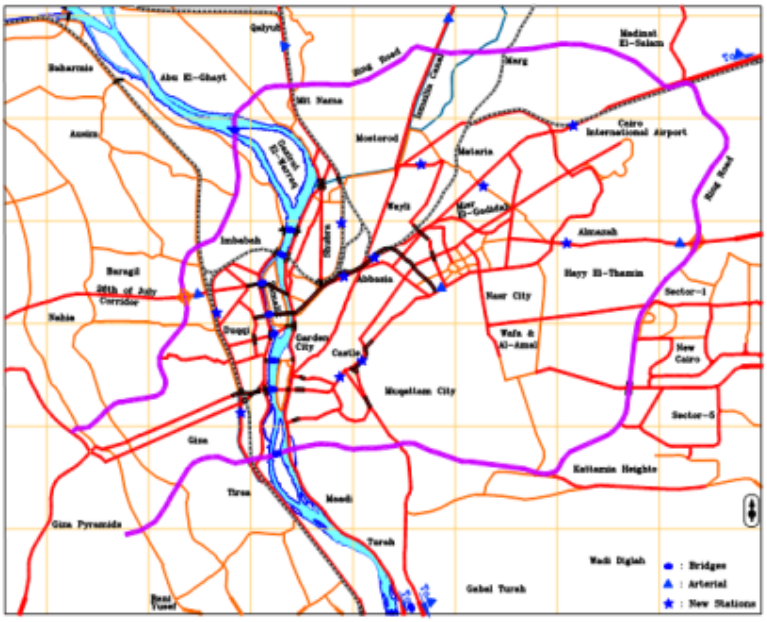


Figure 2.5: Traffic counts observation locations (JICA, 2005)

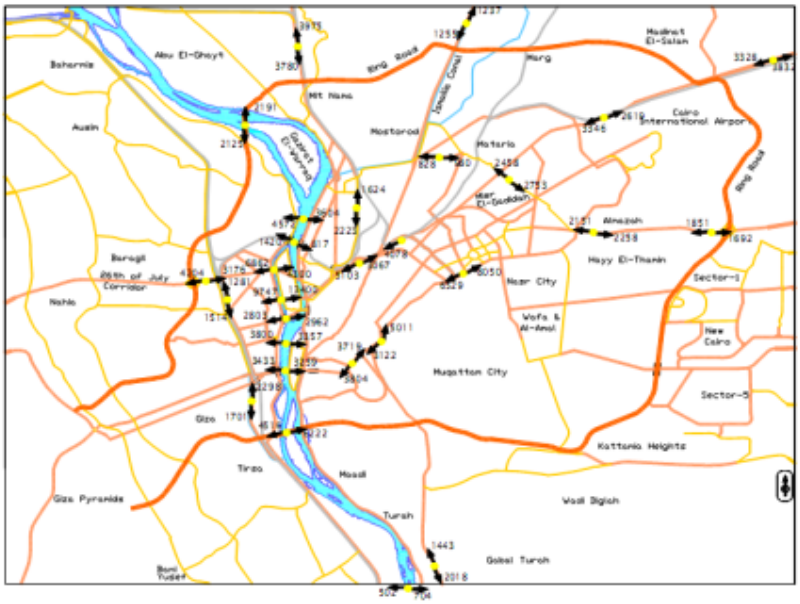


Figure 2.6: Peak hour traffic volumes (JICA, 2005)

The JICA study of 2007 (CUTE) conducted traffic count surveys at 8 locations as identified in Figure 2.7. Classified traffic volumes were manually observed for both directions of the 8 locations for 16 hrs.

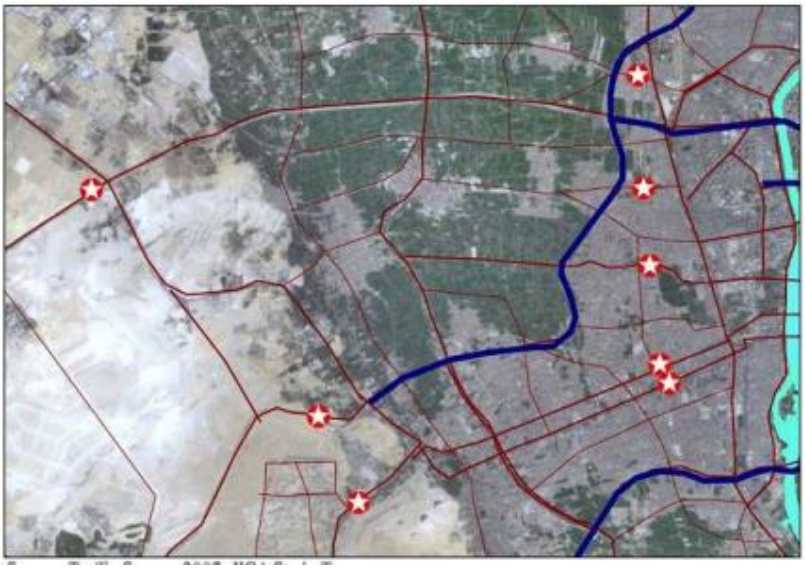


Figure 2.7: Traffic counts observation locations (JICA, 2007)

The Cairo Ring Road study of 2007 (Upgrading of Greater Cairo Regional Ring Road to an Integrated Transport Corridor) conducted traffic count surveys along the Ring Road. Continuous traffic counts ranging from 16-hr to 24-hr were performed at each approach of the 23 interchanges of the Ring Road as shown in Figure 2.8.

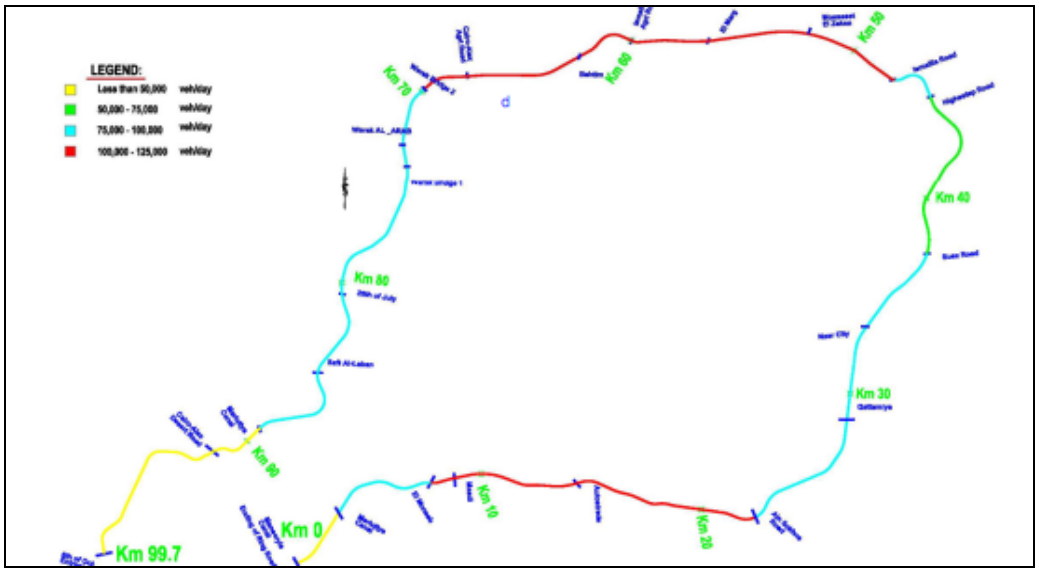


Figure 2.8: Cairo Ring Road Study, 2009

Selection criteria for additional data collection sites

Floating cars

- Maintaining an adequate representation of all identified districts within the GCR
- Maintaining an adequate representation of different road hierarchy levels (considering only the levels from 1 to 4, as defined previously).
- Capturing the impacts of the recent substantial growth in the new settlements on the periphery of the ring road. The main radial corridors carrying traffic demand from those areas, crossing the ring road, to the centre of the city are to be considered.
- Capturing critical corridors with excessive delays considering inputs from the traffic police, professionals, and results reported in previous studies.
- Capturing the severely congested segments of the ring road.
- Maintaining a round-trip travel time within 2 hours (on average) to be able to conduct more than one round trip during the peak period.

Traffic Counts

- Duplicating the traffic counting efforts made by previous studies at a few selected locations. This duplication will enable the estimation of realistic growth factors that could assist in updating the rest of the data.
- Maintaining an adequate representation of areas/corridors where major recent land use developments have been realized. A focus will be dedicated to major traffic corridors connecting GCR new settlements (including 6th of October, El Sheik Zayed, 10th of Ramadan, Obour, Badr, Elshorouk, New Cairo, 15th of May) with the city centre. At least one data collection location is to be defined along the main corridor connecting each of those areas with the ring road.
- Maintaining an adequate overlap with the selected routes of the floating car study. This overlap will allow for the consolidation of different data types which enable a more insightful assessment of traffic conditions.

2.5.4 Development of Data Collection Technical Plan

Floating Cars

Floating Car Routes

A preliminary plan was developed for the floating car routes based on the previously stated route selection criteria. The plan identifies 10 travel routes as candidates for the floating car surveys. The selection process was based on several brainstorming sessions with a number of transportation professionals. Figure 2.9 depicts the formulated preliminary plan.

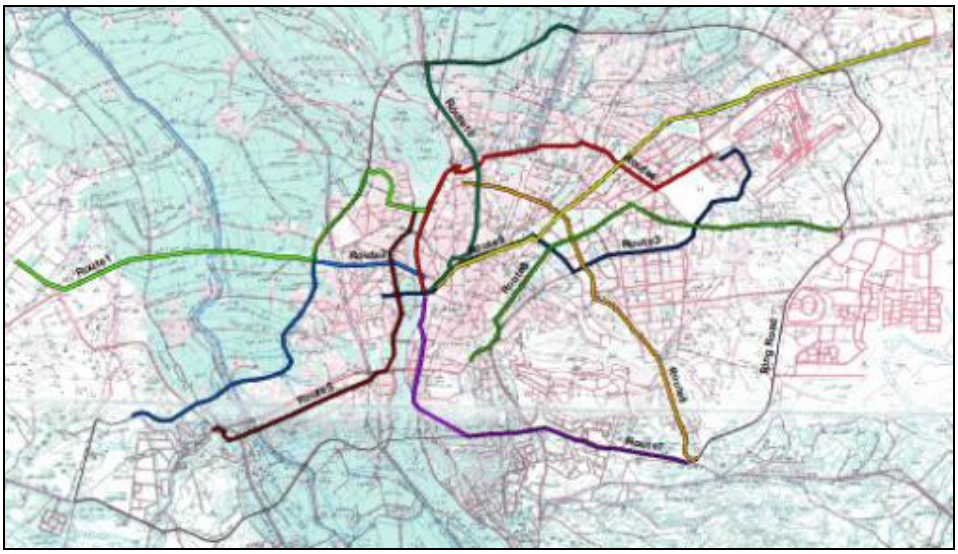


Figure 2.9: Preliminary Routes for the Floating Car Survey

The preliminary plan was subsequently updated based on brainstorming sessions with traffic police representatives and transportation experts. The objective of such sessions was to encapsulate different experiences into the data collection plan. The main feedback obtained was:

- The Ring Road is a crucial travel corridor needs to be entirely surveyed.
- Abass Bridge is a critical high volume flyover that mandates surveillance.
- The appropriateness of "Route 6" in the preliminary plan is not well established. Concerns pertaining to road segments functional hierarchy as well as congestion levels have been expressed.

The preliminary plan was modified in accordance to the above feedback. The entire Ring Road as well as Abass Bridge were included in the updated plan. The final plan constitutes 11 floating car routes, as depicted in Figure 2.10.

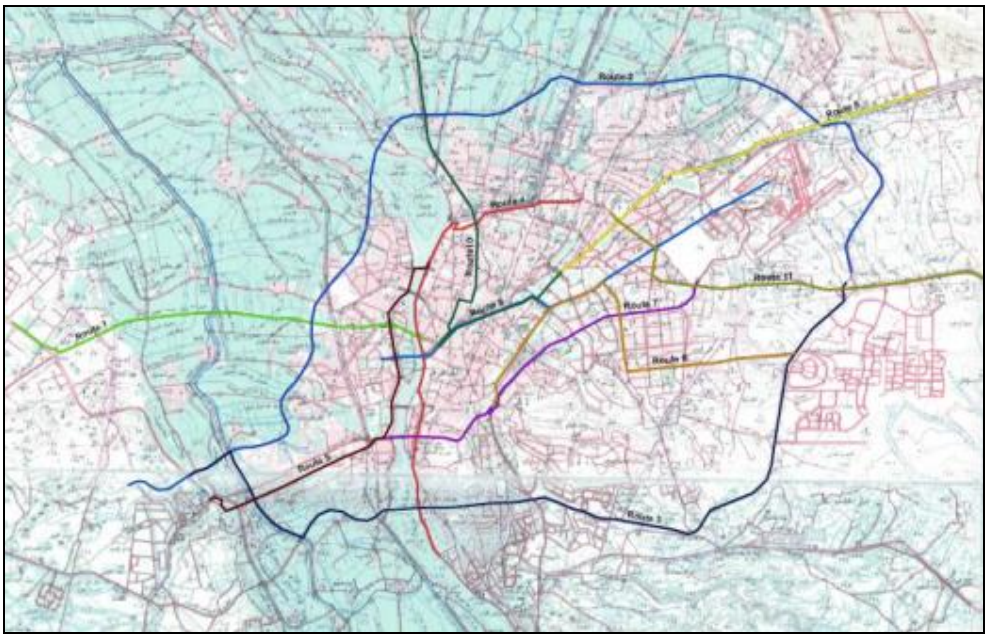


Figure 2.10: Final Routes for Floating Car Survey

Traffic Counts

Based on the previously outlined selection criteria, 15 observation locations were identified along the floating car routes for traffic counts. Figure 2.11 displays the selected observation locations.

Figure 2.11: Traffic counts observation locations

2.5.5 Data Collection Operational Plan

Floating cars

- Reported Observations: Travel distance, actual number of lanes, judgmental congestion level, incidents, unpredictable pedestrian crossing (i.e. Jaywalking), microbus drop-offs/pickups, security checks, and intersections. A sample observation sheet is included in Annex 4.
- Surveyed Routes: (Table 2.3) presents the details of the identified 11 routes. Each route is to be covered by 2 floating cars traveling in opposite directions.
- Drivers/Observers: 22 drivers and 22 observers were recruited to perform the floating car survey. A training session was conducted to get drivers/observers familiar with their assignments.
- Date: the survey was conducted during the following days:
  - Monday 24/5/2010
  - Tuesday 25/5/2010
  - Monday 31/5/2010
  - Tuesday 1/6/2010
- Time: the survey took place during the following peak periods:
  - Morning peak period: 7:00 am to 11:00 am
  - Afternoon peak period: 3:00 pm – 7:00 pm

On each route and during each peak period of each day listed above, two cars were traveling in opposite directions and making two way trips (departure and return). The total number of runs (complete loops) made on the 4 days per route and peak period ranges between 10 (Route 9, PM peak period) and 22 (Route 8, AM and Route 11, PM), as indicated in Table 2.4 below, and the average number of runs for all routes is 16.

Table 2.3: Floating Car Survey Detailed Routes

Route	Name	O/D (Direction 1)	Main Streets	Road Class	% Length
1	26th of July/ 15th May Travel Corridor	Cairo-Alex Desert Road/ El-Esaaf	26th July Street 15th of May Bridge 26th of July corridor Cairo-Alex Desert Road	3 3 2 1	3 13 78 7
2	Ring Road North	Cairo-Suiz Desert Road Interchange/ El-Wahaat Road	Ring Road	2	100
3	Ring Road South	Cairo-Suez Desert Road Interchange/ Cairo Alex Desert Road	Ring Road	2	100
4	El Corniche-East/ El-Matareya Square	El-Matareya Sqr/ Maadi Corniche	El-Kablat Str. Terat Al-Ismaileya Road Said Salem Str. Kornish El-Nile Road(East)	4 4 4 4	9 16 7 69
5	Rod El Farag/ El-Remaya	Roud El-Farag-Bridge/ Remaya Sqr	Roud El-Farag Bridge Kornish El-Nile Road(West) Gamal Abdel Naser(El-Nile)Str. El-Giza (Sharl De Gol) str. Morad Str. El-Giza Bridge El-Ahram Str.	4 4 4 4 4 4 4	7 13 16 12 3 3 44
6	Cairo-Suez Desert Road/El-Qallaa	Mobarak Academy for Security (5th District)/ El-Qalaa	Ahmad El-Zomor Str. (El Methaq Str.) Zaker Hussein Str. El-Tayaran Str. El-tayaran Tunnel Salah Salem	4 4 4 4 4	30 5 20 5 40
7	Autostrad/ Giza Square	Autostrad-Thawra Intersection/Giza Sqr	El-Nasr Road/Autostrad Salah Salem Hassan El-Anwar Str. El Rawda Abbas Bridge Al-Ahram Str.	4 4 4 4 4 4	70 19 5 2 2 2
8	El-Orouba/ 6th of October Bridge	Cairo Int Airport/ ElBatal Ahmed AbdElaziz	El-Orouba Str. 6th of October Bridge	4 3	54 46
9	Cairo-Ismaillia Desert Road/El-Qubba	Obour City/ El-Qubba Bridge	Cairo-ismaileya Desert Road Gesr El-Suize Str.	1 4	30 70
10	Cario-Alex Agr Road El-Qubba	Upstream RingRoad Interchange/El-Qubba Bridge	Cairo-Alex Agricultural Road(Quesna-Qalyoub Road) Ahmed Helmy Str. Ahmed Badawy Str. Shoubra Str. El-Galaa Str. Ramsis Str. El-Khaleefa El-Ma'moon Str.	1 4 4 4 4 4 4	25 34 3 4 4 23 6
11	Cairo-Suez Desert Road/Ebn-ElHakam Square	Cairo-Suiz Desert Road (Rehab Entrance)/ Ibn El-Hakam Sqr.	Cairo-Suiz Desert Road El-Thawra Str. El-Nozha Str. Abo Bakr Al-Sedeeq Str. Ibn El-Hakam Str.	1 4 4 4 4	71 10 6 10 2

Table 2.4: Number of Runs on Each Route during the Floating Cars Survey

	No of Runs/Complete Loops (departure and return trips were completed)	Additional Number of Incomplete Loops (return trip could not be made in the specified period)
Route 1 (AM)	19	5
(PM)	20	4
Route 2 (AM)	13	6
(PM)	11	6
Route 3 (AM)	16	4
(PM)	16	0
Route 4 (AM)	16	3
(PM)	14	3
Route 5 (AM)	19	3
(PM)	19	2
Route 6 (AM)	17	2
(PM)	13	3
Route 7 (AM)	16	1
(PM)	13	5
Route 8 (AM)	22	1
(PM)	14	5
Route 9 (AM)	17	7
(PM)	10	6
Route 10 (AM)	12	3
(PM)	12	2
Route 11 (AM)	21	1
(PM)	22	1

Traffic Counts:

- Data Types: Traffic counts at all observation locations, traffic composition at selected observation locations
- Survey locations: defined in Table 2.5.
- Date: The schedule was determined based on clearances from the Ministry of Interior. The survey was conducted on Monday 05/07/2010, Tuesday 06/07/2010 and Wednesday 07/07/2010.
- Time: Morning peak (7:00 am to 11:00 am) and the afternoon peak period (3:00 pm – 7:00 pm).
- All traffic counts were conducted at normal days during which no local or regional special events were noted.

Table 2.5: Traffic Counts Detailed Observation locations

Code	Description	Date of survey
P1	Ring Road / Between El Khosoos & Cairo-Alex Agr.Rd	Tues - 06 July
P2	Gesr El-Suez/between Ring Road and Ainshams Str.	Mon - 05 July
P3	Suez Desert Road / Between KM 4.5 and Ring Road	Tues - 06 July
P4	Ring Road / Carrefour El-Maadi	Wed - 07 July
P5	Ring Road / Above Cairo-Alex Desert Road	Wed - 07 July
P6	26th July / Between Railway and Ring Road	Tues - 06 July
P7	Al-Ahram Street / Electricity Station	Mon - 05 July
P8	Middle Abbas Bridge	Mon - 05 July
P9	6th October Bridge / Zamalek-Agouza	Wed - 07 July
P10	Ahmed Helmy Str./ Before Abou Wafya Bridge	Mon - 05 July
P11	Ramsis Str./Between Ghamra and Ramsis Srq	Mon - 05 July
P12	Lotfy El-Sayed/between Abaseya&Demerdash Metro stn	Mon - 05 July
P13	Salah Salem Str./Between Elfangary and Abbaseya	Wed - 07 July
P14	Kornish El-Nil /Between 15th May & El-Sahel Brdg	Tues - 06 July
P15	Gamal Abd El-Naser (El-Nile str)/Cornishe El- Agouza	Tues - 06 July

2.6 Peak Hours

According to the Public-Private Partnership Program for Cairo Urban Toll Expressway Network Development traffic count survey (May 2006), the morning peak (07:00 – 9:00) occurred in 29% of traffic count stations, followed by the afternoon peak (13:00 – 16:00), which accounts for 27%. Moreover, other peak periods exist during the day such as the evening peak (20:00 – 21:00). It is interesting to notice that even the period (10:00 – 12:00) was observed to have the peak traffic volume in some locations (e.g., 15th of May Bridge).

The table below classifies peak periods for Cairo based on the results of Public-Private Partnership Program for Cairo Urban Toll Expressway Network Development study (2006):

Table 2.6 Traffic peak periods in the Greater Cairo Metropolitan Area

Peak	Period	Percentage of occurrence in traffic count stations
Morning	07:00-09:00	29.1 %*
	10:00-12:00	21.8 %
Afternoon	13:00-16:00	27.3 %
	17:00-18:00	9.1 %
Evening	20:00-21:00	12.7 %
Total		100 %

*e.g. the morning peak (07:00 – 9:00) occurred in 29.1% of traffic count stations

Given table 2.6, hours between [9:01-9:59], [12:01-12:59], [16:01-16:59], [18:01- 19:59], and [21:01-6:59] won't be considered as peak hours.

2.7 Traffic Composition in the Corridors

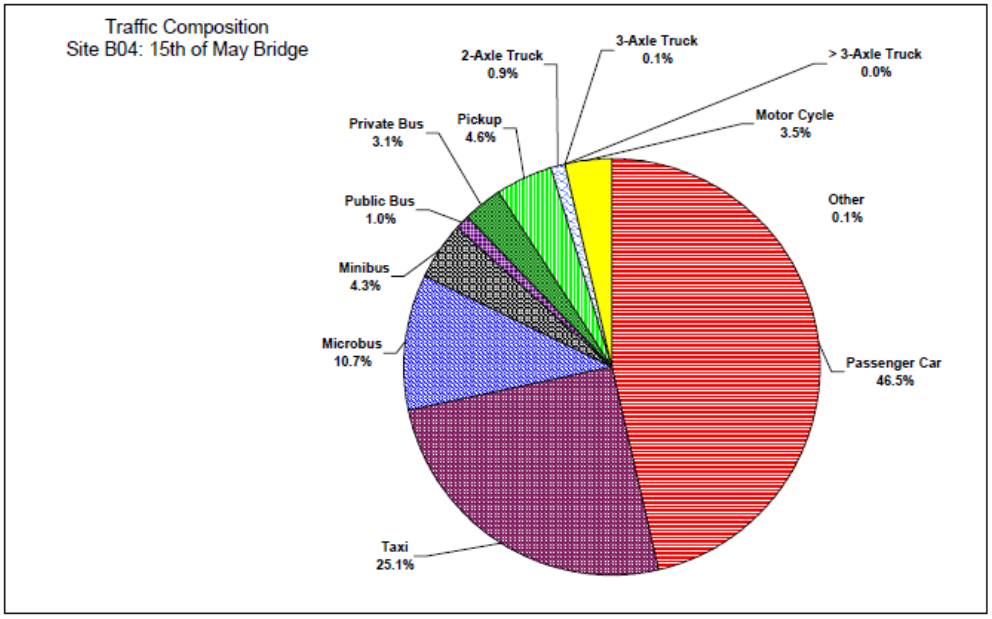
Traffic composition is one of the essential characteristics of traffic flow, especially when the need arises to convert the traffic flow from vehicles into passenger car unit (PCU). Fortunately, the manual classified count (MCC) procedure, which was followed in this study, provides the opportunity to identify the share of each vehicle type within the traffic flow per site per direction per hour. The traffic composition consists of twelve vehicle types which are listed below:

- Passenger Car
- Taxi (metered taxi and intercity taxi).
- Microbuses (shared taxi)
- Public Transport minibus
- Public Transport bus
- Private Bus (school bus, company bus, tourist bus, etc.)
- Light commodity vehicle (pickup and vans)
- 2-Axles truck
- 3-Axles truck
- Heavy truck (more than 3-axle, trailer, semi-trailer).
- 2-wheeler (bicycle and motorcycle)
- Others (military, police, ambulance, etc.)

2.8 Modal Split in the Corridors

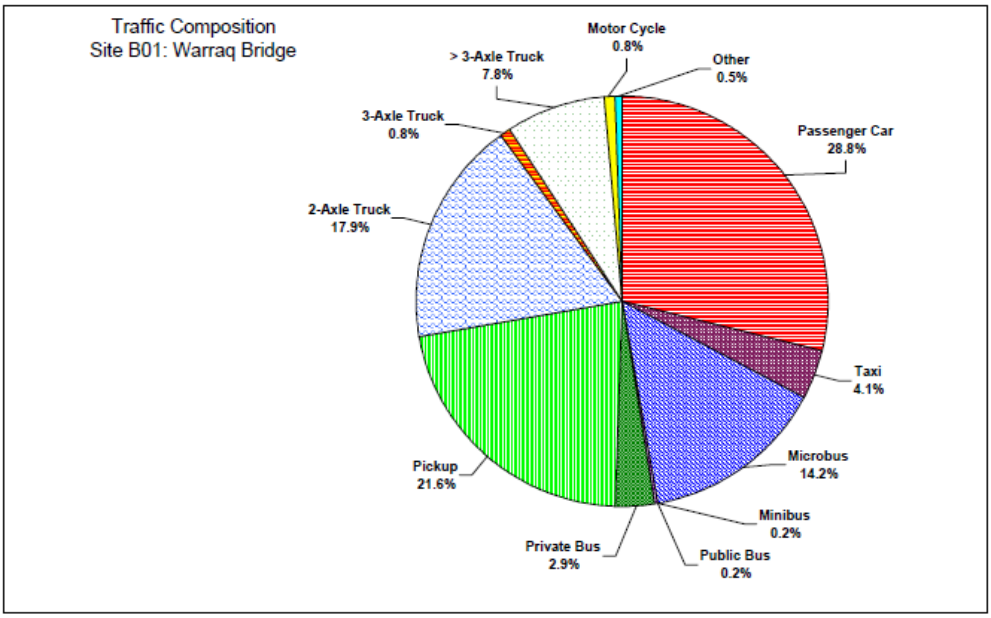
Based on the results of Public-Private Partnership Program For Cairo Urban Toll Expressway Network Development study (2006) and given the diverse mode composition in all eleven corridors, the following pie charts illustrate the modal split for each studied corridor:

Corridor 1: 26th of July/15th of May Travel Corridor



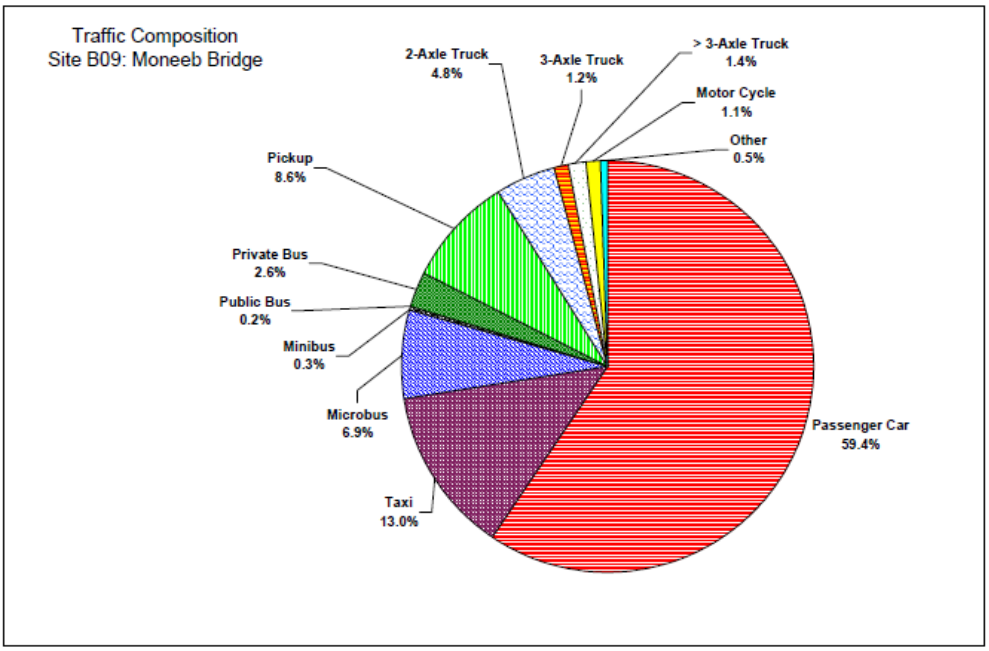
The share of passenger car is the highest in corridor 1.

Corridor 2: Ring Road (Northern segment)



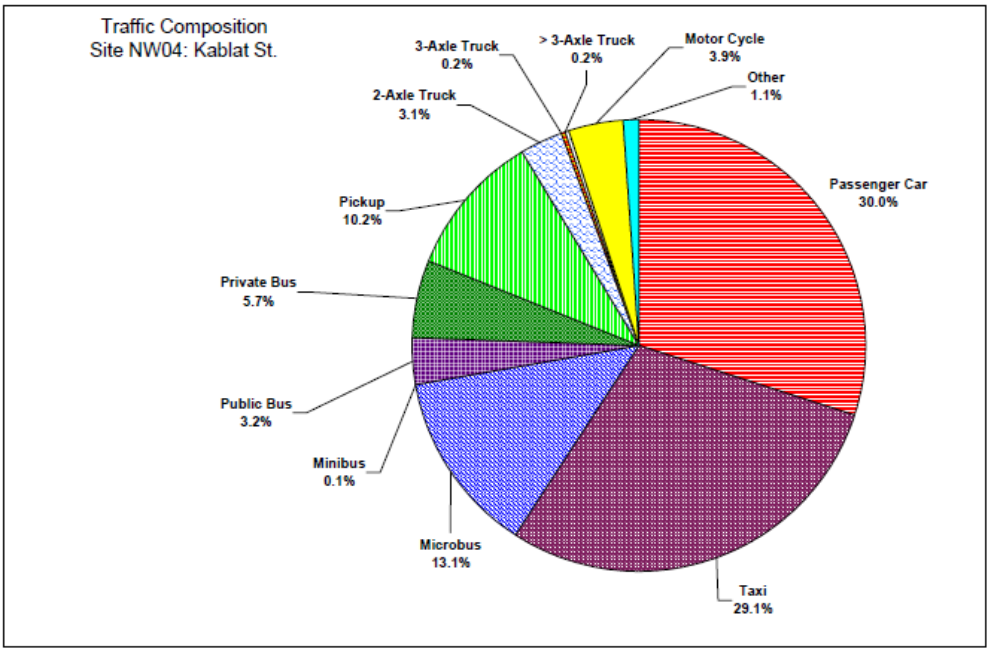
The share of public transportation is fairly low in corridor 2.

Corridor 3: Ring Road (Southern Segment):



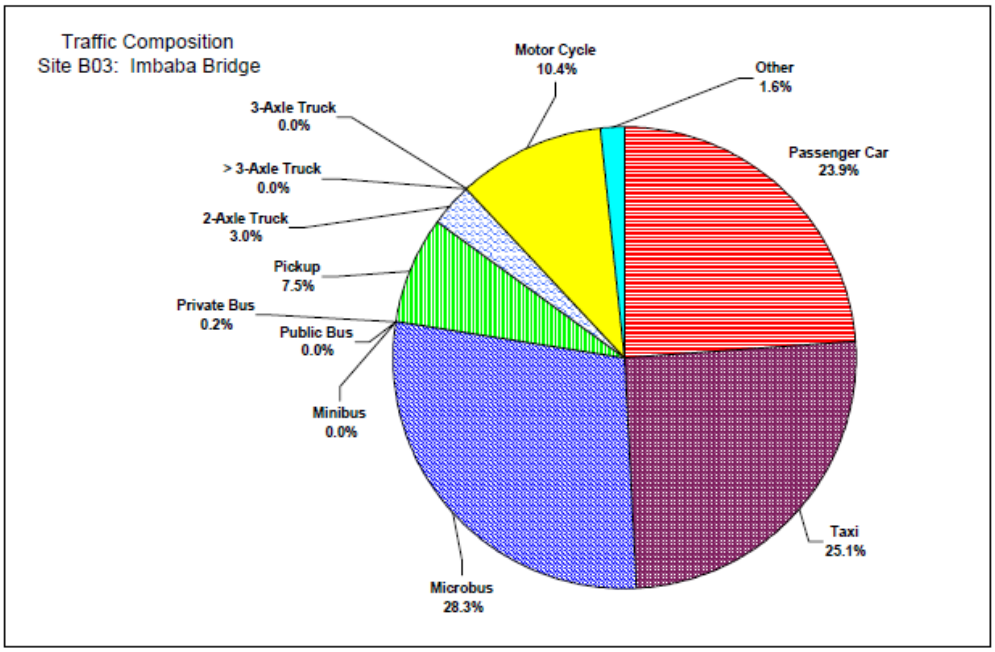
The share of passenger car is the highest and the share of public transportation is low in corridor 3.

Corridor 4: El Corniche-East/El-Matareya Square



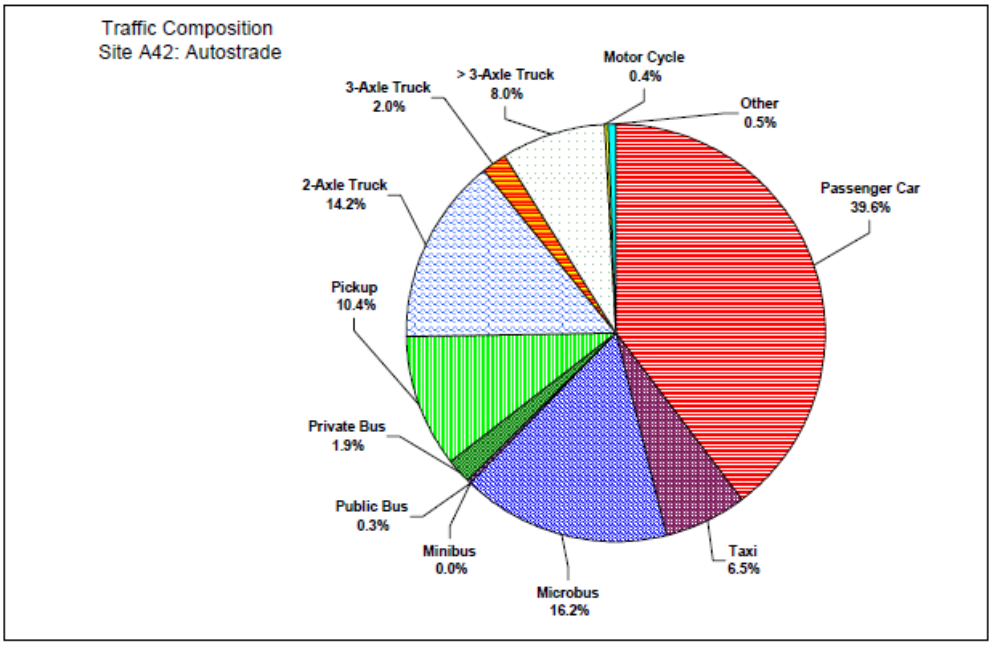
The share of passenger car and taxi is almost the same in corridor 4.

Corridor 5: Rod El Farag/El-Remaya:



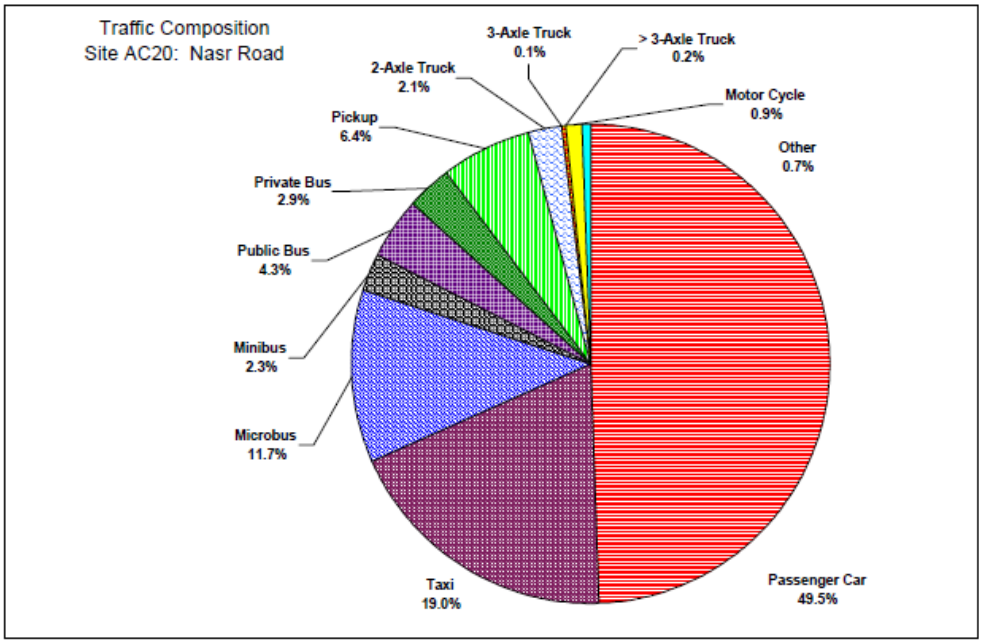
The share of microbus (Shared taxi) in quite high in corridor 5. The share of bus services is almost zero in this corridor.

Corridor 6: Cairo-Suez Desert Road/El-Qalaa



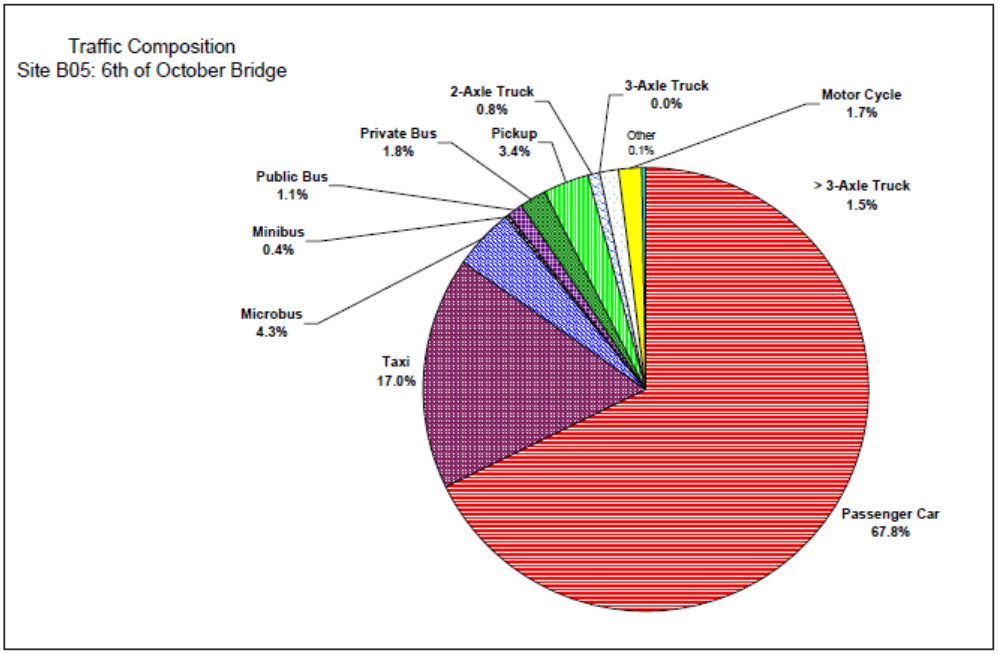
The share of passenger car is the highest in corridor 6.

Corridor 7: Autostrad/Giza Square:



The share of passenger car is the highest in corridor 7.

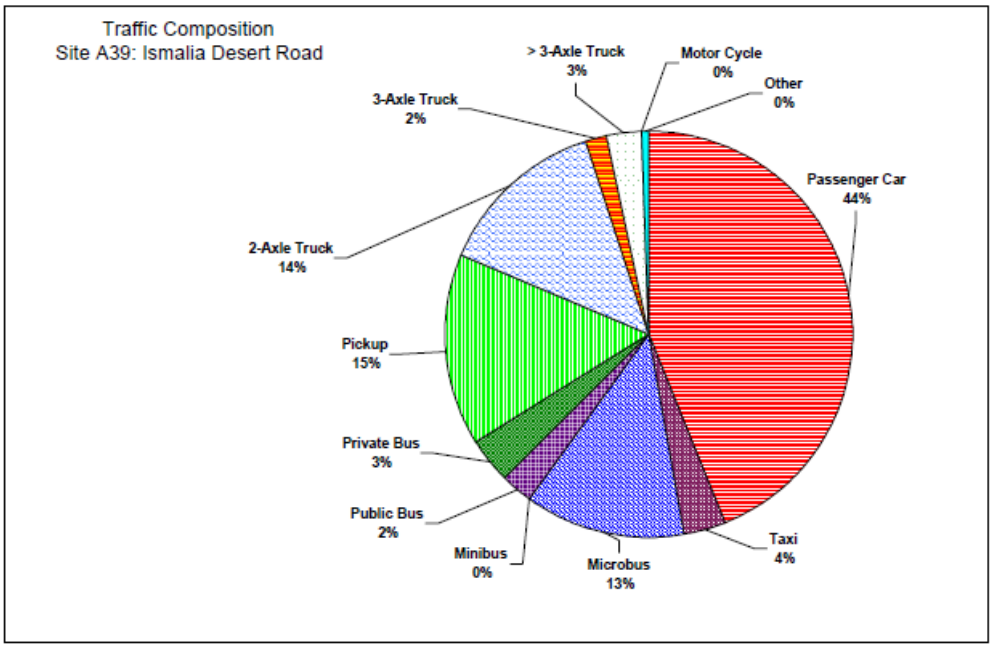
Corridor 8: El-Orouba/6th of October Bridge



The share of passenger car is the highest in corridor 8. The share of freight transport is negligible in corridor 8. The roads between Cairo and 6th of October City and certainly the end of the Ring Road and 26th of July Corridor have small trucks in substantial volumes. These roads are used to transport industrial and agricultural products to the

factories and the wholesale market respectively and later on to Cairo and other destinations for final consumption.

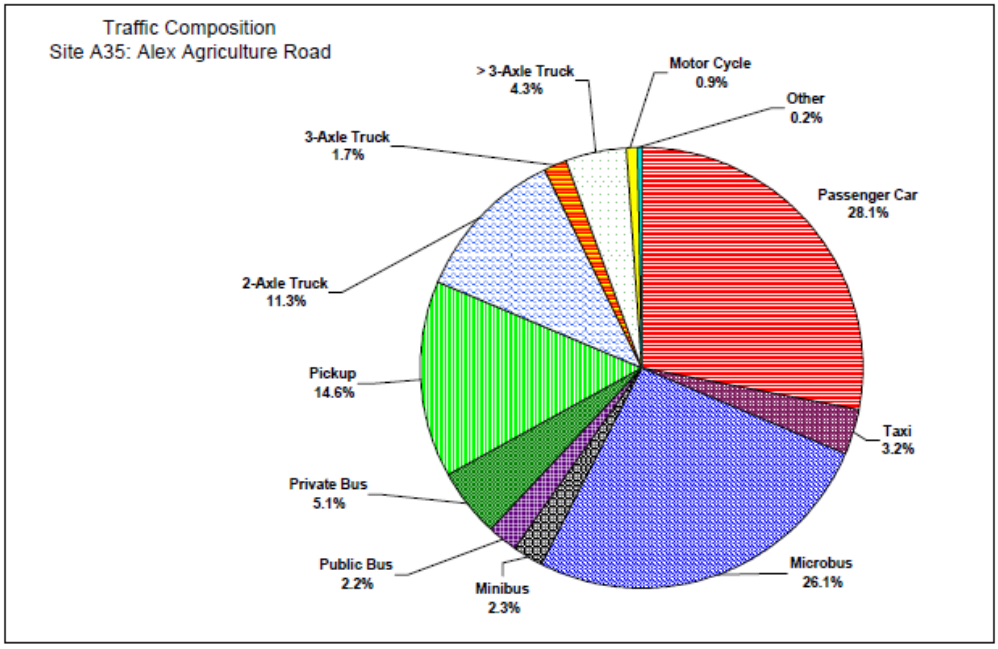
Corridor 9: Cairo-Ismaillia/El-Qubba:



The share of passenger car is the highest in corridor 9. Ismailya Desert Road is characterized by dense truck traffic (over 10,000 PCU per day per direction) that serves four specific areas, namely Oboor City (in particular the wholesale market), 10th of Ramadan City, Ismailya and the Ports of Port Said and Damietta. The effect of truck traffic on the extension inside the Ring Road remains limited, with only Gesr El Suez (extension of the Ismailya Desert road) showing a density above 5,000 PCU per day per direction.

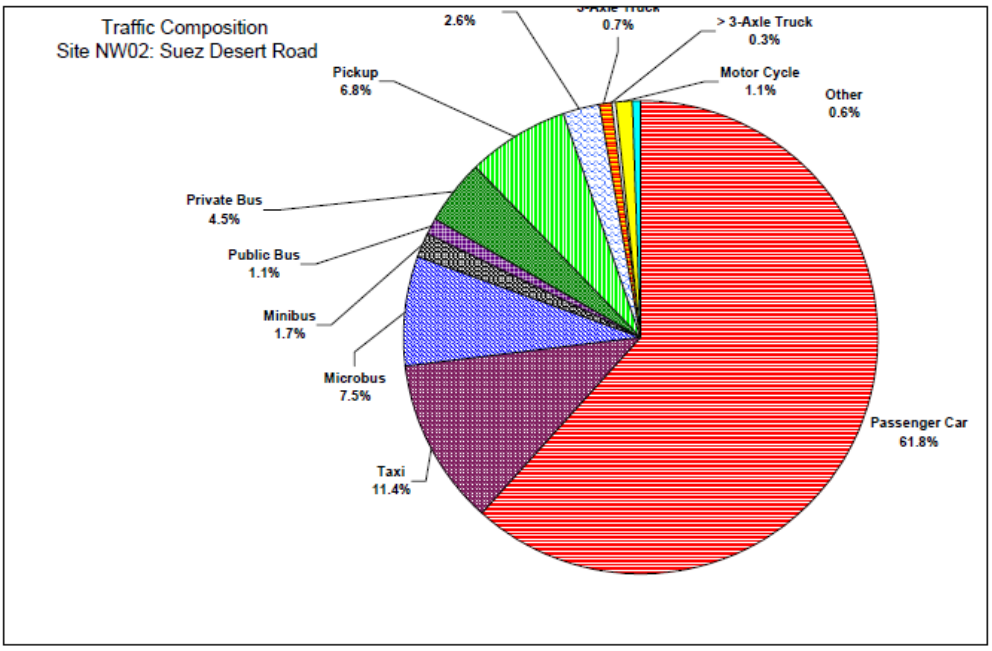
Truck density on Ismailya Agriculture Road is below 5,000 PCU per day per direction. Trucks on this road do not cause problems, not even at its extension inside the Ring Road. The effects of heavy trucks can therefore be ignored.

Corridor 10: Cario-Alex Agr Road/ El-Qubba Bridge



The share of passenger car and Microbus (Shared Taxi) is the same in corridor 10. The Alexandria Agricultural Road is at present the most important truck route. Pick Up trucks and two-axle trucks represent 79% of total trucks while the largest truck type is responsible for only 19% of total volume, going to / coming from Alexandria port and serving the factories (car assembly, glass, cement, etc…) that are located in that Lower Delta region. Up north on Alexandria Agricultural Road, there is a clear separation between heavy and light trucks. While light trucks continue on Alexandria Agricultural Road, heavy trucks predominantly divert to the west towards the road to Belqas, which over its entire length has a share of heavy trucks above 50%. This could indicate that this road is frequently used by heavy trucks as alternative for Alexandria Agricultural Road. But the total number of trucks remains low on this alternative road where capacity is sufficient to accommodate traffic.

Corridor 11: Cairo-Suez Desert Road/Ebn-ElHakam Square



The share of passenger car is the highest in corridor 11. The share of Trucks is negligible in corridor 11.

Truck traffic on this corridor is on average below 10,000 PCU per day per direction but is dominated by heavy trucks, predominantly entering the Ring Road via Suez Desert Road. In addition to trucks coming from Suez port, trucks serving the large number of cement factories along this road generate the high volume of heavy trucks.
Contrary to Suez Desert Road, Qatameya Road has a share of heavy trucks that remains below 50% while the density is also between 5,000 and 10,000 PCU per day per direction.

The high number of heavy trucks accessing the Ring Road via Suez Desert Road joins traffic of the northern section of the Ring Road, making the stretch between Ismailya Desert Road and Suez Desert Road in terms of heavy trucks the most dense road section of the entire road network. That particular section has a density of over 10,000 PCU per day per direction, of which more than 50% are heavy trucks.

Concluding figures above, in most of corridors the share of passenger cars is the highest (Table 2.6 summarizes the figures in the eleven corridors). The average share of passenger cars is approximately estimated 42% for the aforementioned corridors. Moreover, corridors in which the share of public buses is low are usually served by taxies and share taxies instead. The average share of taxies and share taxies is approximately 28% overall. Finally, in corridors 2 (ring road), 9 (Cairo-Ismaillia Desert Road/El-Qubba) and 10 (Cario-Alex Agr Road El-Qubba) the modal share of freight and public transportation (Diesel cars) are higher than that of other corridors. The modal share of freight and public transportation for corridors 2, 9, and 10 is around 60%, 47%, and 53.5% respectively.

Table 2.7: Modal split summary in the eleven corridors (by percentage)

Corridor	Car %	Taxi %	Microbus %	Minibus %	Public bus %	Private bus %	Pickup %	> 3- Axle Truck %	2 Axle Truck %	3 Axle Truck %	Motorcycle %	Other %
1	46.5	25.1	10.2	4.3	1.0	3.1	4.6	0.9	0.1	0.0	3.5	0.1
2	28.8	4.1	14.2	0.2	0.2	2.9	26.1	17.9	0.8	7.8	0.8	0.5
3	59.4	13.0	6.9	0.3	0.2	2.6	8.6	4.8	1.2	1.4	1.1	0.5
4	30.0	29.1	13.1	0.1	3.2	5.7	10.2	3.1	0.2	0.2	3.9	1.1
5	23.9	25.1	28.3	0.0	0.0	0.2	7.5	3.0	0.0	0.0	10.4	1.6
6	39.6	6.5	16.2	0.0	0.3	1.9	10.4	14.2	2.0	8.0	0.4	0.5
7	49.5	19.0	11.7	2.3	4.3	2.9	6.4	2.1	0.1	0.2	0.9	0.7
8	67.8	17.0	4.3	0.4	1.1	1.8	3.4	1.5	0.8	0.0	1.7	0.1
9	44.0	4.0	13.0	0.0	2.0	3.0	15.0	14.0	2.0	3.0	0.0	0.0
10	28.1	3.2	26.1	2.3	2.2	5.1	14.6	11.3	1.7	4.3	0.9	0.2
11	61.8	11.4	7.5	1.7	1.1	4.5	6.8	2.6	0.7	0.3	1.1	0.6

Table 2.8 summarizes the percentage of traffic volumes during peak period. As the table shows, the percentages range from 46% in corridor 4 to 72% in corridors 1.

Table 2.8: The percentage of traffic volumes in peak hours

Corridor	Count Site	Direction	% of traffic volumes in the peak period
1	15th of May Bridge	Cairo	68%
		Giza	68%
2	Warraq Bridge	Qalyobeya	55%
		Giza	50%
3	Moneeb Bridge	Cairo	60%
		Giza	60%
4	Kablat St.	Mataria Sq.	50%
		Ismailia Canal	46%
5	Imbaba Bridge	Cairo	50%
		Giza	50%
6	Autostrade	Cairo Airport	50%
		Helwan	50%
7	Nasr Road	Cairo Airport	69%
		Helwan	65%
8	6th of October Bridge	Cairo	60%
		Giza	65%
9	Ismailia Desert Road	Ismailia	51%
		Cairo	58%
10	Alex. Agriculture Road	Alexandria	72%
		Cairo	56%
11	Suez Desert Road	Suez	47%
		Cairo	51%

2.9 Daily Traffic Volume

Table 2.8 summarizes the traffic counts including 16 hours, 24 hours, and 24 hours PCU for the eleven corridors in 2005 according to the JICA study of (Cairo Urban Toll Expressway Network Development) conducted traffic surveys at 28 locations within the GCR. Traffic counts as well as classification data were collected at the 28 locations, for both travel directions, for 16 hrs. The JICA counts have been matched with the defined corridors by the consortium.

Table 2.9 summarizes the estimated traffic counts for 2010 using growth rate factors for the period 2005-2010 as provided in the JICA report. For the sake of comparison among different traffic volumes with different traffic compositions, it is preferable to convert the unit of traffic volume from vehicle to passenger car unit (PCU) by applying passenger car equivalencies. The gross-up factors of expanding the traffic volume from 16-hour count into 24-hour volume and passenger car equivalencies (PCE) are given in table 2.5 and are

derived from the JICA study of (Cairo Urban Toll Expressway Network Development). These factors were applied to the total observed traffic counts in 2005 to estimate the traffic volume expressed in PCU per day.

Table 2.9: Traffic counts in the eleven corridors (2005)

Corridor	Count Site	Direction	16 Hour Count (2005)	Total	24- Hour vehicles (2005)	24-Hour PCU (2005)	ADT (2005)	Growth rate PCU (%)
1	15th of May Bridge	Cairo	47456	118548	141847	159359	63793	2.6
		Giza	71092				95566	
2	Warraq Bridge	Qalyobeya	24820	45992	56161	83198	44899	5.5
		Giza	21172				38299	
3	Moneeb Bridge	Cairo	43707	104066	125381	145532	61122	16.9
		Giza	60359				84410	
4	Kablat St.	Mataria Sq.	12214	22565	26991	31791	17208	2.4
		Ismailia Canal	10351				14583	
5	Imbaba Bridge	Cairo	8500	21574	25898	28619	11276	3.9
		Giza	13074				17343	
6	Autostrade	Cairo Airport	14445	32579	39984	58716	26034	2.9
		Helwan	18134				32682	
7	Nasr Road	Cairo Airport	92674	169714	202874	241226	131724	3.1
		Helwan	77040				109502	
8	6th of October Bridge	Cairo	144986	259798	311933	329331	183790	6.0
		Giza	114812				145541	
9	Ismailia Desert Road	Ismailia	38960	79534	95907	130693	64020	1.0
		Cairo	40574				66673	
10	Alex. Agriculture Road	Alexandria	43959	89080	107287	157960	77950	0.6
		Cairo	45121				80010	
11	Suez Desert Road	Suez	27525	51872	62032	71264	37815	2.4
		Cairo	24347				33449	

Table 2.10: Traffic counts in the eleven corridors (estimated for 2010)

Corridor	Count Site	Direction	24- Hour vehicles (NON PCU) (2010)	ADT (PCU) (2010)	Peak Periods ADT (PCU) 2010 (total peak hours)	Peak Periods ADT (NON PCU) 2010 (total peak hours)
1	15th of May Bridge	Cairo	64559	72529	49342	43920
		Giza	96713	108653	73884	65765
2	Warraq Bridge	Qalyobeya	39611	58681	32558	21978
		Giza	33789	50056	24822	16755
3	Moneeb Bridge	Cairo	114960	133436	80062	68976
		Giza	158759	184274	110564	95255
4	Kablat St.	Mataria Sq.	16449	19374	9723	8255
		Ismailia Canal	13940	16419	7539	6401
5	Imbaba Bridge	Cairo	12355	13653	6826	6177
		Giza	19003	21000	10500	9501
6	Autostrade	Cairo Airport	20452	30034	14872	10128
		Helwan	25676	37704	18852	12838
7	Nasr Road	Cairo Airport	129051	153447	105830	89004
		Helwan	107280	127560	82498	69382
8	6th of October Bridge	Cairo	232960	245953	148388	140548
		Giza	184477	194766	127295	120570
9	Ismailia Desert Road	Ismailia	49377	67286	34382	25231
		Cairo	51422	70074	40556	29762
10	Alex. Agriculture Road	Alexandria	54551	80316	57964	39369
		Cairo	55993	82440	46325	31464
11	Suez Desert Road	Suez	37060	42576	20139	17530
		Cairo	32781	37660	19134	16655

2.10 Traffic Survey Results

Summary sheets for the non-classified and classified vehicle counts conducted on the 5th, 6th and 7th of July 2010 are included in Annex 6 and Annex 7 respectively. Counts were taken at 15 minute intervals during the following times and periods:

- 7:00 to 11:00 - AM
- 3:00 to 7:00 - PM

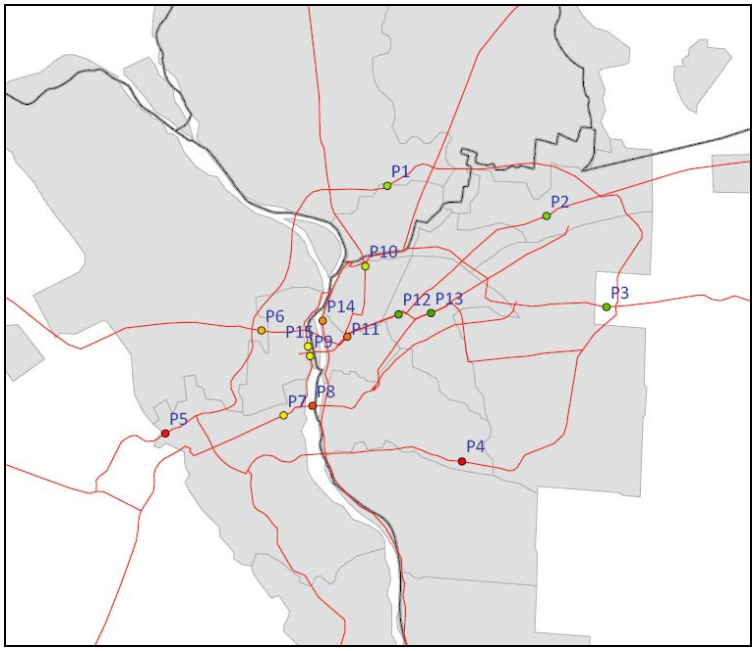


Figure 2.12: Traffic counts observation locations

Tables 2.9 and 2.10 indicate the average traffic volumes recorded on each location in the AM and PM periods respectively, while Figures 2.13 through 2.27 indicate the traffic volumes recorded for each 15 minute interval during the AM and PM survey periods.

It appears that the highest peak during the morning period occurs from 8 to 9 at most traffic counts locations. On the other hand, volumes are comparable in the different afternoon hours and there does not seem to be any specific peaking pattern.

Table 2.11: Traffic Survey Results- AM

Traffic Count Number & Road Name		Traffic Count Direction 1 (veh/hr)	Traffic Count Direction 2 (veh/hr)
P1	Ring Road / Between El Khosoos & Cairo-Alex Agr.Rd	3299	3212
P2	Gesr El-Suez/between Ring Road and Ainshams Str.	5708	2766
P3	Suez Desert Road / Between KM 4.5 and Ring Road	3051	1890
P4	Ring Road / Carfour Al Maadi	6969	6716
P5	Ring Road / Above Cairo-Alex Desert Road	3418	2981
P6	26th July / Between Railway and Ring Road	4389	2398
P7	Al-Ahram Street / Electricity Station	2242	2813
P8	Middle of Abbas Bridge	1512	2022
P9	6 October Bridge between Zamalk and Agozah	7400	7154
P10	Ahmed Helmy Str./ Before Abo Wafya Bridge	651	497
P11	Ramses St. between Ghmara and Ahmed Said St. (One Way to Abasia)	4244	
P12	Lotifi Al Said St. between Abasia and Ghamrah (One Way to Ramses Square)	4093	
P13	Salah Salem Str./Between Elfangary and Abbasey	3873	3600
P14	Cornish El-Nil /Between 15th May & El-Sahel Bridge	2535	4016
P15	Gamal Abd El-Naser (El-Nile St.)/Kornish al Agouza	4058	3000

Table 2.12: Traffic Survey Results-PM

Traffic Count Number & Road Name		Traffic Count Direction 1 (veh/hr)	Traffic Count Direction 2 (veh/hr)
P1	Ring Road / Between El Khosoos & Cairo-Alex Agr.Rd	2968	2985
P2	Gesr El-Suez/between Ring Road and Ainshams Str.	5532	2821
P3	Suez Desert Road / Between KM 4.5 and Ring Road	3996	2009
P4	Ring Road / Carfour Al Maadi	7821	9605
P5	Ring Road / Above Cairo-Alex Desert Road	2765	2958
P6	26th July / Between Railway and Ring Road	3323	2499
P7	Al-Ahram Street / Electricity Station	3267	2318
P8	Middle of Abbas Bridge	1765	2464
P9	6 October Bridge between Zamalk and Agozah	5695	3197
P10	Ahmed Helmy Str./ Before Abo Wafya Bridge	606	726
P11	Ramses St. between Ghmara and Ahmed Said St. (One Way to Abasia)	4448	
P12	Lotifi Al Said St. between Abasia and Ghamrah (One Way to Ramses Square)	4111	
P13	Salah Salem Str./Between Elfangary and Abbasey	3773	5454
P14	Cornish El-Nil /Between 15th May & El-Sahel Bridge	3460	3249
P15	Gamal Abd El-Naser (El-Nile St.)/Kornish al Agouza	3513	4192

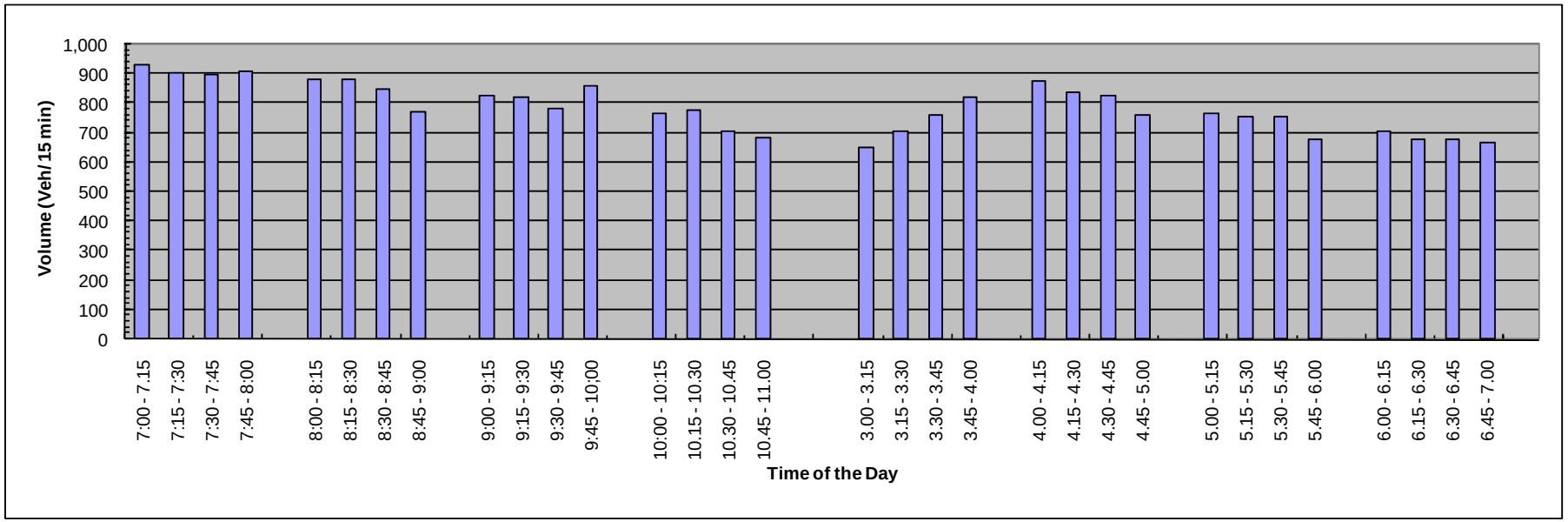


Figure 2.13: P1 - Ring Road / Between El Khosoos & Cairo-Alex Agr.Rd

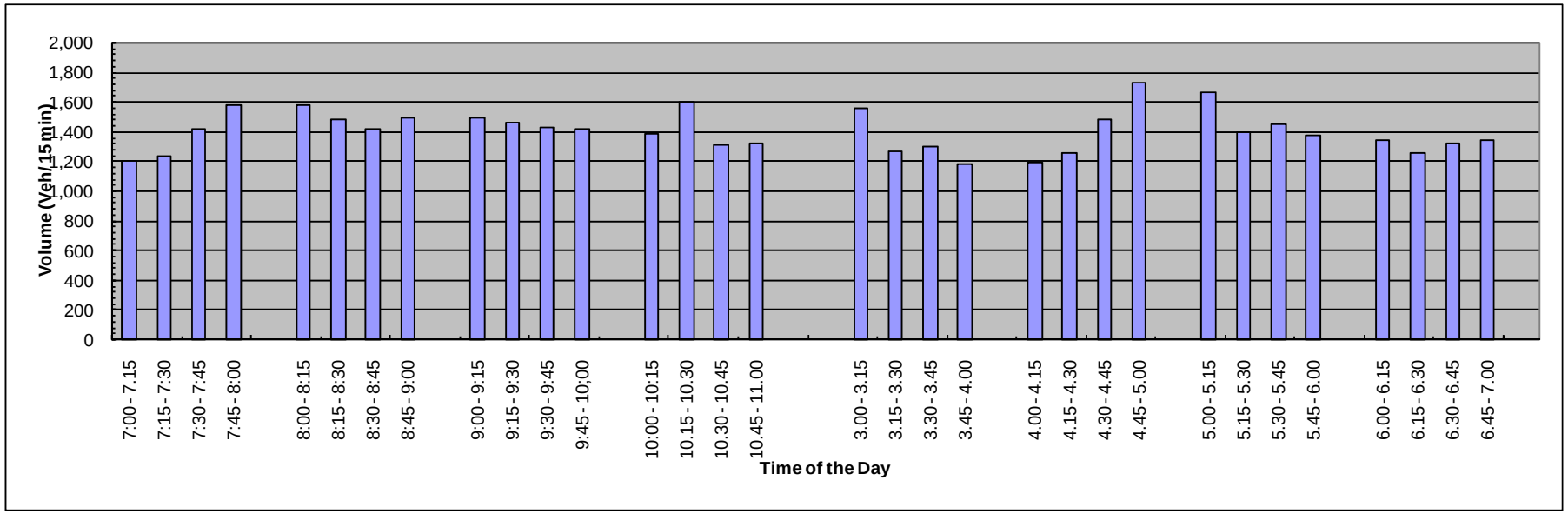


Figure 2.14: P2 – Gesr El-Suez/between Ring Road and Ainshams Street

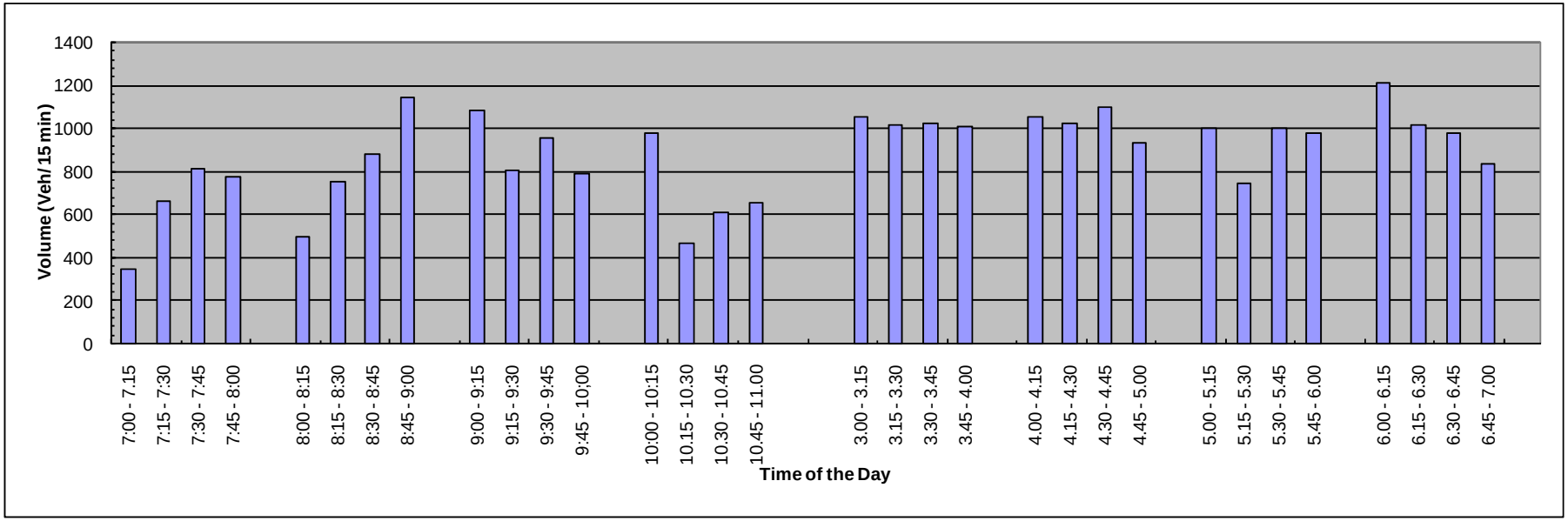


Figure 2.15: P3 – Suez Desert Road / Between KM 4.5 and Ring

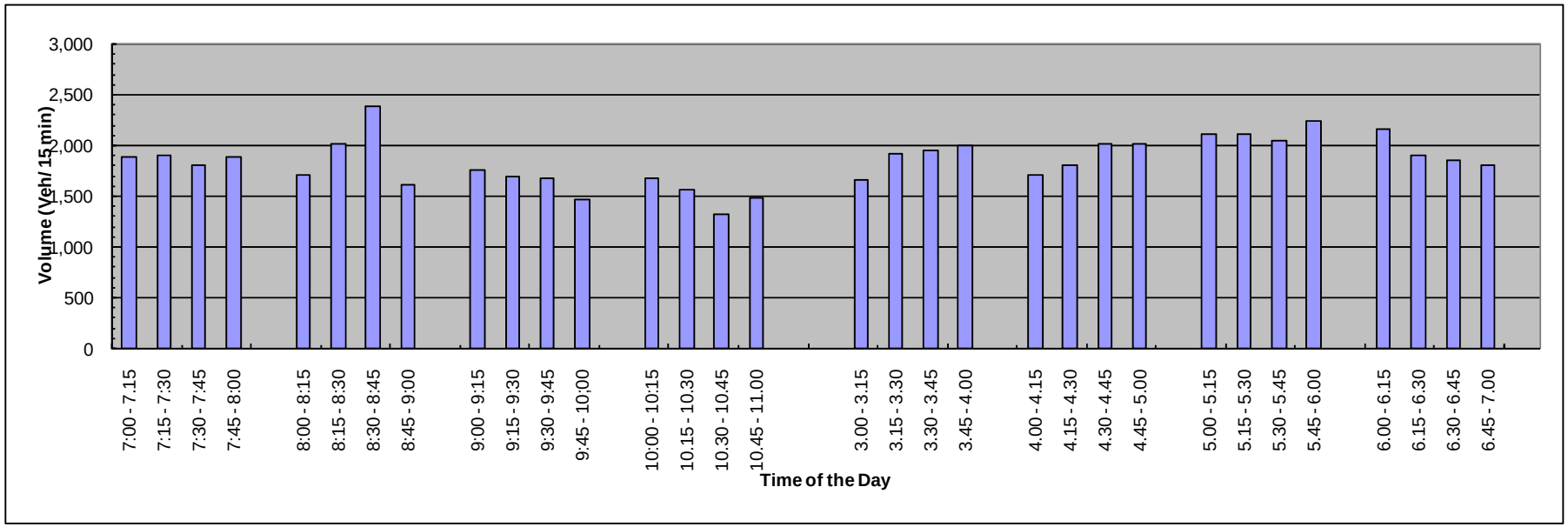


Figure 2.16: P4 – Suez Desert Road / Between KM 4.5 and Ring Road

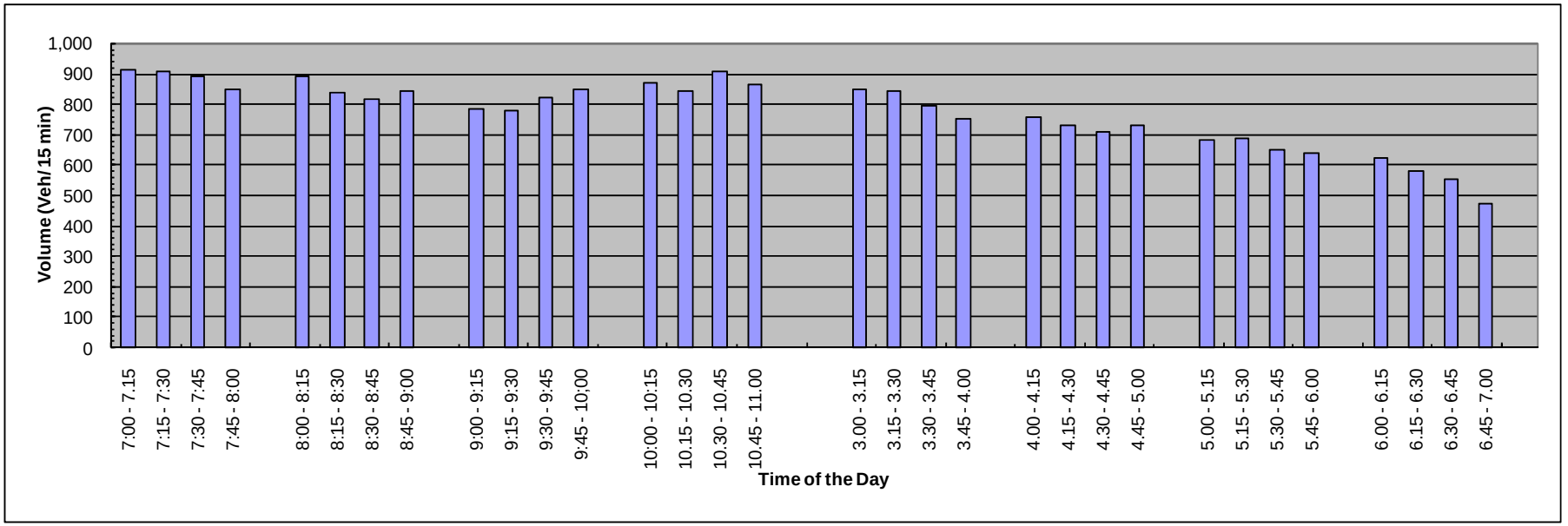


Figure 2.17: P5 – Ring Road / Above Cairo-Alex Desert Road

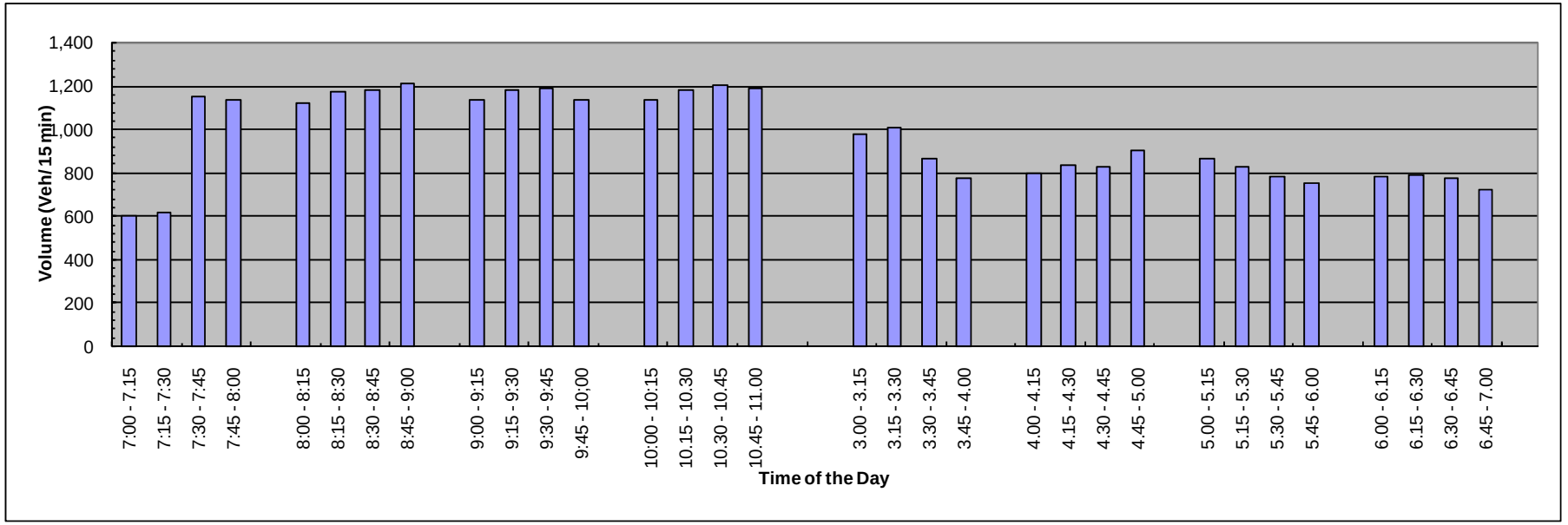


Figure 2.18: P6 – 26th July / Between Railway and Ring Road

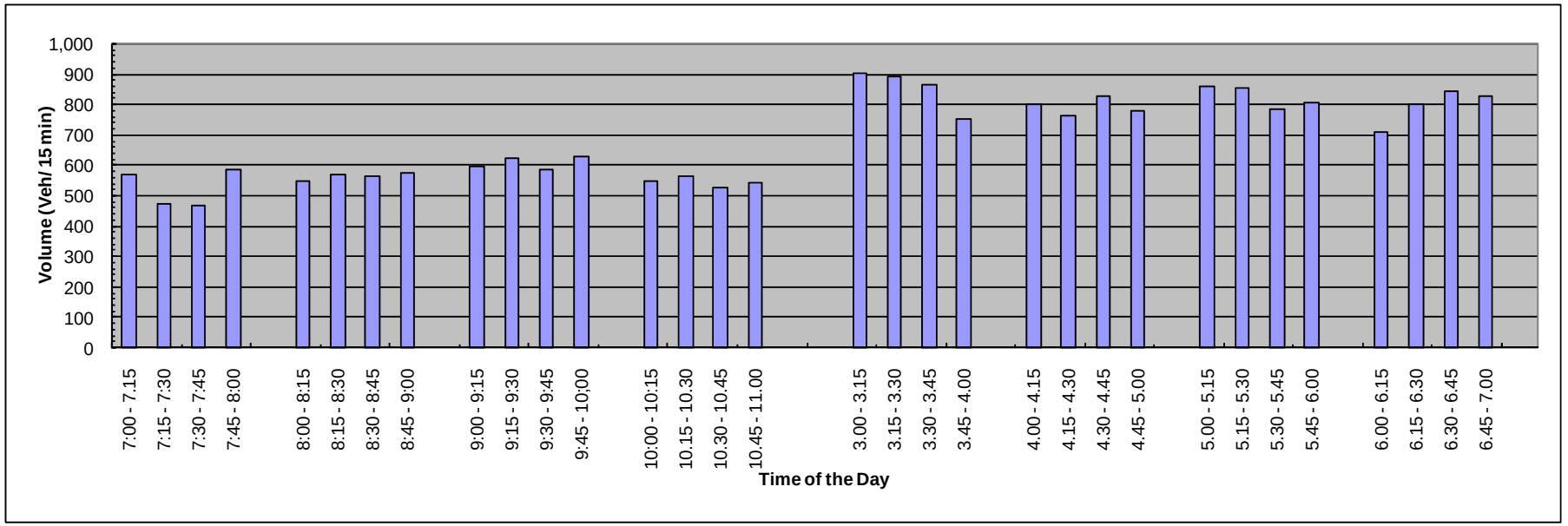


Figure 2.19: P7 – Al-Ahram Street / Electricity Station

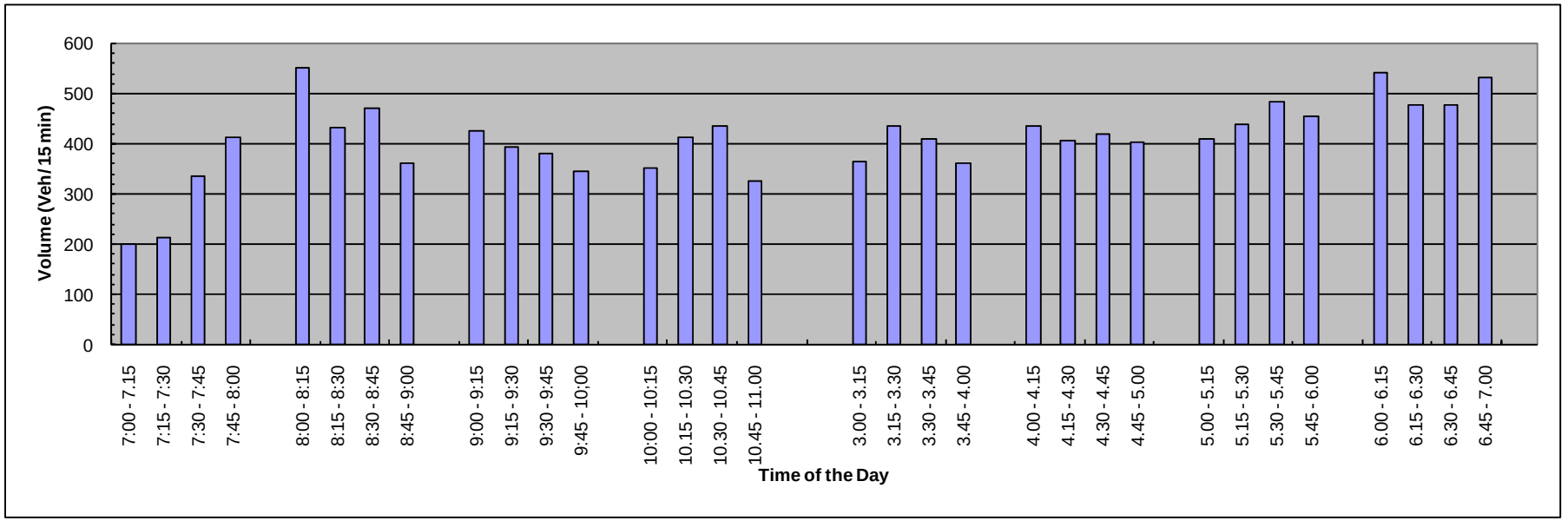


Figure 2.20: P8 - Middle of Abbas Bridge

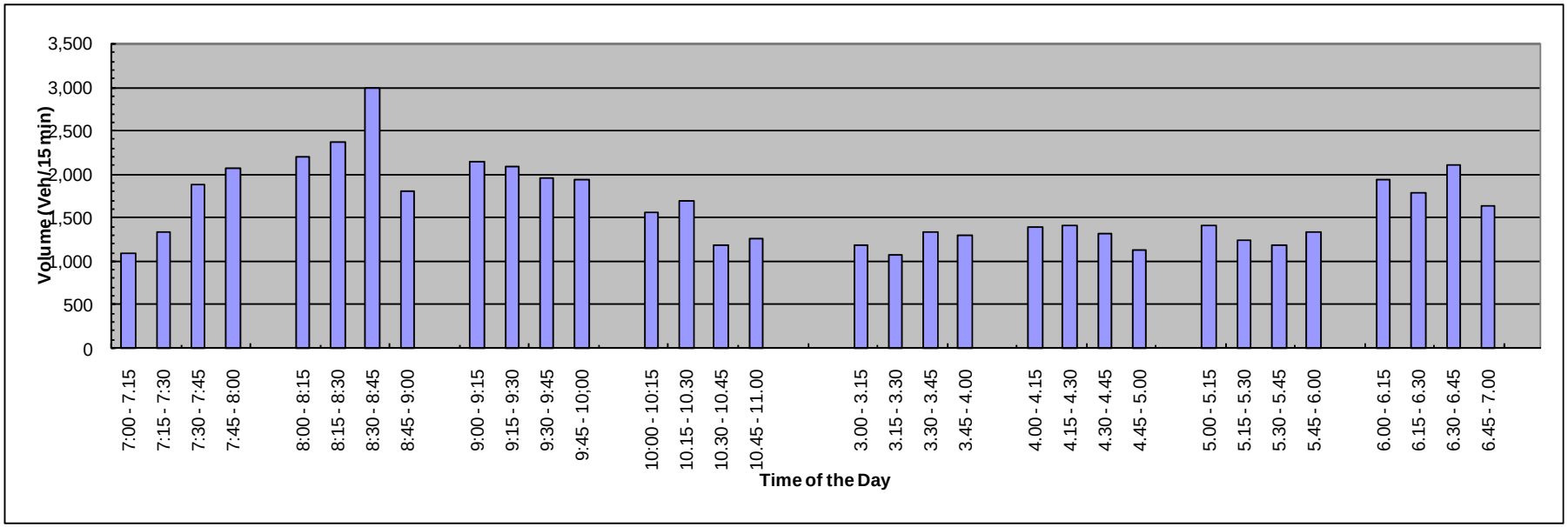


Figure 2.21: P9 - 6 October Bridge between Zamalk and Agozah

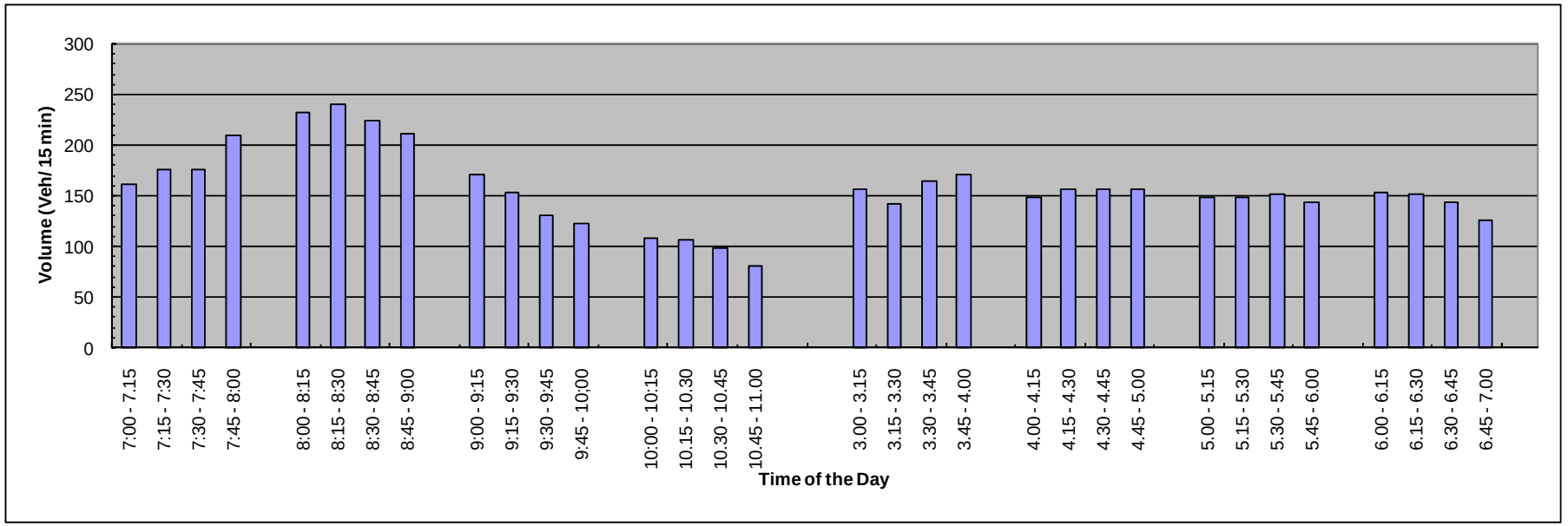


Figure 2.22: P10 - Ahmed Helmy Str./ Before Abou Wafya Bridge

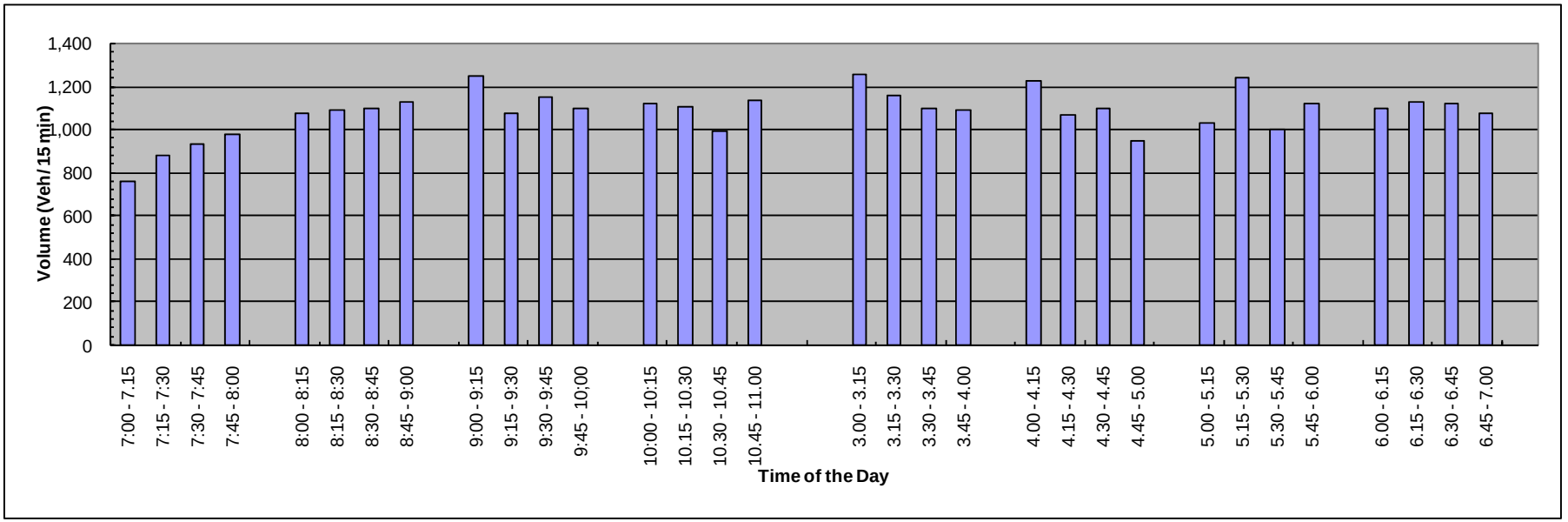


Figure 2.23: P11 – Ramses St. between Ghmara and Ahmed Said St. (One Way to Abasia)

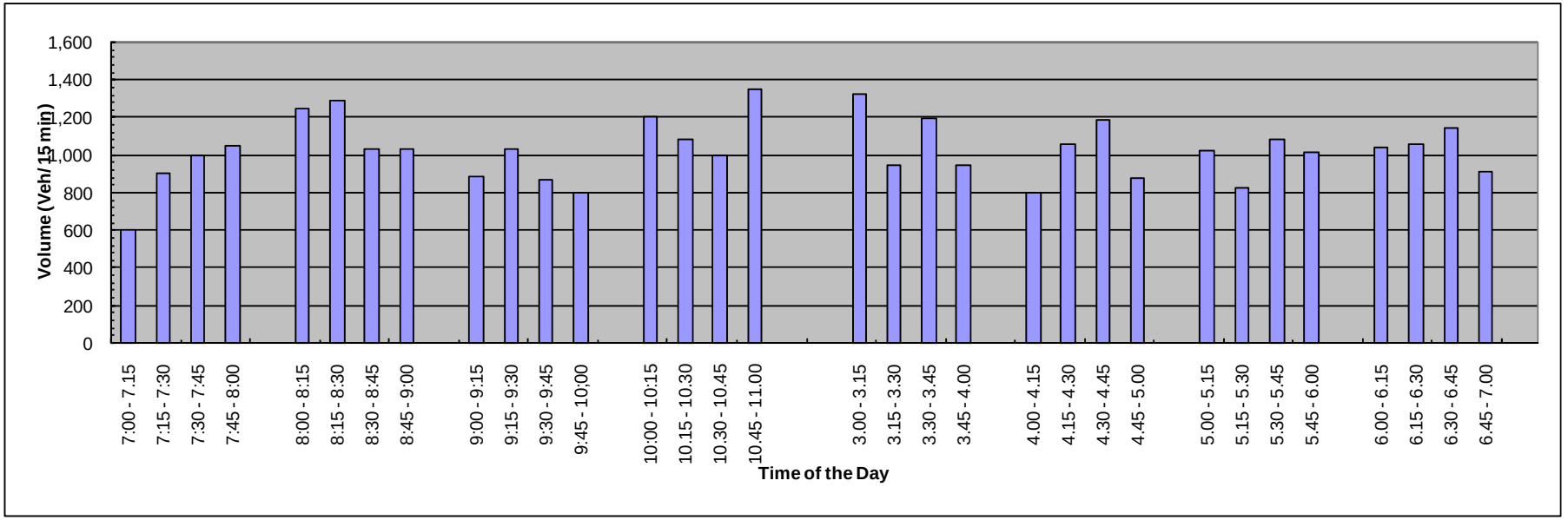


Figure 2.24: P12 - Lotifi Al Said St. between Abasia and Ghamrah (One Way to Ramses Square)

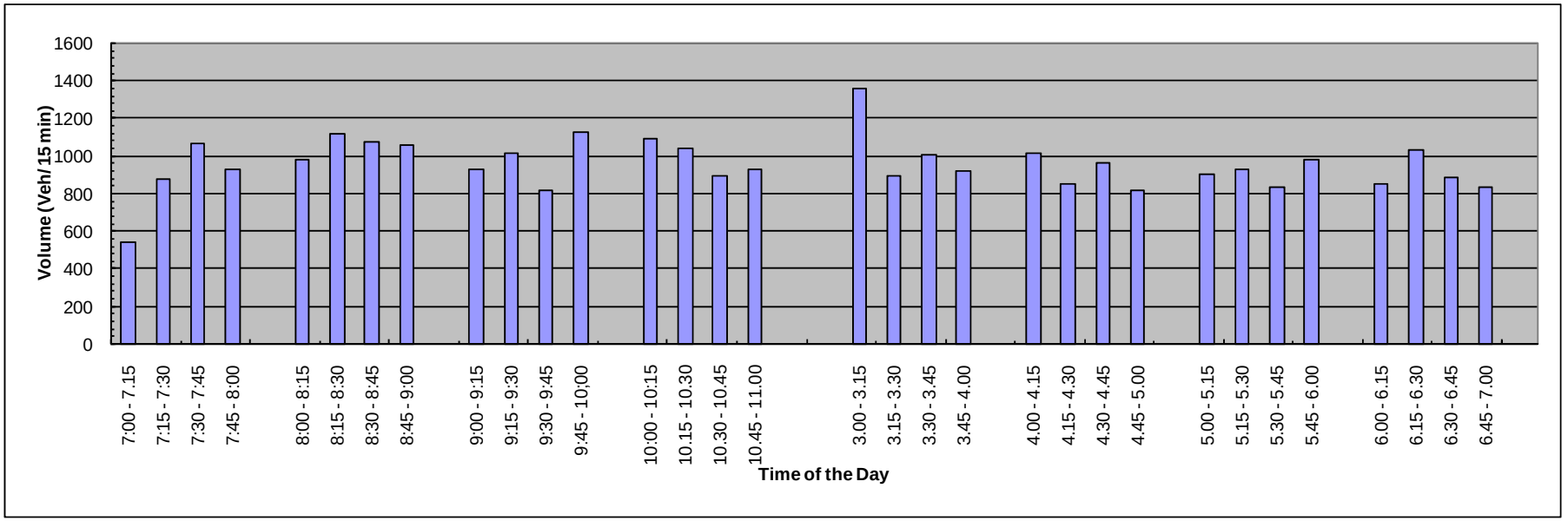


Figure 2.25: P13 - Salah Salem Str./Between Elfangary and Abbasey

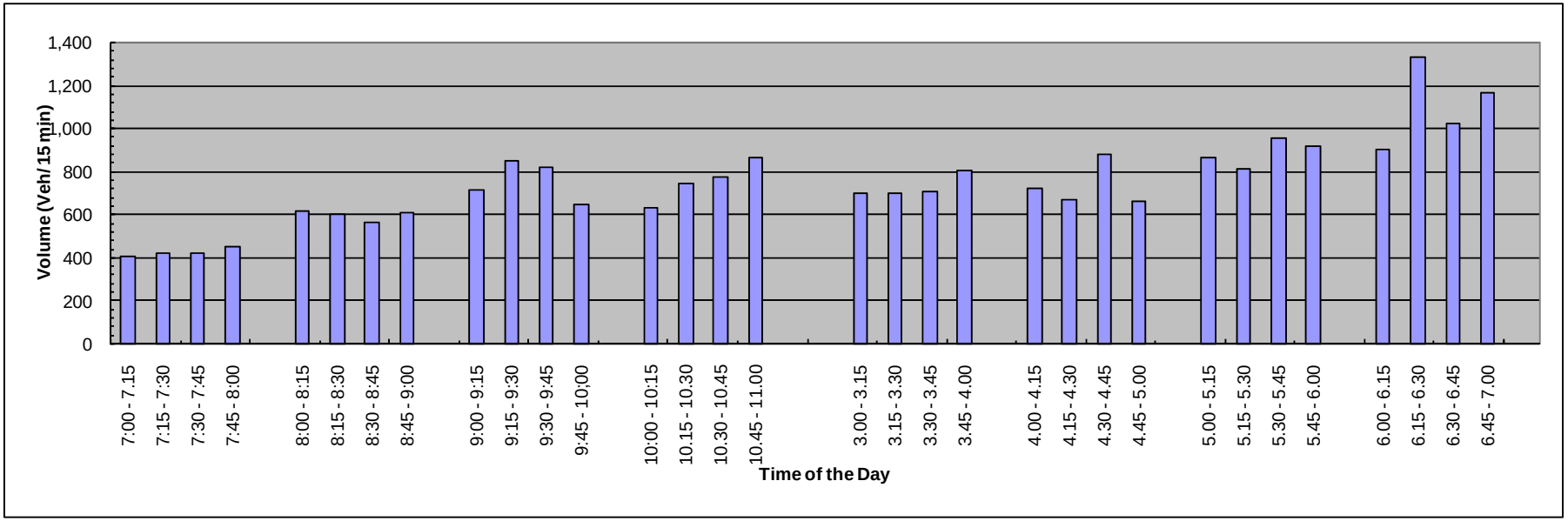


Figure 2.26: P14 – Kornish El-Nil /Between 15th May & El-Sahel Brdg

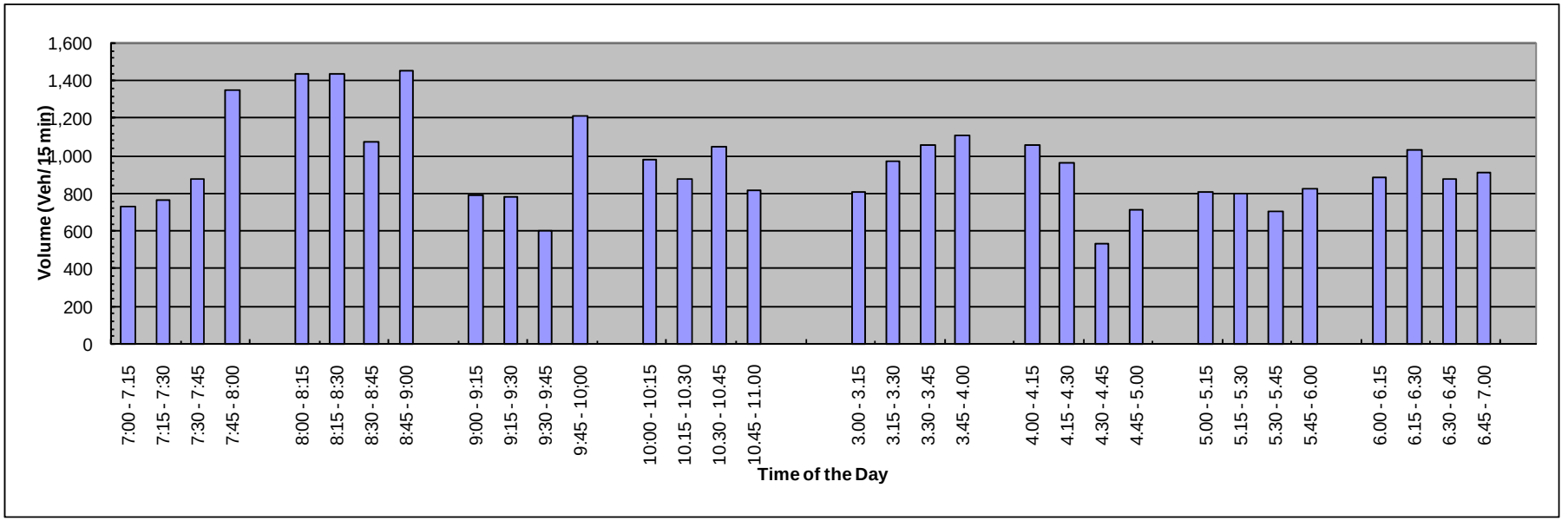
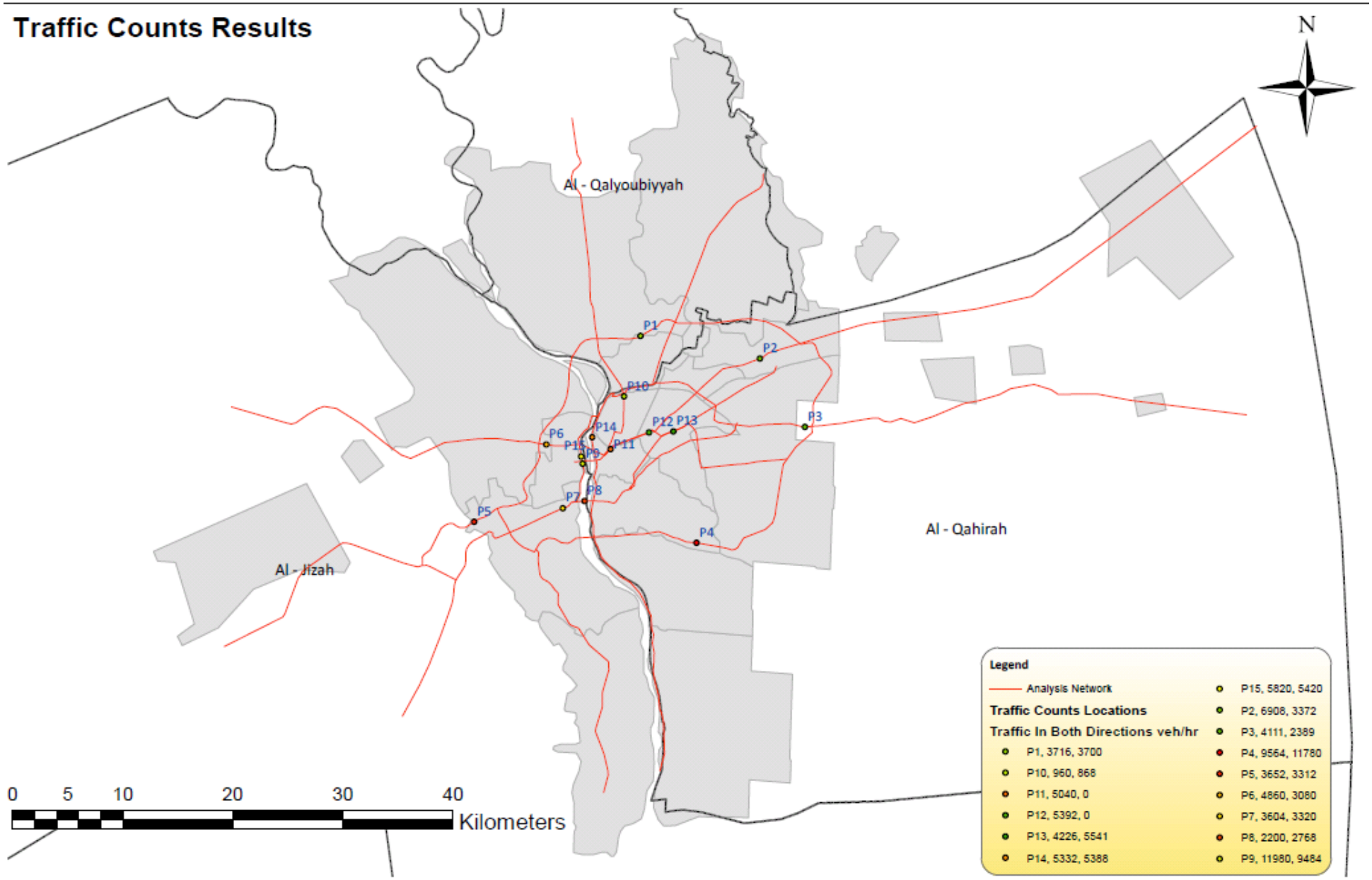


Figure 2.27: P15 – Gamal Abd El-Naser (El-Nile str)/Cornishe El- Agouza


Traffic Counts Results
N
Al - Qalyoubiyyah
Al - Qahirah
Al - Jizah
P1
P2
P3
P4
P5
P6
P7
P8
P9
P10
P11
P12
P13
P14
P15
0 5 10 20 30 40
Kilometers
Legend
Analysis Network
Traffic Counts Locations
Traffic In Both Directions veh/hr
P1, 3716, 3700
P10, 960, 868
P11, 5040, 0
P12, 5392, 0
P13, 4226, 5541
P14, 5332, 5388
P15, 5820, 5420
P2, 6908, 3372
P3, 4111, 2389
P4, 9564, 11780
P5, 3652, 3312
P6, 4860, 3080
P7, 3604, 3320
P8, 2200, 2768
P9, 11980, 9484

Classified vehicle counts were performed on locations of P3 (Suez Desert Road / Between KM 4.5 and Ring Road) and P13 (Salah Salem Str./Between Elfangary and Abbaseya), while vehicle counts on the remaining locations were non-classified.

Figure 2.28 below gives some indication about the modal split on the roads in Greater Cairo based on the classified vehicle counts performed on locations P3 and P13. It appears that road traffic is dominated by private cars with a share of 70%, followed by taxis with 15% share, then the microbuses and minibuses with 7%, while the big buses make up only 1% of the traffic. Small trucks and heavy trucks constitute 5% and 2% of road traffic respectively.

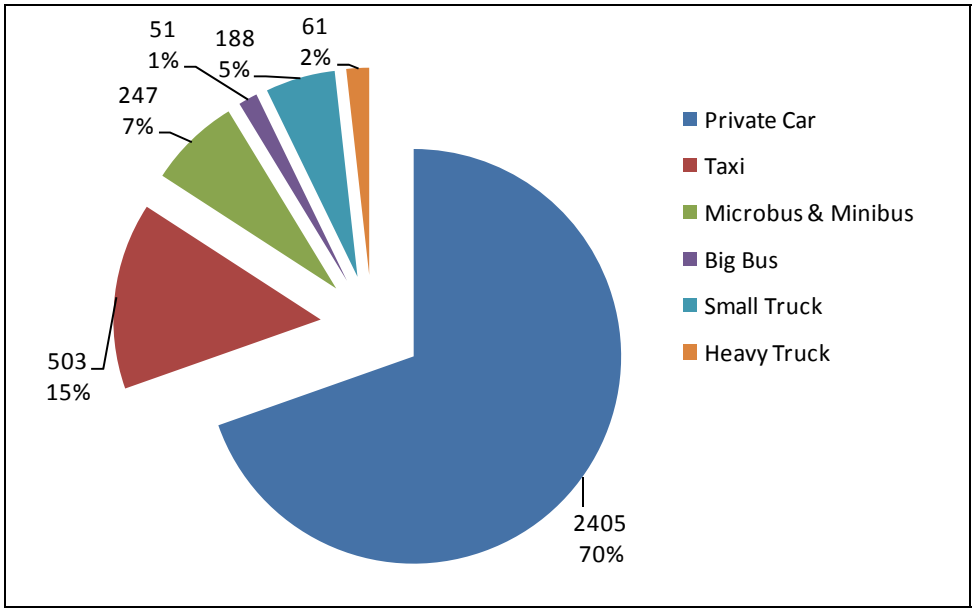


Figure 2.28: Modal Split according to the Classified Vehicle Counts

2.11 Trend Analysis of Travel Characteristics (2005-2010)

2.11.1 Changes in Modal Split

As mentioned in Section 2.10 of this Report classified vehicle counts at the following two locations have been carried out:

- P3: Suez Desert Road / Between KM 4.5 and Ring Road
- P13: Salah Salem Street/Between Elfangary and Abbasia

The resulting modal distributions are compared with those of the "Public-Private Partnership Program for Cairo Urban Toll Expressway Network Development" study at the same locations, based on a survey conducted in 2005.

For the sake of comparison, the compositions related to the following modes were considered equivalent:

2005	Private Car	Taxi	Microbus	Minibus	Public bus	Private bus	Pickup	2 Axle Truck	3 Axle Truck	> 3 Axle Truck
2010	Private Car	Taxi	Microbus and Minibus		Big Bus		Small Truck		Heavy Truck	

The modal splits at Suez Desert Road are illustrated in the following pie charts:

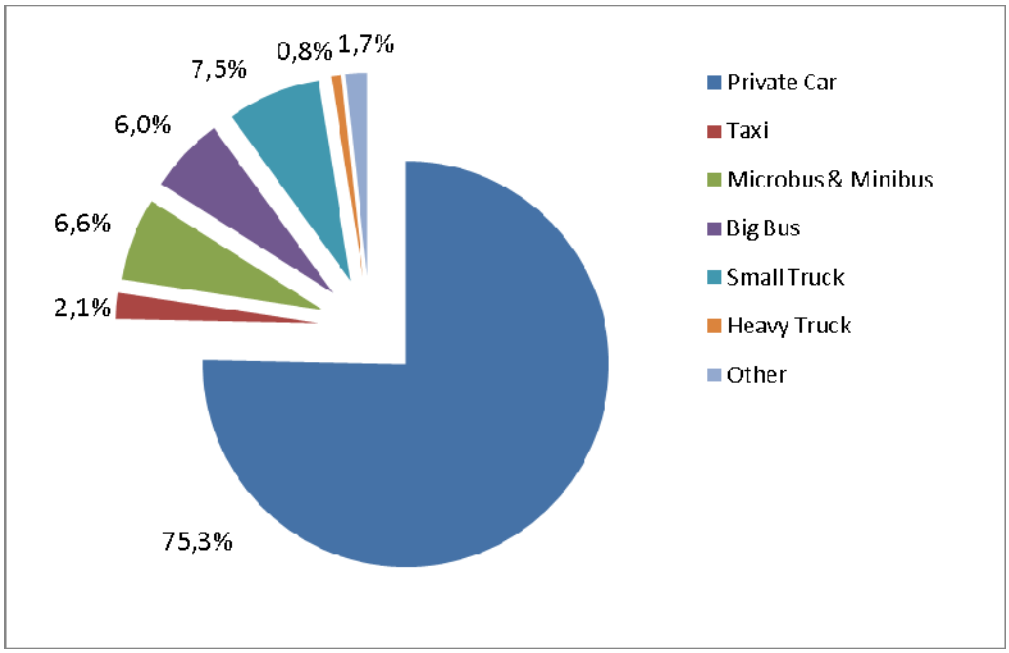


Figure 2.29: Modal Split according to 2005 Survey on Suez Desert Road

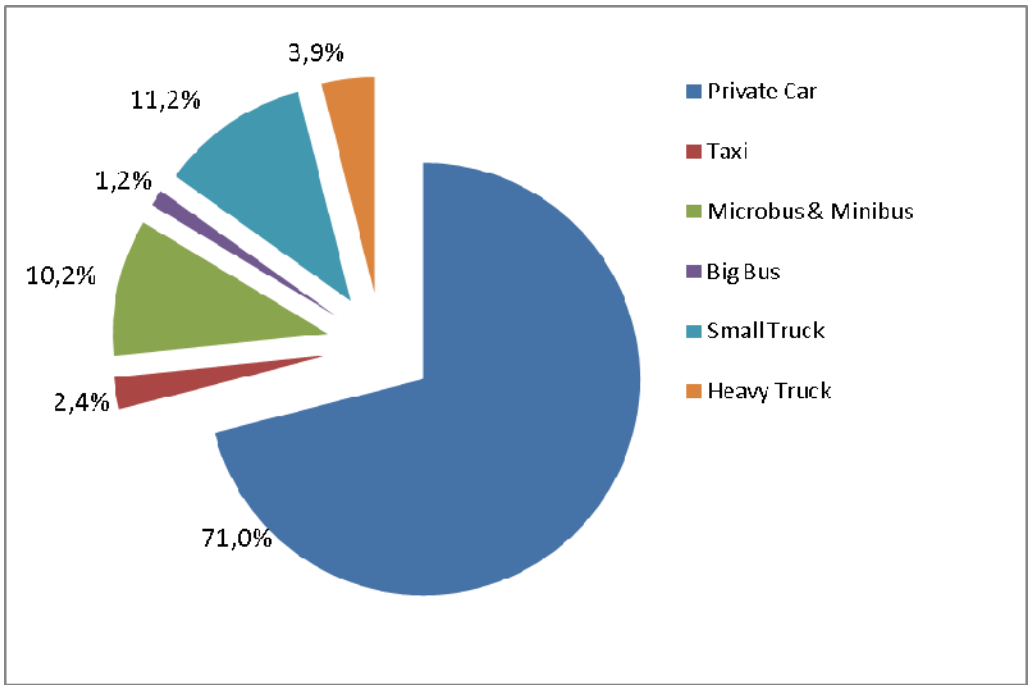


Figure 2.30: Modal Split according to 2010 Survey on Suez Desert Road (P3)

A moderate decrease is observed in the share of passenger cars (around 4%), which continues to be the highest among other transport modes share in 2010. The taxi use seems to have slightly increased by 0.3% while the use of microbuses and minibuses has increased by 3.6%. The big bus share however has decreased from 6% to 1.2%, which could be due to some shift to taxi, microbus and minibus throughout the past 5 years. The shares of small and heavy trucks have increased by 3.7% and 3.1% respectively.

The modal splits at Salah Salem Street are illustrated in the following pie charts:

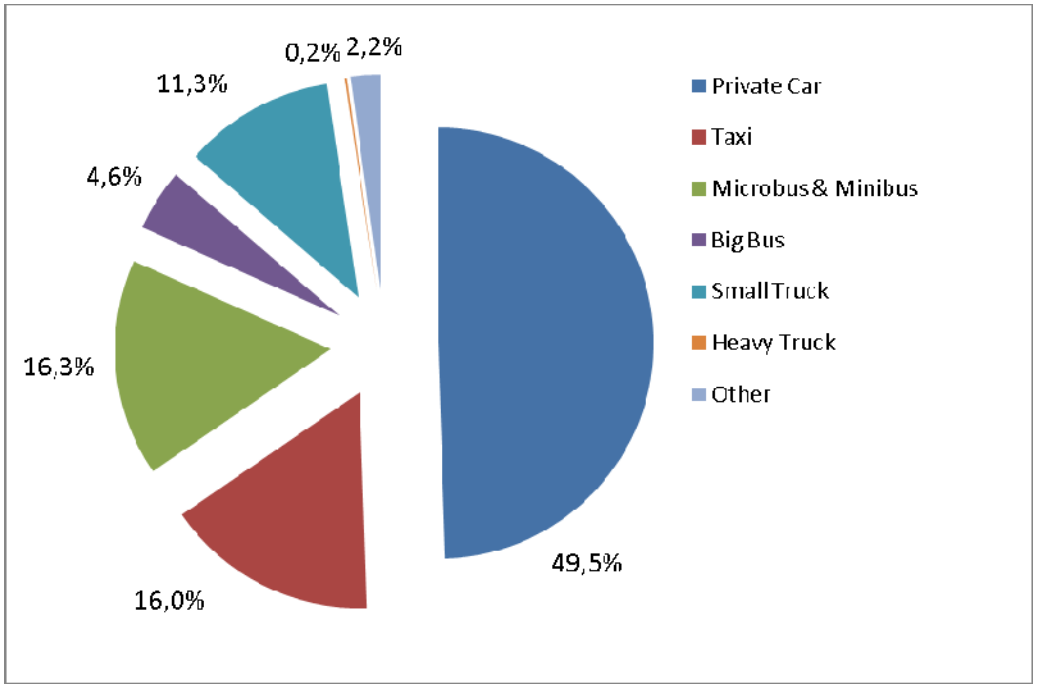


Figure 2.31: Modal Split according to 2005 Survey on Salah Salem Street

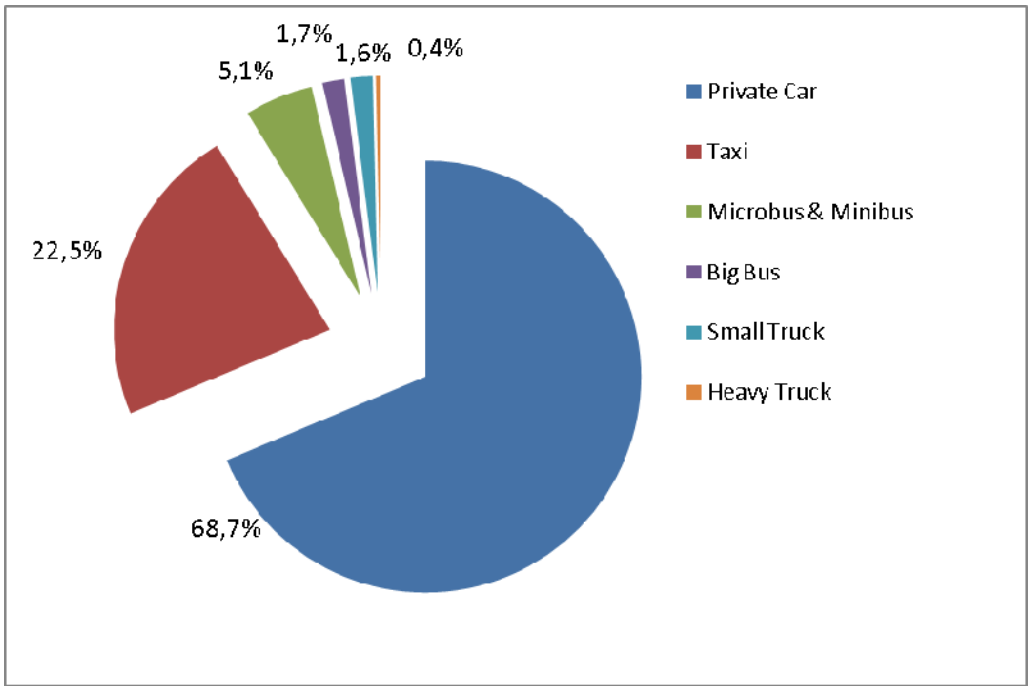


Figure 2.32: Modal Split according to 2010 Survey on Salah Salem Street (P13)

Differently from the results shown on the above-mentioned location, the private car share on Salah Salem Street was originally around 50% in 2005, compared to 75% on Suez Desert Road. Yet this share increased to 69% in 2010, implying the persistence of the undesirable situation of car dominance. The taxi share increased notably from 16% in 2005 to 23% in 2010. However, the overall bus utilization including microbus, minibus and the big bus, has dropped significantly by around 11% at this location. The construction of a new metro station is taking place in this area, which could have caused a temporary change in bus routes. While the share of small trucks decreased unaccountably by some 10%, the number of heavy trucks almost doubled.

Finally, if we compare the overall modal split charts, on one hand the average modal composition based a survey of 11 corridors in 2005[4] and on the other hand the one based on the classified vehicle counts performed in 2010, it may be concluded that:

- The share of passenger cars is not only the highest but in a continuous increase
- The taxi share increased by less than 1.5%
- The overall microbus and minibus share almost doubled
- The big bus share dropped by more than 3%
- The number of small trucks decreased by around 6%,
- The number of heavy trucks decreased by around 7%

The decrease in the number of trucks could be a result of banning them from using most of the city roads during working hours.

[4] Public-Private Partnership Program For Cairo Urban Toll Expressway Network Development study

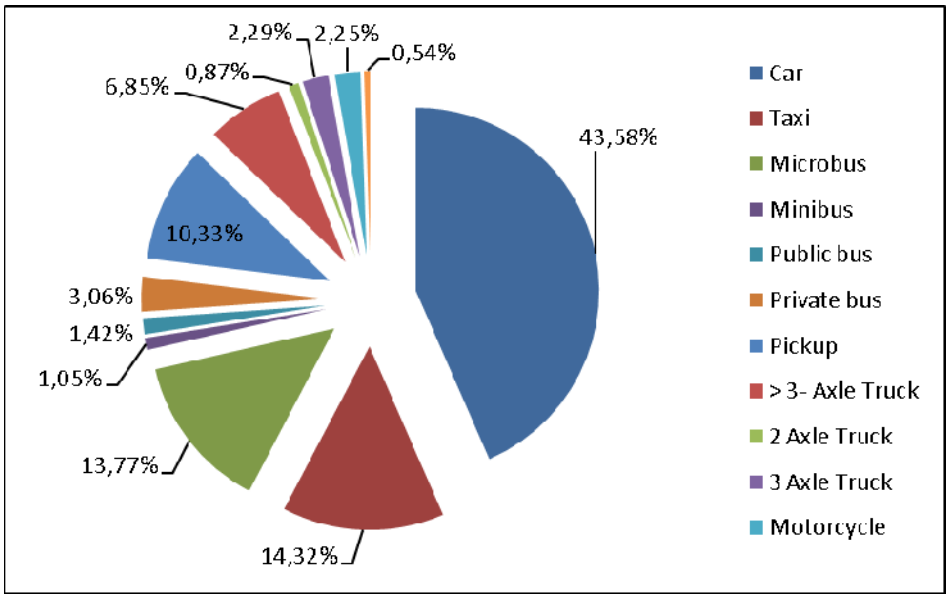


Figure 2.33: Average Modal Split – 2005

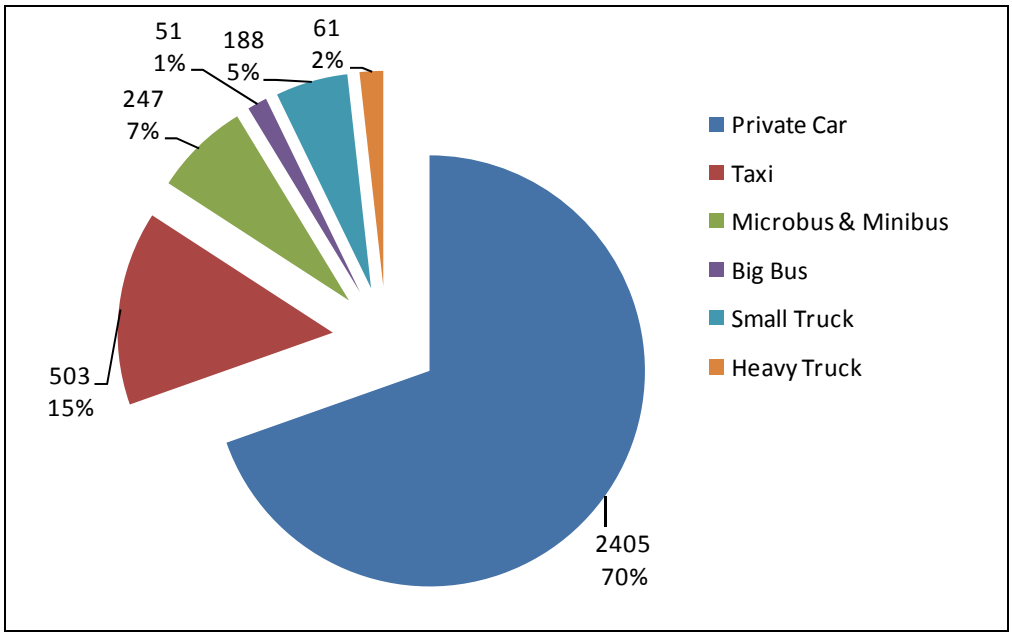


Figure 2.34: Modal Split - 2010

2.11.2 Changes in Traffic Patterns

To develop an idea about the changes in traffic patterns in the past 5 years, the following two data sources were compared:

a. 2005 data, as per the survey in the JICA Study (Cairo Urban Toll Expressway Network Development), presented in Table 2.9

b. 2010 data obtained from the survey of Cairo Congestion Study, and presented in Tables 2.11 and 2.12.

In order to compare the results of 2005 and 2010 surveys, the following common traffic counts locations were identified:

Table 2.13: Comparable Traffic Count Locations

Code	Traffic Count Location (WB Study-2010)	Traffic Count Location (JICA Study-2005)
P1	Ring Road / Between El Khosoos & Cairo-Alex Agr.Rd	Warraq Bridge (TC no.1)*
P2	Gesr El-Suez/between Ring Road and Ainshams Str.	Gesr El Suez St (TC no.18)
P3	Suez Desert Road / Between KM 4.5 and Ring Road	Suez Desert Road (TC no.12)
P6	26th July / Between Railway and Ring Road	26th of July Corridor (TC no.11)
P8	Middle Abbas Bridge	Giza Bridge (TC no.8)
P9	6th October Bridge / Zamalek-Agouza	6th October Bridge (TC no.5)
P10	Ahmed Helmy Str./ Before Abou Wafya Bridge	Ahmed Helmy (TC no.24)
P11	Ramsis Str./Between Ghamra and Ramsis Srq	Ramsis St (TC no.25)
P12	Lotfy El-Sayed/between Abaseya&Demerdash Metro stn	Lotfy El sayed (TC no.22)
P13	Salah Salem Str./Between Elfangary and Abbaseya	Salah Salem Road (TC no.26)

*** locations are not exactly similar but volumes maybe comparable**

Based on the above, the average traffic volumes per direction were compared at each location for the same peak periods (7:00 to 11:00 AM and 3:00 to 7:00 PM) as shown in the following tables.

Table 2.14: Comparison between 2005 and 2010 Traffic Count Surveys Data: Average Traffic Volumes per Direction for the AM Peak Period (7:00 to 11:00)

Traffic Count Number & Road Name		Direction	2010 (veh/hr)	2005 (veh/hr)	Percent Difference
P1	Ring Road / Between El Khosoos & Cairo-Alex Agr.Rd	To East Cairo	3,299	1,674	97%
		To West Cairo	3,212	1,271	153%
P2	Gesr El-Suez/between Ring Road and Ainshams Str.	To CBD	5,708	1,576	262%
		To Ismailia	2,766	1,952	42%
P3	Suez Desert Road / Between KM 4.5 and Ring Road	To Cairo	3,051	1,204	154%
		To Suez	1,890	1,314	44%
P6	26th July / Between Railway and Ring Road	To Cairo	4,389	3,562	23%
		To 6th Oct City	2,398	2,812	-15%
P8	Middle of Abbas Bridge	To Cairo	1,512	2,328	-35%
		To Giza	2,022	2,452	-18%
P9	6 October Bridge between Zamalk and Agozah	To Al Mohandeseen &Al Doki	7,400	6,346	17%
		To Cairo-Alx Agr Rd	7,154	11,823	-39%
P10	Ahmed Helmy Str./ Before Abo Wafya Bridge	To Shobra	651	733	-11%
		To Ramsis	497	1,616	-69%
P11	Ramses St. between Ghmara and Ahmed Said St. (One Way to	To Abasiah (1 way)	4,244	1,772	139%

	Abasia)				
P12	Lotifi Al Said St. between Abasia and Ghamrah (One Way to Ramses Square)	To Ramses Sq (1 way)	4,093	3,696	11%
P13	Salah Salem Str./Between Elfangary and Abbasey	To Abasiah	3,873	3,367	15%
		To Cairo Airport	3,600	2,399	50%

Table 2.15: Comparison between 2005 and 2010 Traffic Count Surveys Data: Average Traffic Volumes per Direction for the PM Peak Period (3:00 to 7:00)

Traffic Count Number & Road Name		Direction	2010 (veh/hr)	2005 (veh/hr)	Percent Difference
P1	Ring Road / Between El Khosoos & Cairo-Alex Agr.Rd	To East Cairo	2,968	1,381	115%
		To West Cairo	2,985	2,049	46%
P2	Gesr El-Suez/between Ring Road and Ainshams Str.	To CBD	5,532	2,566	116%
		To Ismailia	2,821	2,455	15%
P3	Suez Desert Road / Between KM 4.5 and Ring Road	To Cairo	3,996	1,250	220%
		To Suez	2,009	1,270	58%
P6	26th July / Between Railway and Ring Road	To Cairo	3,323	3,177	5%
		To 6th Oct City	2,499	2,252	11%
P8	Middle of Abbas Bridge	To Cairo	1,765	2,723	-35%
		To Giza	2,464	2,977	-17%
P9	6 October Bridge between Zamalk and Agozah	To Al Mohandeseen and Al Doki	5,695	6,860	-17%
		To Cairo-Alx Agr Rd	3,197	8,426	-62%
P10	Ahmed Helmy Str./ Before Abo Wafya Bridge	To Shobra	606	1,143	-47%
		To Ramsis	726	1,055	-31%
P11	Ramses St. between Ghmara and Ahmed Said St. (One Way to Abasia)	To Abasiah (1 way)	4,448	2,562	74%
P12	Lotifi Al Said St. between Abasia and Ghamrah (One Way to Ramses Square)	To Ramses Sq (1 way)	4,111	2,937	40%
P13	Salah Salem Str./Between Elfangary and Abbasey	To Abasiah	3,773	2,484	52%
		To Cairo Airport	5,454	3,416	60%

Most of the changes in traffic patterns can be attributed to variants in terms of transport demand and supply and land use characteristics within the last 5 years. The following major changes were identified in the GCMA:

1. Population growth in new cities on the peripheral areas of the Ring Road (6th of October, El Obour, El Rehab, etc). However, many of the new settlers still work in the CBD, implying the central area surrounded by the Ring Road.

2. With many residents leaving the central area to the GCMA periphery, an expansion in commercial and business activities is observed in certain areas such

as El-Mohandeseen and El Doki. The use of many residential facilities has been transformed into commercial and/or business, resulting in an extended CBD.

The changes in demand and land use mentioned in points 1 and 2 explain some of the observed increase in traffic volumes during the AM peak (to work trips) on the corridors leading to the extended CBD such as (26th of July in the direction to Lebanon square). Consequently there is an increase in the PM peak going out form the extended CBD.

3. A major change in supply has been perceived with the opening of the new Maryottya corridor that connects El Moneeb Bridge and the Ring Road. The new corridor has attracted a large portion of traffic going from/to the south (El Maadi and Helwan) and east areas (Nasr city) to/from the west area (6th of October City and Cairo/Alexandria Desert Road). This major supply change caused the reduction in traffic volumes along major routing alternatives such as (Abbas Bridge, 6th of October Bridge, etc).

4. Upgrading El Khalafaway corridor (north of Shobra and Ein Shams areas) into a limited access travel corridor. This corridor currently attracts traffic from surrounding areas; reducing their traffic load. The corridor also facilitates access to the north/west sections of the Ring Road in the vicinity of Cairo/Alexandria Agricultural Road.

5. A remarkable increase in car ownership in GCMA.

With reference to Table 2.14, it is clear that traffic in the AM period has increased remarkably on most traffic count locations including:

- The Ring Road, Between El Khosoos and Cairo Alex Agricultural Road in both directions. Such increase may have resulted from the changes identified in points 1, 4 and 5 described above.Gesr El Suez, between Ring Road and Ain Shams Street in both directions (points 1, 4, 5)
- Suez Desert Road, between KM 4.5 and Ring Road in both directions (points 1 and 5)
- 26th July Corridor, between Railway and Ring Road in the direction of Central Cairo (points 1, 2 and 5)
- 6th October Bridge in the direction of Al Mohandeseen and Al Doki (points 2 and 5)
- Ramses St. between Ghmara and Ahmed Said Street, in the direction to Abasia (points 2 and 5)
- Lotifi Al Said Street between Abasia and Ghamrah, in the direction to Ramses Square (points 2 and 5)
- Salah Salem Street, between Elfangary and Abbasey in both directions (points 2 and 5)

On the other hand, traffic has decreased on the following links:

- Abbas Bridge in both directions (attributed to the change identified in point 3)
- 6th October Bridge in the direction of Cairo-Alexandria Agricultural Road (points 3 and 4)

- Ahmed Helmy Street in both directions (attributed to the change identified in point 4, in addition that only one-way movement of traffic is currently allowed one a large segment of Ahmed Helmy street)
- 26th July Corridor in the direction of 6th October City (points 1, 2 and 3)

As seen in Table 2.15 above, the differences in traffic volumes in the PM period are generally consistent with those in the AM Period, in other words, traffic has increased or decreased at almost the same count locations, but the magnitude of the difference has sometimes switched directions. The exceptions are:

- 26th July Corridor in the direction of 6th October City: traffic decreased in the AM period by 15%, but increased at the same location by 11% during the PM peak period
- 6th October Bridge in the direction of Al Mohandeseen and Al Doki: traffic increased in the AM period by 17%, but then decreased at the same location by 17% during the PM peak period

The highest increase (220%) is observed at Suez Desert Road in the direction of Cairo. The highest decrease (-62%) is however seen at the 6th of October Bridge in the direction to Cairo-Alexandria Road.

Peak Hour Factor

The peak hour factors (PHF) calculated on the selected corridors based on the latest survey results generally range between 0.85 and 0.95, which is typical for urban peak hour conditions.

In comparison with JICA study, the PHF increased on five out of eight locations as shown in the table below, from an average of 0.81 (2005) to 0.91 (2010), implying more variation of the traffic volumes within the peak hours at these locations. On the other hand, the PHF decreased at the three remaining locations from an average of 0.94 (2005) to 0.90 (2010), but this drop can be considered as minor since the factors are still within the same range.

Table 2.16: Comparison of Peak Hour Factors at Traffic Count Locations

Code	Traffic Count Location	PHF (WB Study-2010)	PHF (JICA Study-2005)
P1	Ring Road / Between El Khosoos & Cairo-Alex Agr.Rd	0.93	0.72
P2	Gesr El-Suez/between Ring Road and Ainshams Str.	0.92	0.87
P6	26th July / Between Railway and Ring Road	0.91	0.84
P8	Middle Abbas Bridge	0.89	0.93
P9	6th October Bridge / Zamalek-Agouza	0.86	0.78
P10	Ahmed Helmy Str./ Before Abou Wafya Bridge	0.92	0.86
P11	Ramsis Str./Between Ghamra and Ramsis Srq	0.93	0.94
P12	Lotfy El-Sayed/between Abaseya&Demerdash Metro Stn	0.87	0.95

2.11.3 Changes in Peak Hours

According to the Public-Private Partnership Program for Cairo Urban Toll Expressway Network Development traffic count survey (May 2006), and as shown in Section 2.6, traffic peak periods in GCMA are as follows:

- The morning peak (07:00 – 9:00)
- The afternoon peak (13:00 – 16:00)
- The evening peak (20:00 – 21:00)
- The period (10:00 – 12:00) was observed to have the peak traffic volume in some locations (e.g., 15th of May Bridge)

The current study's survey took place during the following peak periods:

- Morning peak period: 7:00 am to 11:00 am
- Afternoon peak period: 3:00 pm – 7:00 pm

The following observations could be made:

- The highest peak during the morning period occurs from 8 to 9 at most traffic counts locations, which is consistent with the highest peak identified in 2005 as 7:00 to 9:00 AM.
- According to 2010 data, volumes are comparable in the different afternoon hours and there does not seem to be any specific peaking pattern.
- Additionally, as per 2010 data, congested conditions in the afternoon peak period are more widespread across the network relative to the morning peak period.
- What has notably changed from 2005 till 2010 is that the afternoon peak period has shifted from (13:00 – 16:00) to (15:00-18:00 pm)

2.12 Overview of additional existing data

The following remaining data items listed in Table 2.have not yet been addressed:

A) The total number of vehicles (by type)
B) Public transport capacity, fleet composition and age
C) Accident data and information
D) Unit vehicle operating cost
E) Fuel cost
F) Household income and value of time
G) Car ownership
H) Percentage of daily traffic in peak hour
I) Passenger Car Unit (PCU)
J) Vehicle Occupancy Factor
K) OD Matrix (by Mode)

It is noted that only a few of these data items are actually needed to calculate the economic costs of congestion (Chapter 4), namely E) Fuel cost, F) value of time, H) Percentage of daily traffic in peak hour, I) Passenger car units and J) Vehicle Occupancy

Factor. The other data items are interesting to present to get a comprehensive overview of the urban transport situation in Cairo; however these are not crucial for the calculation.

In Annex 3 the detailed information on all data items is presented.