Government of the People's Republic of Bangladesh

Report on

TRAFFIC ACCIDENT STUDY IN DHAKA CITY

(2007-2011)

Contract Package Number: DCC-S4B

Implemented by

CLEAN AIR AND SUSTAINABLE ENVIRONMENT (CASE) PROJECT
Dhaka South City Corporation (DSCC)
and
Dhaka North City Corporation (DNCC)

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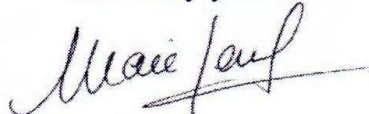
June 7, 2012

June 22, 2012

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Clear Air and Sustainable Environment Project (Cr-4581 BD)
Draft Report on Traffic Accident Survey in Dhaka City (2007-2011)

Dear Mr. Ullah:

We thank you very much for sending to us on June 13, 2012 a copy of the above report. We have found the report very satisfactory and would like to congratulate Mr. Bayes Ahmed for his work. Our main recommendation is to see the recommendation of this report included in various work packages under the project.

Sincerely yours,

Maria Sarraf
Task Team Leader, CASE

cc: Dr. M. Nasiruddin, Joint Secretary (Dev) and CASE Project Coordinator, MOEF
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Abstract

Road traffic accidents are the world's number one cause of death among young people between 16 and 24. Bangladesh has one of the highest fatality rate in road accidents in the world. Moreover, Dhaka, the capital of Bangladesh, is the most vulnerable city both in terms of total number of accidents and accident rates. A total number of 2,720 accidents occurred within 2007-2011. This has caused a total of 1,481 numbers of pedestrian fatal accidents with 1,562 pedestrian fatal casualties.

At this backdrop, road safety problem has become one of the major issues for the transport regulators and traffic law enforcers in Dhaka. Therefore it is much needed to identify the most accident prone roads, the victims as well the in-depth reasons for traffic accident.

The people's republic of Bangladesh has received a credit in the amount of about US$ 62.2 million from the International Development Association (IDA) towards the cost of Clear Air and Sustainable Environment (CASE) Project to be implemented by Dhaka City Corporation (both South and North components).

The objective of the project is to reduce the traffic congestion by improving traffic flows in Dhaka City with a target of 10% reduction in traffic accident and 10% increase of traffic mobility at the end of the project.

Significant progress in crash reduction can be achieved through a comprehensive information system of traffic accident database and analyzing it properly. Therefore, the primary objective of this research work is to develop comprehensive road accident related maps/database (2007-2011) using Geographic Information System (GIS) software for Dhaka City. The data (Accident Reporting Forms) have been collected from Dhaka Metropolitan Police (DMP) Headquarter.

In this study, the road safety situation and trends of DMP area have been discussed elaborately. It also discusses some contemporary issues and priorities in addressing the road safety problems.

The findings of this study are as follows:

1. Most accidents are occurring in the major arterial roads of Dhaka City, not in the tertiary access roads.
2. Indiscriminate use of footpath, uncontrolled pedestrian crossing, unskilled drivers and lack of adequate penalty are the major reasons for traffic accidents.
3. Dhaka Metropolitan Police is the only Government authorized legal source for collecting accident information.
4. Under-reporting, under-recording and improper transcription of accident reporting forms are some of the major drawbacks for accident data collection.
5. On an average, the total numbers of traffic accidents are reducing by 11% each year.
6. Fatal accidents and motor collisions are decreasing while injury accidents are increasing.
7. Approximately 95% of the total accidents take place in the selected 30 roads.
8. The top most accident prone roads are 'Dhaka-Mymensing' Road, 'Airport' Road, 'Mirpur' Road, 'Dhaka-Chittagong' Highway and 'Beribadh' Road.
9. No profound effect of weather/season on road accidents is found.
10. Most traffic accidents: cause fatality (69%), hit a pedestrian (60%) and dominant in straight and flat roads (97%).
11. Most traffic accidents occur where there is 'No Junction' (71%), 'No Traffic Control' (63%), in 'One-Way Streets' (73%), where 'Road Dividers' exist (80%), in 'Daylight' (54%) and in 'City Roads' (67%).

Based on the findings of this study, some recommendations related to Engineering, Enforcement, Educational and Emergency Response aspects are made. This kind of research will help generating new ideas to find out the parameters for reducing road traffic accidents in greater Dhaka City. The decision makers as well the transport planners can make appropriate plans based on the outcome of this research study.

Acknowledgement

It is a great pleasure to acknowledge my sincere and greatest gratitude to Engr. Md. Shehab Ullah PEng, Project Director PIU, CASE Project, Dhaka South City Corporation; for his careful supervision, thoughtful suggestions and enduring guidance at every stage of this research study. This work would not be in its current shape without his continuous exertion and support.

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Moreover, my special thanks go to Mr. Kutub Uddin Chisty, student Level-2/Term-1 of the department of Urban and Regional Planning, Chittagong University of Engineering and Technology, Bangladesh for helping me in preparing some tables for appendices.

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Finally yet importantly, I want to express deep gratitude to the officials and staff of CASE Project, Dhaka South City Corporation, Nagar Bhaban, Dhaka; for providing me logistic supports and any other help as required.

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Abbreviations and Acronyms

ARF	Accident Reporting Form
ARI	Accident Research Institute
BIP	Bangladesh Institute of Planners
BRAC	Bangladesh Rural Advancement Committee
BRT	Bus Rapid Transit
BRTA	Bangladesh Road Transport Authority
BTM	Bangladesh Transverse Mercator
BUET	Bangladesh University of Engineering and Technology
CASE	Clean Air and Sustainable Environment
CIPRB	Centre for Injury Prevention and Research, Bangladesh
DCC	Dhaka City Corporation
DMA	Dhaka Metropolitan Area
DMDP	Dhaka Metropolitan Development Plan
DNCC	Dhaka North City Corporation
DOE	Department of Environment
DOS	Disk Operating System
DSCC	Dhaka South City Corporation
DSMA	Dhaka Statistical Metropolitan Area
DTCB	Dhaka Transport Coordination Board
FIR	First Information Report
FOB	Foot Over Bridge

GDP	Gross Domestic Product
GHG	Greenhouse Gas
GIS	Geographic Information System
GOB	Government of Bangladesh
IDA	International Development Association
IDC	Institutional Development Component
IO	Investigating Officer
KSI	Killed and Seriously Injured
LUTP	Leaders in Urban Transport Planning
MAAP	Microcomputer Accident Analysis Package
MRT	Mass Rapid Transit
MV	Motorized Vehicle
NGO	Non-Governmental Organization
NMV	Non-Motorized Vehicle
PM	Particulate Matter
RAJUK	Rajdhani Unnayan Katripakha (Capital Development Authority)
SEI	Sustainable Environmental Initiative
UN	United Nations
WB	World Bank
WHO	World Health Organization

Traffic Accident Glossary

Vehicle

Any motorized or non-motorized vehicle not operating on rails.

Accident

A set of events not under human control originating when control is lost and terminating when control is regained or when all persons and property are at rest and that includes at least one occurrence of injury or damage. A crash involving at least one motor/non-motor vehicle on a roadway that is open to the public.

Driver

An occupant who is in actual physical control of a vehicle or, for an out-of-control vehicle, an occupant who was in control until control was lost. Unless otherwise indicated, the operator of a motor/non-motor vehicle or bicycle.

Fatality

Any injury that results in death within 30 days of the date of the accident.

Fatal Traffic Accident

A traffic crash that results in one or more fatalities within 30 days of the date of accident.

Injury

Hurt, damage, or loss sustained by a person as a result of a traffic crash. Bodily harm to a person that is not a fatal injury.

Injury Traffic Accident

A non-fatal traffic crash that results in one or more injuries.

Motor Collision

An accident involving one or more motor/non-motor vehicles while being utilized to transport persons or property from one place to another on any publicly maintained way or place reserved or commonly employed for such use.

Occupants

Drivers and passengers of automobiles, vans, trucks, buses, and non-motor vehicles. Any person who is part of a vehicle.

Pedestrian

Any person who is not an occupant.

Chapter 1

Introduction

1.1. Background of the Project

More than one-third of the population of Bangladesh lives in cities. It is projected that, by the middle of the century, more than half of the population of Bangladesh will be urban-based. Most of the population growth is concentrated in and around Dhaka, the capital of Bangladesh. Since 1970, it has seen an eightfold increase in population which stands at more than 14 million, making it the eighth largest city in the world. It is projected to become the fourth largest city by 2015 with a population of approximately 22 million [1].

The concentration of the key air pollutant of concern (Particulate Matter) in Dhaka and other major cities has been steadily increasing in recent years, with an annual average much higher than the World Health Organization (WHO) guidelines. It is estimated that, if the exposure to urban air pollution were reduced by 20% to 80%, it would save 1,200 to 3,500 lives and avoid 80 to 230 million occurrences of disease per annum. In the case of Dhaka, this would be equivalent to health cost savings of between US$170 and US$500 per annum [1].

Polluting sectors, like industries and transport, are likely to grow manifold over the coming years. This will drive the growth of air pollutants and greenhouse gas (GHG) emissions, unless efforts are initiated urgently to contain the air pollution sources [1].

Moreover, rapid urban population growth has far outstripped the capacity of urban infrastructure, leading to low level of efficiency and massive shortages. The transport conditions in Dhaka are characterized by chronic traffic congestion and delays, low quality of public transport service, lack of comfort and safety for pedestrians and growing air pollution [2].

In Dhaka, nearly 50% of the people are walking dependent, both for economic and efficiency reasons. Also, 77% of traffic accident fatalities are pedestrians and 50% of these fatalities involve buses [1].

Therefore it is important to focus on reducing conflict between motorized and non-motorized transport, reducing congestion and providing safer and cleaner mobility for those who walk and use public transport, particularly, working women.

1.1.1. Project Objective

The project development objective is: to improve air quality and safe mobility in Dhaka through the implementation of demonstration initiatives in urban trans   port and brick making [1].

The total project cost is approximately US$ 71.25 million with a World Bank credit of US$ 62.20 million [1]. The overall objective of the project is to catalyze the adoption of Sustainable Environmental Initiatives (SEIs) in key polluting sectors (urban transport and brick making) with a focus to abate air pollution and generate co-benefits through introducing energy efficient technology in brick sector and lay the foundation for introducing mass transit like Bus Rapid Transit in capital Dhaka [2].

1.1.2. Project Outcome

The specific project outcome indicators include [2]:

1. Decrease in particulate emissions per brick kilns adopting cleaner technologies and practices of 20-30% by the end of project period.
2. Reduction in the GHG emissions per brick kilns adopting cleaner technologies and practices by 15-20% compared to the prevailing baseline status.
3. Improved traffic flow in the locations of project intervention due to reduced congestion. The outcome is to reach 10% increase in vehicular traffic mobility throughout by the end of the project particularly for those who use non-motorized vehicles and public transport, especially women.
4. A 10% decrease in the number of traffic accidents in the project areas by the end of the project.

1.1.3. Project Components

In keeping with the functional division of the various sectors, the project is structured around two components [1]:

(i) Environment, which includes addressing brick kiln emissions, to be implemented by the Depart of Environment (DOE); and

(ii) Transport, which includes addressing traffic management and engineering issues, to be implemented by Dhaka City Corporation (DCC) and Dhaka Transport Coordination Board (DTCB).

Hence, the focus of DCC is on mobility and safety. This sub-component combines the improvements to traffic flow with various elements of safety particularly for pedestrians. It also aims to assist the urban poor and women by judiciously targeting improvements to the areas with a high concentration of ready-made garment factories where many low-income women employees walk to work [1].

1.2. Background of the Study

The people's republic of Bangladesh has received a credit in the amount of about US$ 62.2 million from the International Development Association (IDA) towards the cost of Clear Air and Sustainable Environment (CASE) Project to be implemented by Dhaka City Corporation (DCC) and it intends to apply a part of the proceeds towards payments for Junior Data Processing Specialists (Traffic Accident).

Dhaka City Corporation (DCC) will investment in traffic engineering and management aimed at improved traffic flow and pedestrian movement, particularly where there is significant conflict between traffic flow and pedestrian movement.

To achieve the objectives of DCC, the following measures will be supported: (a) traffic safety campaigns; (b) people-with-disability (PWD) friendly sidewalks with surface drainage, appropriate ancillary road improvements and removal of obstructions to safe walking; (c) separation of motor vehicles (MVs) from non-motor vehicles (NMVs); (d) defining new one-way streets; (e) foot over bridges (FOBs) (f) traffic signaling, improvement of intersection and related activities; and (g) development of a framework for sustainable parking strategies and policies and their enforcement on the basis of a parking study [1].

At this backdrop DCC will develop a comprehensive road accident related database of Dhaka City Areas, which will cover the years 2007, 2008, 2009, 2010 and 2011 to establish baseline road safety indicators for the project areas and other corridors.

Chapter 2
Literature Review

Everyday thousands of people are killed and injured on roads worldwide. Men, women or children walking, biking or riding to school or work, playing in the streets or setting out on long trips, are never having guarantee to reach destinations or to return home safely. Thousands of people each year are spending many weeks in hospital after severe crashes with many of them not being able to live, work or play as they used to do.

2.1. Traffic Accident Trends in Global and Regional Level

According to WHO estimation, road traffic injuries are a leading cause of death, killing nearly 1.3 million people annually more than 3000 deaths each day (Figure 2.1). Twenty to fifty million more people sustain non-fatal injuries from a collision, and these injuries are an important cause of disability worldwide. Approximately 90% of these deaths occur in low and middle-income countries-70% of total road traffic deaths occur in low income countries, which claim less than half the world's registered vehicle fleet [4].
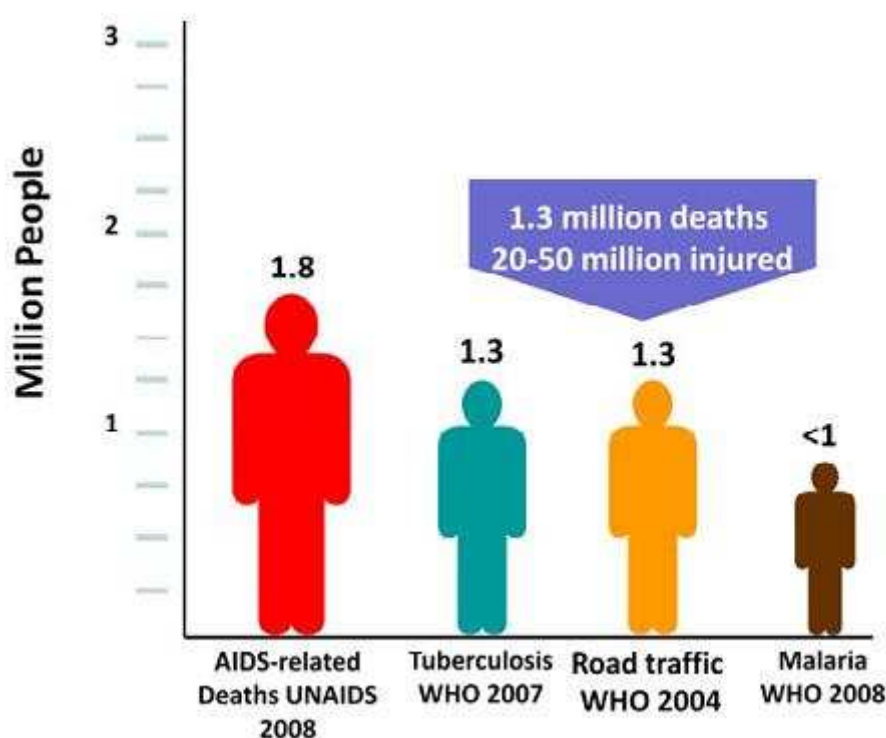
Figure 2.1: Road Safety is a Growing Health and Development Issue

Source: Cluster 7/Module 3: Safety Issues, Building Leaders in Urban Transport Planning (LUTP), 2012

Road traffic injuries are among the three leading causes of death for people between 5 and 44 years of age (Table 2.1). Road traffic accidents are the world's number one cause of death among young people between 16 and 24. Moreover road traffic injuries are predicted to rise from their current position as the ninth leading cause of death to become the fifth leading cause of death by 2030 (Table 2.1), resulting in an estimated 2.4 million deaths each year [4].

Table 2.1: Leading Causes of Death

2004		2030	
Rank	**Disease or Injury**	**Rank**	**Disease or Injury**
1	Ischaemic Heart Disease	1	Ischaemic Heart Disease
2	Cerebrovascular Disease	2	Cerebrovascular Disease
3	Lower Respiratory Infections	3	Chronic Obstructive Pulmonary Disease (COPD)
4	Chronic Obstructive Pulmonary Disease (COPD)	4	Lower Respiratory Infections
5	Diarrhoea Disease	5	Road Traffic Injuries
6	HIV/AIDS	6	Trachea, Bronchus, Lung Cancer
7	Tuberculosis	7	Diabetes Mellitus
8	Trachea, Bronchus, Lung Cancer	8	Hypertensive Heart Disease
9	Road Traffic Injuries	9	Stomach Cancer
10	Premature and Low-Birth Weight	10	HIV/AIDS

Source: Cluster 7/Module 3: Safety Issues, Building Leaders in Urban Transport Planning (LUTP), 2012

Pedestrians, cyclists, and motorcyclists are vulnerable road users and constitute nearly half the victims of road traffic crashes. 65% of these crashes involve pedestrians. Of these pedestrian deaths, 35% are children [4].

This is, in part, a result of rapid increases in motorization without sufficient improvement in road safety strategies and land use planning. The economic consequences of motor vehicle crashes have been estimated between 1% and 3% of the respective GNP of the world countries, reaching a total over $500 billion [4]. Reducing road casualties and fatalities will reduce suffering; unlock growth and free resources for more productive use.

There are five key behavioral risk factors that impact road safety. These are speeding, driving under the influence of alcohol and/or drugs, the use of helmets, the use of seatbelts, and the use of child restraints. Only 15% of the world's countries have comprehensive laws relating to these key factors [4].

Table 2.2: Global Trends of Traffic Accident

World Bank Region	KSI % Change (2000-2020)
South Asia	144%
East Asia and Pacific	80%
Sub-Saharan Africa	80%
Middle East and North Africa	68%
Latin America and Caribbean	48%
Europe and Central Asia	18%
Sub-Total	**83%**
High-Income Countries	-28%
Global Total	**66%**

Source: Cluster 7/Module 3: Safety Issues, Building Leaders in Urban Transport Planning (LUTP), 2012

Table 2.2 shows the projected percentage change that will occur in the number of persons Killed and Seriously Injured (KSI) between 2000 and 2020 if the current situation continues. As demonstrated, the South Asia region will be the most affected with an estimated 144% increase between 2000 and 2020 (Table 2.2). This is partly due to the expected rapid motorization and the resultant increased road infrastructure development in the region [5].

Table 2.3 shows the respective shares in the global population, registered vehicles, and road traffic deaths of high, middle, and low income countries. Although high income countries have the largest number of registered vehicles, they have the lowest population as well as the lowest percentage of road traffic deaths. It should be noted that the percentage of deaths in low and middle income countries are similar. Low income countries, however, have a much lower share of the registered vehicle population [5].

Table 2.3: Global Trends of in Terms of Respective Shares

Parameter	High Income	Middle Income	Low Income
Population	15.6%	47.8%	36.7%
Registered Vehicles	52.1%	38.7%	9.2%
Road Traffic Deaths	8.5%	49.6%	41.9%

Source: Cluster 7/Module 3: Safety Issues, Building Leaders in Urban Transport Planning (LUTP), 2012

Therefore, the goal for the decade is to halt, or even reverse, the predicted increase in road traffic fatalities around the world. At the end of this decade, the goal is to have saved 5 million lives and to have prevented serious injuries to an additional 50 million people (Table 2.4) [5].

Table 2.4: Projected Targets of 'Decade of Action'

Region	Fatalities 2010	Fatalities 2020	UN Decade of Action Fatalities Target 2020	Lives to be Saved During 2011-2020	Serious Injuries to be Avoided During 2011-2020
East Asia & Pacific	313,317	646,000	323,000	1,640,000	16,400,000
South Asia	275,569	590,000	295,000	1,475,000	14,750,000
Sub-Saharan Africa	248,130	365,000	182,500	937,000	9,370,000
Middle East & North Africa	100,655	152,000	76,000	380,000	3,800,000
Latin America & Caribbean	98,877	130,000	65,000	325,000	3,250,000
Europe & Central Asia	85,979	97,000	48,500	243,000	2,430,000
Total	**1,119,527**	**1,980,000**	**990,000**	**5,000,000**	**50,000,000**

Source: Cluster 7/Module 3: Safety Issues, Building Leaders in Urban Transport Planning (LUTP), 2012

Table 2.4 shows the current estimated fatalities in different regions, the projected fatalities for 2020 if the status remains the same, and the projected targets of lives and serious injuries to be saved or avoided during the "Decade of Action" [5].

The Global Plan for the Decade, launched by United Nations (UN) Secretary General Mr. Ban Ki-Moon on 11th May 2011, is built around 5 'pillars' that are believed to encompass key areas that must be addressed to increase road safety. The pillars are formed based on of the success that various countries have achieved in preventing road traffic injuries [4].

The five pillars are [4]:

1. Road Safety Management
2. **Safer Roads and Mobility**
3. Safer Vehicles
4. Safer Road Users
5. Post-Crash Response

2.2. Traffic Accident Trends in the Context of Bangladesh

Bangladesh, a country having an area of 1, 47, 570 sq. km. and a population of 152 million, has about 1.6 million motorized and could be over 3 million non-motorized vehicles. Road accidents in Bangladesh claim, on an average, about 4000 lives and injure another 5000 every year [6].

The paved road network in the country has expanded dramatically since Independence, from 3,000 km in 1971 to over 55,000km today [7]. Road transportation is an extremely important part of the economy of Bangladesh. About 12% of Gross Domestic Product (GDP) and 20% of the annual development budget is spent on transport, and 9.4% of the national employment is in fact in the transport sector [8]. The national loss due to road accident is estimated around $600 million (at nearly 2% of GDP) every year [6].

All Divisional Headquarters and sea-ports are linked to the Capital by paved roads, and there is a high level of road connectivity in rural areas. In fact, the road density in Bangladesh is one of the highest in Asia [7]. However, the network is characterized by inefficient and under-funded maintenance regimes, with the result that many parts of it now require urgent rehabilitation. Traffic management is poor, and the full capacity of the network is not being fully realized. Low cost traffic management measures can aid safety, and avoid costly investment in new roads.

In recent years good roads are being constructed adding speed to transportation and frequency of movement of people. Simultaneously number of road accidents is also soaring high. Increases in road traffic, and speeds, have made roads more threatening for pedestrians and rickshaws. The economic benefits of roads are being undermined by the economic and social costs of road accidents, injuries and fatalities. In Bangladesh, road transport related fatality rates are much higher than those of inland water transport and railways [7]. That is the dilemma with road transport - on the one hand it brings advantages but, on the other, it takes up valuable land and causes high accident rates.

The statistics reveals (Table 2.5) that Bangladesh has one of the highest fatality rate in road accidents – higher than 85 deaths per ten thousand registered motor vehicles every year, whereas, in developed countries the number of motorized vehicles is many times more, the rate is below 5 (as compared with the rates of 2.0 in USA and 1.4 in UK) [9]. Moreover, the number of registered vehicles is growing alarmingly as well (Table 2.5).

Table 2.5: Growth of Motor Vehicles and Road Accident Casualties in Bangladesh

Year	Registered Vehicles	Deaths	Injury	Total Casualties
2000	28764	3430	3211	6641
2001	42510	3109	3172	6281
2002	54877	3398	3770	7168
2003	59248	3289	3818	7107
2004	61202	2748	1080	5621
2005	65878	3187	2754	5941
2006	80305	3193	2409	5602
2007	121272	3749	3273	7022
2008	144419	3765	3284	7049
2009	145243	2958	2686	5644
2010	161178	2847	1803	4449
2011	172484	2467	1631	3858

Source: Bangladesh Road Transport Authority (BRTA), 2012
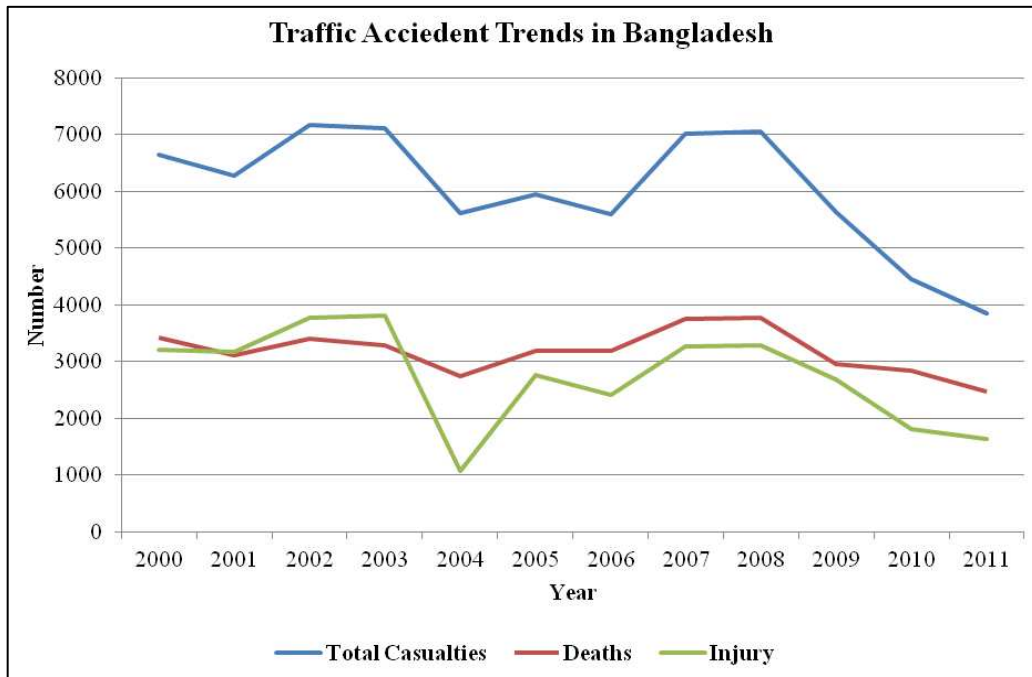
Figure 2.2: Traffic Accident Trends in Bangladesh

Though the traffic accident situation is alarming for Bangladesh but it is clear that the number of total casualties, deaths and injuries are decreasing in recent years. Moreover, the traffic accident pattern is found fluctuating with no specific trend (Figure 2.2).

2.2.1. Statement of Problems

The global forecast has indicated that over the next 10 years developing countries like Bangladesh will experience an alarming increase in road accidents and casualties. Addressing the safety problems thus emerges a serious challenge in the absence of requisite transport safety professionals and resources [6].

The poor countries have about 40 percent of world's motor vehicles but have 86 percent fatalities [10]. The rapid economic growth, increasing disposable income and urbanization are raising the demands for transportation rapidly in developing countries. As a result, the numbers of vehicles on roads of developing countries are also increasing rapidly. Developing countries are experiencing an annual growth rate of about 16% to 17%, which is doubling the vehicle fleet in five years [10]. This factor along with the high proportion of two-and three-wheeled motor vehicles in the region and the relatively young age of the majority of the population, are contributing to the serious road accident casualties. These comments are especially relevant to Bangladesh [10].

At the current growth rate, the number of vehicles in the country is expected to double in the next ten years. The complexity of road environment with mixed traffic is another reality of road transportation in Bangladesh, where road designs are not appropriate for mixed traffic standards [11].

Main causes of road accidents in Bangladesh are over speeding, overloading, and overtaking by motor vehicles. Unregulated movement of non-motorized vehicles along with motorized vehicles on the same route is also one of the major causes for road accidents. Lack of awareness and reckless driving habits also result in frequent accidents claiming lives and causing anguish and grief to the affected families [9]. In other words the road safety problem has become one of the major issues for the transport regulators and traffic law enforcers in Bangladesh.

In urban areas, the traffic roadway system is more complex where a mixed road user environment prevails and greater perceptual demands are placed on the road users. Of particular concern are the urban intersections, particularly the signalized ones that are problematic locations and have been identified as among the most hazardous locations on the roads which account for a substantial portion of traffic accidents. The heterogeneity of traffic, plying of modes with varying speed and maneuvering time makes the intersections of cities of Bangladesh even more complex [12].

Chapter 3
Study Area Profile

3.1. Location of the Study Area

Dhaka City, the capital of Bangladesh, is located in Dhaka District that is surrounded by rivers. Dhaka is located in central Bangladesh at 23°43′0″N, 90°24′0″E (Figure 3.1), on the eastern banks of the Buriganga River [13]. Dhaka city area is under jurisdiction of different authorities that are known as Dhaka City Corporation (DCC), Dhaka Metropolitan Area (DMA), Dhaka Statistical Metropolitan Area (DSMA) and Dhaka Metropolitan Development Plan (DMDP) area.

The study area for this research is Dhaka Metropolitan Area (Figure 3.2). The study area covers the whole DCC area, the oldest organic core part of Dhaka city (Old Dhaka), the planned areas and even the unplanned new generation organic areas that are called 'Informal Settlements'. This selected study area almost covers the biggest urban agglomeration and is the central part of Bangladesh in terms of social and economic aspects [14].

3.2. A Brief Description of the Study Area

Dhaka Municipality was established on August 1, 1864. Dhaka became the capital of Bangladesh with the independence in the year 1971. Then Dhaka Municipality was awarded the status of Dhaka City Corporation (DCC) in 1978. DCC is a statutory organization constituted under the Dhaka Municipal Corporation Ordinance, 1993 and is headed by elected Mayor(s). The City area is divided into 92 wards. The area of the City Corporation at present is about 360 Sq. km. The area of Dhaka Metropolitan City is nearly 1530 Sq. km and the estimated population is currently about 14 million [15].

The Local Government (City Corporation) Amendment Act (2011) has divided DCC as Dhaka South City Corporation (DSCC) and Dhaka North City Corporation (DNCC) on 4th December, 2011 [15]. Because of this amendment, the city has been divided into two parts: DSCC and DNCC. But the project intervene area covers both parts of DCC. Therefore, in this report the common term DCC has been used frequently.

Figure 3.1: Location of Dhaka City in Bangladesh

Source: Banglapedia, National Encyclopedia of Bangladesh, 2012
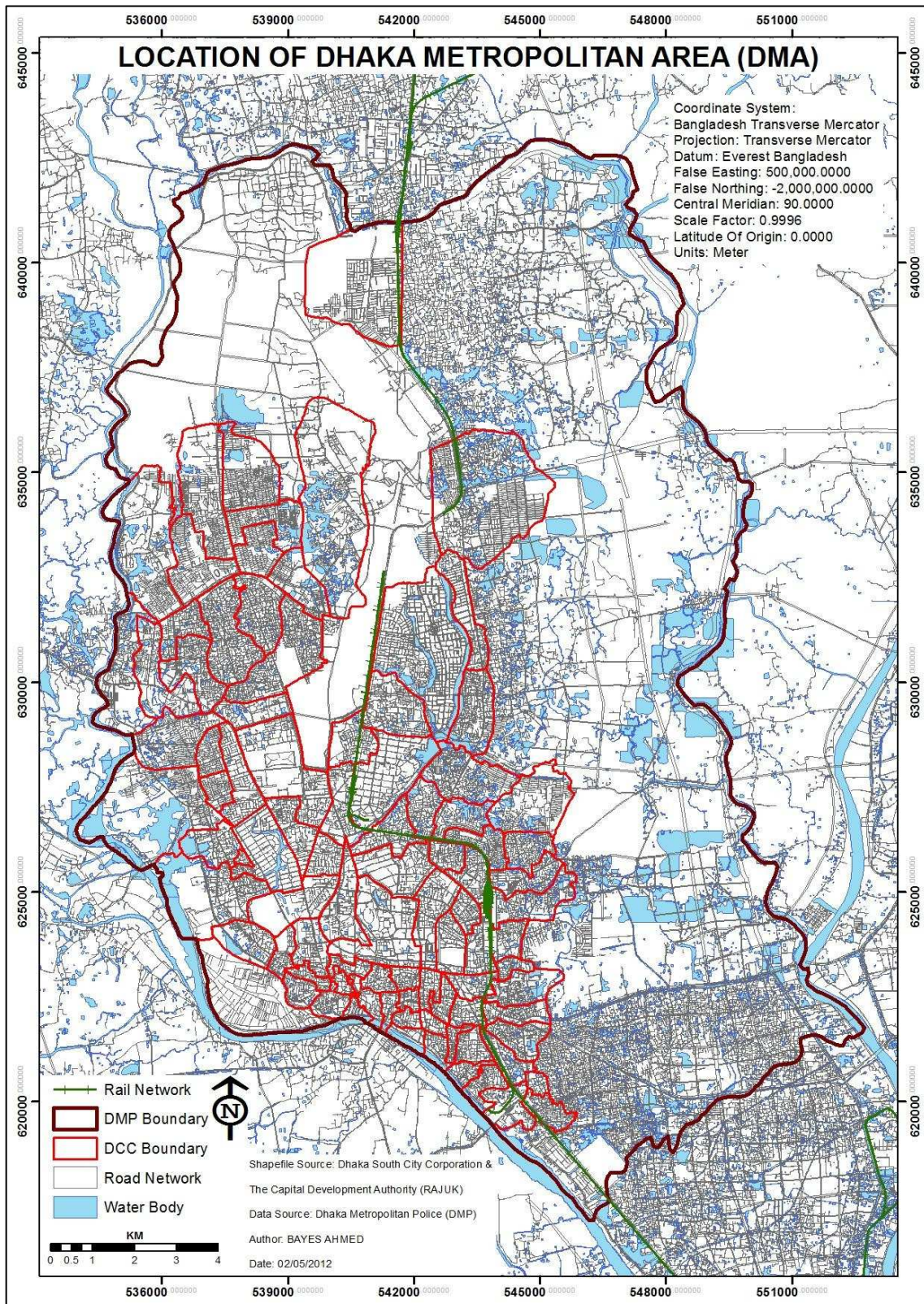
Figure 3.2: Location of the Study Area within Greater Dhaka City

3.3. Traffic Accident Scenario of Dhaka City

The Mega-City Dhaka, the capital of Bangladesh, with a population of 14 million (may rise to 22-25 million by 2020) presently cannot cater the demands of the city dwellers in terms of basic transport network. Dhaka City Corporation, the largest city corporation of the country, is in the verge of challenges like development and maintenance of transport infrastructures which includes city roads and highways, pedestrian facilities, traffic signals, bus terminals, road surface, footpaths, and underpasses/overpasses etc.

Table 3.1 shows the traffic accident scenario of the four major cities of Bangladesh of the year 2009. This is the latest available data collected from Bangladesh Road Transport Authority (BRTA). It is found that Dhaka is the most vulnerable city both in terms of total number of accidents and accident rates (Table 3.1).

Therefore, this study is much important in the context of Dhaka, as it is one of the most accident prone cities of Bangladesh (Table 3.1 and Figure 3.3). Moreover, this kind of research will help generating new ideas to find out the parameters for reducing road traffic accidents in developing countries. The decision makers as well the transport planners can make appropriate plans based on the outcome of this research study.

Table 3.1: Recorded Casualty Accidents by City (2009)

City Name	Number of Accidents				Accident Rate (No. per 10,000 Population)	
	Severity			Total Accidents	Fatal Accidents	Fatal and Injury Accidents
	Fatal	Grievous Injury	Simple Injury			
Dhaka	315	113	23	451	0.492	0.704
Rajshahi	20	6	2	28	0.438	0.613
Khulna	28	9	1	38	0.304	0.413
Chittagong	60	17	1	78	0.157	0.205

Source: Bangladesh Road Transport Authority (BRTA), 2010
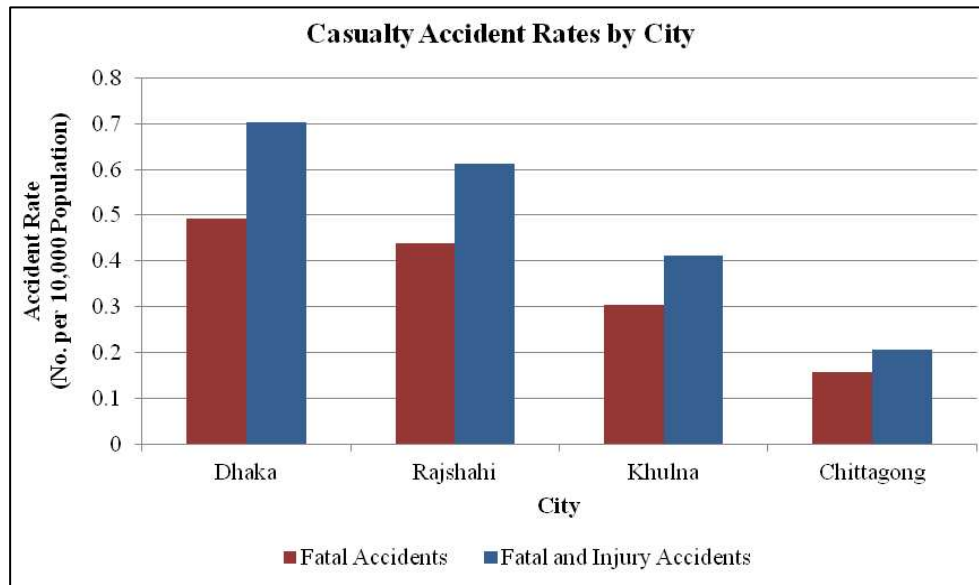
Figure 3.3: Casualty Accident Rates of the Major Cities of Bangladesh (2009)

Figure 3.3 depicts the casualty accident rates of the four major cities of Bangladesh. It is quite visible from this figure that accident rate is highest in Dhaka while Rajshahi city is in second position. Moreover, it is also clear that the total number of traffic accidents is the highest in Dhaka City (451), while Chittagong City (78) is in second position (Table 3.1). Rajshahi City has the lowest number of traffic accidents (28).

3.4. Problems Exaggerating Traffic Accidents of Dhaka City

After extensive field survey, the following problems have been identified as some of important causes of traffic accidents especially pedestrian collisions in DMP area:

    i.   Inadequate and Indiscriminate Use of Footpaths
    ii.   Road Side Car Parking
    iii.   Retail Vendors or Shops on Footpaths
    iv.   Improper Use of Zebra Crossing
    v.   Uncontrolled Pedestrian Crossing
    vi.   Open Slab of Drain on Footpath
    vii.   Cutting and Filling of Roads
    viii.   Damaged Road Condition
    ix.   Under-Aged and Un-Skilled Drivers
    x.   Improper Use of Foot Over Bridges
    xi.   Informal Settlements on Footpaths

These problems are illustrated in the following photographs:

Photograph 1: Mobile Vendors on Footpath

Photograph 2: Retail Shops on Footpath

Photograph 3: Open Slab of Drain on Footpath

Photograph 4: Car Parking on Footpath

Photograph 5: Motorcycles on Footpath

Photograph 6: Road Side Car Parking

Photograph 7: Open Pit on Median Separation

Photograph 8: Damaged Road Condition

Photograph 9: Uncontrolled Pedestrian Crossing
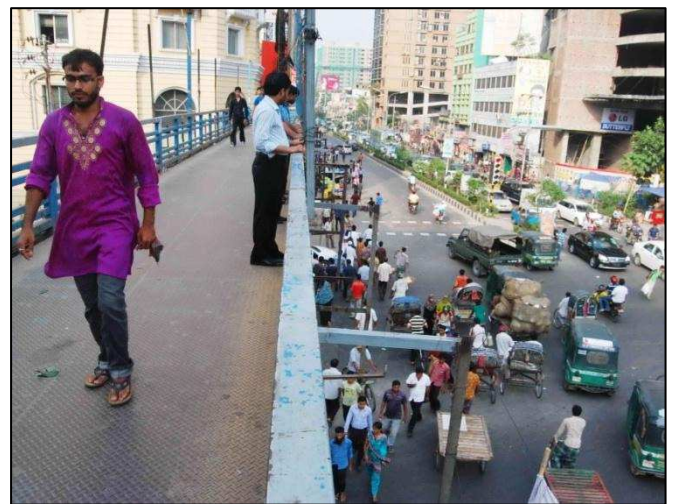
Photograph 10: Pedestrians Not Using FOB

Photograph 11: Improper Use of Zebra-Crossing

Photograph 12: Retail Shops on FOB

Photograph 13: Informal Settlements on Footpath

Photograph 14: Rickshaw Stands on Footpath

Photograph 15: Road Maintenance in Day Time

Photograph 16: Risky Road Crossing

Photograph 17: Un-Skilled and Under-Aged Drivers

Photograph 18: Lack of Passenger Safety

Photograph 19: Damaged Footpath

Photograph 20: Violating Traffic Rules

Photograph 21: Pedestrians Violation Traffic Signal

Photograph 22: Retail Shops on FOB

Photograph 23: Over-Loaded Public Transport

Photograph 24: Damaged Road Condition

Chapter 4
Data Collection and Methodology

Road traffic accidents with casualties are causing great concern regarding communications within Bangladesh. It has long been recognized that the most effective means towards accident reduction lies in a systematic and scientific approach based on the use of accurate and reliable traffic accident data. Much of the accident information available in police files is all too often incomplete and therefore has not been utilized to the fullest extent [3].

4.1. Data Collection

The first task is to collect data, covering the years of 2007, 2008, 2009, 2010 and 2011, for the project intervene areas as well for the whole DMP and Dhaka City Corporation.

The following sectors/institutions/organizations have been visited to collect the necessary data:

  i.   Different Police Stations of Dhaka Metropolitan Police (DMP) Area
 ii.   Dhaka Metropolitan Police (DMP) Headquarter
iii.   Road Safety Cell, Bangladesh Road Transport Authority (BRTA)
 iv.   Dhaka Transport Coordination Board (DTCB)
  v.   Accident Research Institute (ARI) of Bangladesh University of Engineering and Technology (BUET)
 vi.   Centre for Injury Prevention and Research, Bangladesh (CIPRB)
vii.   Rajdhani Unnayan Katripakha (Capital Development Authority)
viii. Urban Planning Division, Dhaka South City Corporation
 ix.   Road Safety Program, Bangladesh Rural Advancement Committee (BRAC)
  x.   Bangladesh Institute of Planners (BIP)

After extensive field survey, it is found that the responsibility of collecting traffic accident related data vests on the Police department of Bangladesh. The concerned Police Stations fill-up 'Accident Reporting Form' (ARF) for each accident. This is the official source of accident information or data. Finally the ARFs have been collected from the DMP Headquarter, Dhaka. A total of 2,720 ARFs are collected for the years of 2007-2011. A sample ARF is attached in Appendix-I.

4.1.1. Brief Description of Data Collection Process by Police

Before 1995, there were population censuses, agricultural census etc., but no definite data about traffic accidents in Bangladesh. World Bank then decided to introduce an accident database in Bangladesh. Therefore it was decided to give this responsibility to the Police department as they made the FIR (First Information Report) and had to go to the accident places if anyone would injure there. Then the traffic 'Accident Report Form (ARF)', designed jointly by the police and Institutional Development Component (IDC) was introduced into the northern division of DMP on June 1995. By January 1996, the Accident Report Form (ARF) had been introduced by all the Police stations of DMP. By the beginning of 1998, it had been introduced nationwide. The ARF, in both English and Bangla was introduced nationwide. Steps had been taken to adopt this form as a part of the FIR of accident cases [16].

For the circumstances of casualty and vehicles data associated with each personal injury accidents are recorded by police officers as First Information Report (FIR). In case of road traffic accidents, after recording, Investigating Officer (IO) after enquiring into the matter fills up the Accident Reporting Form (ARF). Each Police Station has to maintain a separate register on road accidents. Each accident is to be entered into that register with separate serial number by the officers [16].

Then Investigating Officer submits the Accident Report Form (ARF) to the Superintendent of Police (SP) office. The Superintendent of Police collects Accident Reporting Form (ARF)'s from all Police Stations under his control, and sends those to Deputy Inspector General of Police (DIG) of concerned Range. All of the accident data collected is entered into computer in the Accident Data Units (ADU) established in DIG offices. All data are then entered and processed by using the MAAP5 (Microcomputer Accident Analysis Package) software. This work is forwarded to police headquarters through Floppy Disk on a monthly basis [16].

4.2. Selection of Traffic Accident Variables

The next step is to select the variables to define/determine road accident related database from the ARFs. The variables have been selected in consultation with the project management to achieve the goals of this project. The ARF contains a total of 69 fields. From there, 28 relevant fields have been selected for this study purpose.

The selected variables cover the following information:

a) Identification of the locations (X,Y coordinate) and address
b) Serial number corresponding to the location/intersection on the map
c) Time and date of occurrence
d) Number of vehicles involved
e) Number of death at the location during the year
f) Number of injured people (Grievous and Minor)
g) Whether the accidents involved pedestrians, non-motorized or motorized vehicles/passengers
h) Information about the accident severity, junction type, traffic control, collision type, movement, divider, weather; light, road geometry, surface type, surface quality, road classification and road feature.

4.3. Database Creation

At this stage, a database has been developed using 'Microsoft Access' for the selected 28 variables (Figure 4.1). Later this database has been exported to ArcGIS software for mapping and projecting the accident locations incorporating all the necessary information.

4.4. Plotting the Accident Locations in GIS Platform

One major problem plotting the accident locations in GIS platform was to match the unknown coordinate system of DMP maps. DMP Headquarter uses quite old maps of Dhaka City with no geographic and projected coordinate system referred.

To solve this problem, the unknown coordinate system has been transformed into Bangladesh Transverse Mercator (BTM) projection system. This helps to identify the accident locations more accurately.

The base maps (shapefiles) including the DCC boundary, water bodies, railway lines and road networks have been collected from Rajdhani Unnayan Kartripakkha (RAJUK). These maps were produced in 2010. The GPS and other surveying activities were conducted during 2005-2008. Therefore, these are the available latest and up-to-date maps of Dhaka City.
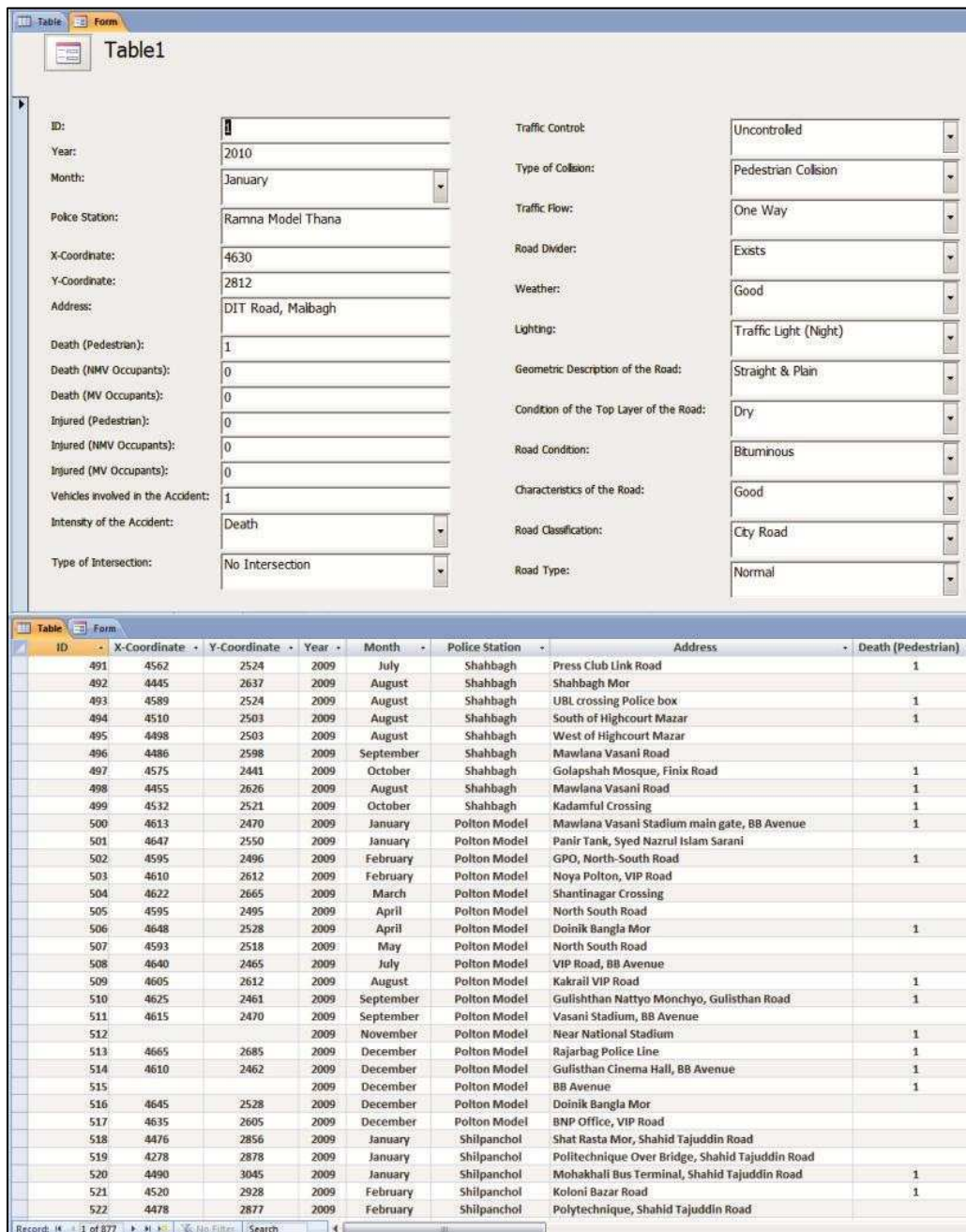
Figure 4.1: Screen Shot of the Database Created in 'Microsoft Access'

Later on, the database created in 'Microsoft Access' has been exported to ArcGIS. Now it is possible to plot all the accident locations including the information generated from the selected variables. At the end, the undefined locations from the ARFs have been identified using the collected latest Geographic Information System (GIS) based maps. This is how; GIS based traffic fatality/injury allied maps are produced.

4.5. Limitations of the Study

4.5.1. Problems Related to Data Collection

For DMP area, only the concerned 41 Police Stations are responsible for collecting traffic accident data. There are no other organizations or institutions responsible for collection data. All other organizations rely on DMP for traffic accident data. This is the only Government authorized source for accident information.

Even ARI and BRTC depend on DMP for this data. There is only one person responsible in the police headquarter for collecting, managing and handling the ARFs from different police stations. This makes the situation more difficult.

According to the staff responsible in DMP Headquarter, it is very difficult to collect ARFs from all the police stations. In most cases, the police stations make delay in sending the ARFs or even sometimes do not send the ARFs for the concerned month. Therefore, there is always a difference between the accident cases filed in Police Stations and accidents entered in MAAP5 database of Police Headquarter.

4.5.2. Under Reporting of Traffic Accident Data

A common factor of central importance in road safety management is the collection and use of accurate and comprehensive data related to road accidents. The interpretation of those data can lead to a better understanding of operational problems, is a pre-requisite for an accurate diagnosis of accident problems, assists in the development of remedial measures and allows evaluating the effectiveness of road safety programs.

According to Bangladesh Rural Advancement Committee (BRAC), a leading Non-Governmental Organization (NGO) of Bangladesh, it is estimated that about 4,000 people are killed and injure, while another 4,000 lives with road accidents every year [17]. But data constraints and widespread under reporting of accidents prevent understanding the real magnitudes of road accident problems. It is observed that the sources of accident data are biased due to under-reporting, particularly in the case of non fatal accidents. Only one accident out of 125 occurred is reported to the police [18].

Figure 4.2 shows that 34% of accident cases have been settled locally, either by paying some treatment cost or begging pardon or making some financial compensation. The second major reason for under-reporting was drivers fleeing the scene (21%) with the accident vehicle [18].
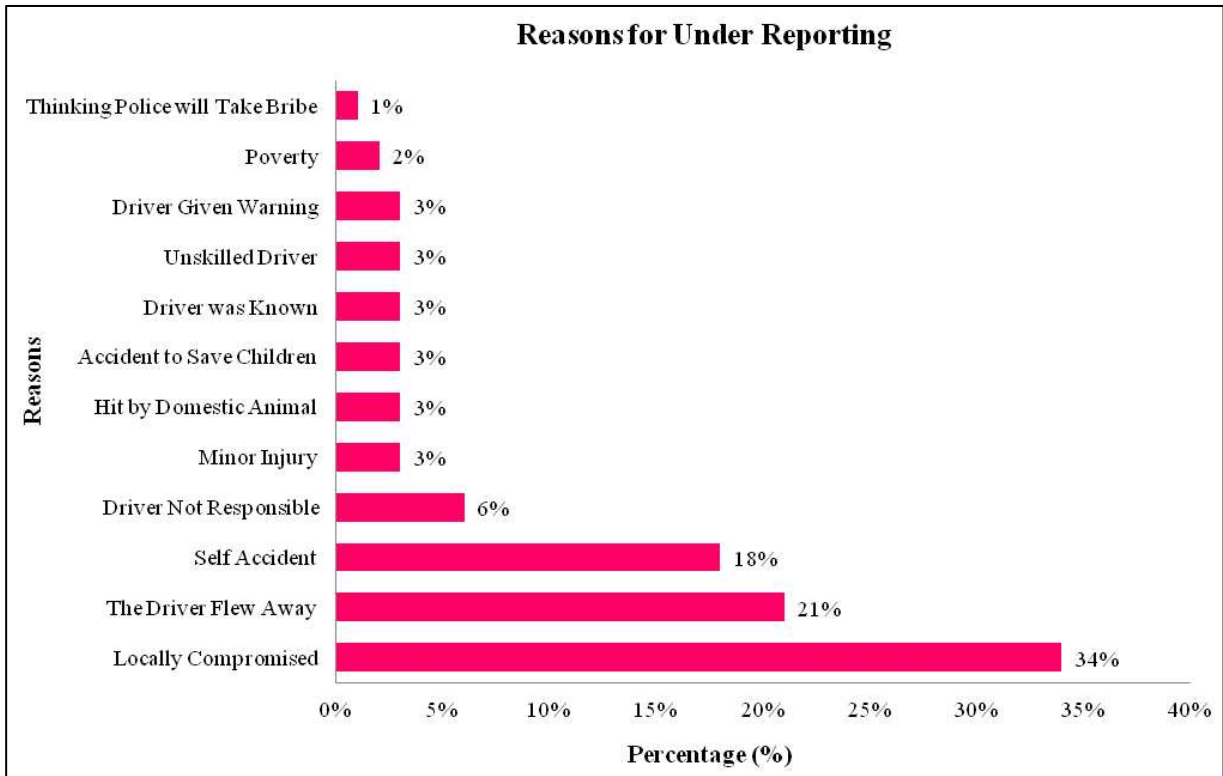
Figure 4.2: Reasons for Under Reporting of Traffic Accident

Accident Research Institute (ARI) of BUET conducted a survey data on Dhaka-Aricha road to investigate the extent of underreporting. It is found that the extent of underreporting is as high as 60% in some Police Stations. Moreover a thorough review of newspaper revealed that underreporting of fatality information is also highly prevalent [16].

4.5.3. Problems Related to Base Map Preparation

There are 41 police stations in DMP area now. But DMP headquarter uses the old version maps of 17 police stations for positioning the accident locations (Figure 4.3).
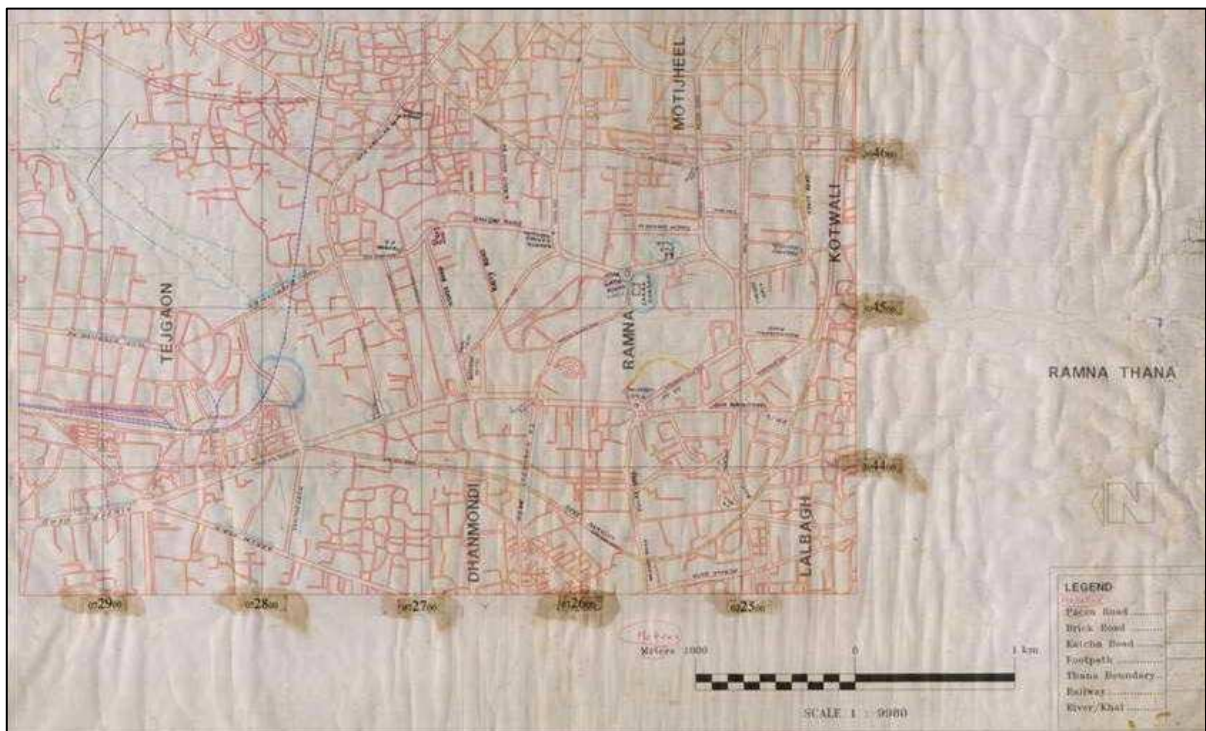
Figure 4.3: Sample DMP Maps (Pallabi and Ramna Police Stations)

Source: Dhaka Metropolitan Police Headquarter, 2012

The old 17 police stations maps have been scanned and collected from DMP Headquarter in Dhaka. But these maps are out-of-date as the road network has changed over time or many new roads have been constructed. Moreover the base year of these maps and the geographic or projected coordinate systems are unknown.

4.5.4. Problems Related to Boundary Demarcation

Another problem faced is the demarcating the boundary for this research work. The Dhaka City Corporation and DMP area boundaries are different. DMP area covers a much greater area than DCC boundary (Figure 3.2). The boundary of the 41 police stations is not available in GIS form. It means the Police Stations coverage areas; the DCC boundary and DMP boundary are different.

Moreover, the only source of traffic accident data is the Police Stations of Dhaka City, which covers only the accidents occurred within the jurisdiction area of DMP. No accident data is available for only DCC area. Therefore, for this research purpose the DMP area has been selected as study area.

4.5.5. Errors during Data Entry

In many cases the accident data could not get accurate due to under-recording. There are also errors due to wrong filling up of Accident Report Forms (ARFs) by the Investigating Officer (IO). Some examples are as follows:

i. About 20% ARFs have found without (X, Y) coordinate values. This is because of the out-dated maps used by DMP. Because of this, many accidents occurred in new roads could not be located.

ii. Another point is that there is one field called weather in the ARF. This includes four sub-sections like Fair, Rain, Wind and Fog. This field indicates the weather condition when the accident occurred. But in 99% cases this field is filled-up as 'Fair'.

iii. The same problem is for the field called 'Surface Condition'. It contains four sub-sections: Dry, Wet, Muddy and Flooded. But in all cases, the ARFs are filled as 'Dry'.

iv. There is another field in the ARF termed as 'Surface Quality' with the sub-sections as Good, Rough and Under Repair. But same for this section as well, all the ARFs are filled as 'Good'.

v. The most important mistake is made in the section termed as 'Road Class'. This field has five sub-sections: National, Regional, Feeder, Rural Road and City Road. The officers or staffs responsible for filling-up the ARFs have less idea about this classification. Therefore, in many cases, the ARFs are showing the different/wrong classes for the same road.

vi. The field 'Road Feature' has five sub-sections as None, Bridge, Culvert, Restriction and Speer Breaker. But in 99.99% cases, the ARF is filled as 'None'.

Out of the selected 28 fields from ARF, 8 are found wrongly filled-up. This is a matter of concern. There are some probable reasons for under-recording:

i. Lack of training for filling up the Accident Report Forms.
ii. Lack of coordination among the Police Stations of DMP regarding filling the ARFs in the same way.
iii. Extra load of other works of the officers/staffs.

4.6. Recommendations for Solving the Limitations

The following points have been recommended to overcome the problems faced while conducting this study:

i. According to ARI, accident statistics indicates that a vast number of accident casualties go unreported. Hence, this research study strongly demands the concerned authority and the policy makers to take appropriate measures for ensuring regular reporting of accident occurrences for investigation.

ii. Improvement of data collection procedure is necessary. Not only DMP but also other organizations should be involved in traffic accident data collection process. This will enhance both the quality and quantity of recording accidents in ARFs. Another advantage is there will be provisions for cross-checking the collected data whether there is any mistake or problems related to under-reporting or under-recording.

iii. Strict rules should be imposed in filling the ARFs. Investigating officers should be trained properly who are in charge of filling the ARF.

iv. Accident location coding system should be developed. This can be done by producing high-resolution quality base maps of the entire DMP area.

v. MAAP5 software should be replaced or upgraded. MAAP5 is now outdated as it is operated in Disk Operating System (DOS) mode. Moreover, the analytical capability is not much powerful. Therefore, ARI and DMP should use the latest version of Windows mode software like ArcGIS. This software is up-to-date and better for analyzing traffic accident issues.

vi. Improper transcription of Accident Report Form may evolve erroneous information even in the case of recorded accidents. Therefore standard practice of accurate data transcription should be practiced.

It is very important to preserve all accident data in a proper way as it can lead us to further steps of accident countermeasure. In Bangladesh, accident database is fully dependent on police accident report, training of the officers in a proper way and mass awareness is urgent to improve the present situation. Accident database should be made comprehensive and accurate enough by overcoming the problems of under-reporting and under-recording.

Chapter 5

Analysis and Results

In this chapter, the detailed analyses of the GIS based traffic accident maps have been performed. This includes analyses of all the maps from year 2007-2011 of Dhaka City.

5.1. Cause-Effect Analysis

The cause and effect scenario of traffic accidents are depicted in Table 5.1 and Table 5.2. A total number of 2,720 accidents occurred within 2007-2011. This has a caused a total of 1,481 numbers of pedestrian fatal accidents (cause) with 1,562 pedestrian fatal casualties (effect). The scenarios for Non-Motorized Vehicle (NMV) and Motorized Vehicle (MV) are also visible in these tables. These tables are classified into fatality and injury sections with detailed information about the pedestrians, NMV and NM. It is also possible to find out the number of vehicles involved in traffic accidents including vehicle collisions. It is very interesting that the total number of traffic accidents is decreasing over the years (Figure 5.1). From 2007 to 2011, the traffic accidents have decreased by 48%. Moreover, each year the total numbers of traffic accidents are reducing by 11% on an average.
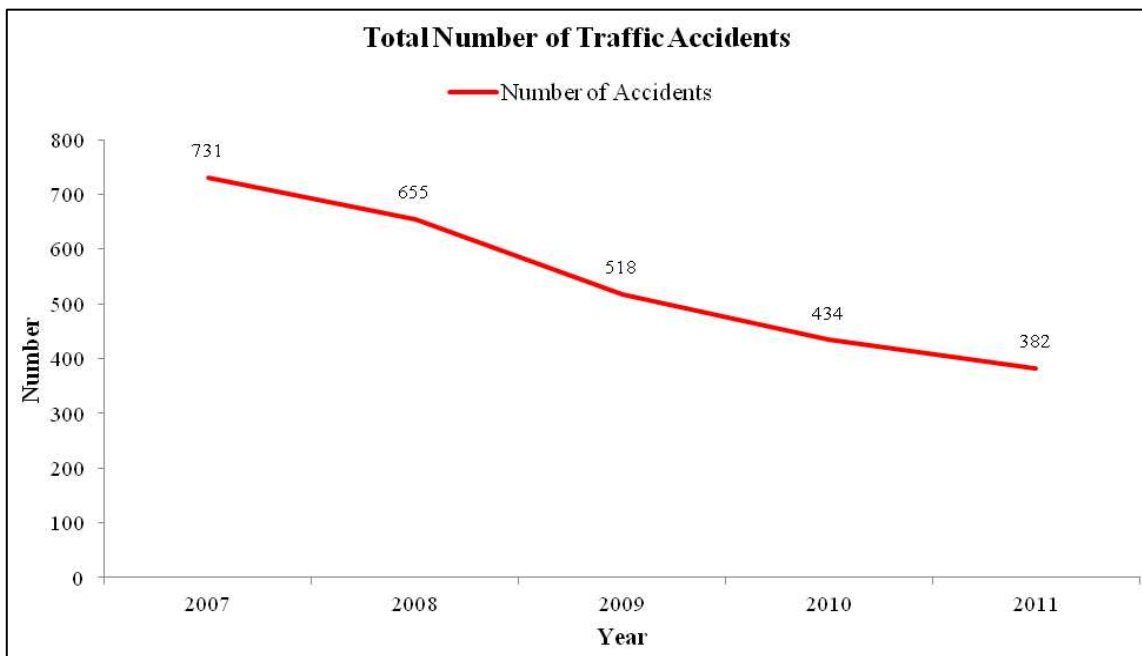
Figure 5.1: Total Number of Accidents in Dhaka City (2007-2011)

Table 5.1: Traffic Accident Scenario of Dhaka Metropolitan Area (Cause)

Year	* Total Number of Recorded Accidents	Number of Fatal Accidents			Number of Injury Accidents (Grievous and Simple)			Number of Motor Collision
		Pedestrian	**NMV	***MV	Pedestrian	**NMV	***MV	
2007	731	361	46	47	78	32	59	109
2008	655	367	40	56	20	28	56	88
2009	518	307	26	45	14	23	40	65
2010	434	249	31	32	30	17	48	44
2011	382	197	29	42	41	17	50	28

Table 5.2: Traffic Accident Scenario of Dhaka Metropolitan Area (Effect)

Year	* Total Number of Recorded Accidents	Number of Fatal Casualties (Passengers or Drivers)			Number of Injury Casualties (Passengers or Drivers)			Total Number of Vehicles Involved in Traffic Accidents
		Pedestrian	**NMV	***MV	Pedestrian	**NMV	***MV	
2007	731	395	53	62	84	57	115	997
2008	655	382	45	80	20	47	122	918
2009	518	315	33	59	15	39	73	721
2010	434	262	36	45	44	22	85	587
2011	382	208	29	53	45	22	80	528

Note: One accident may cause fatality and injury at the same time. Moreover, one accident can cause more than one casualties.

* Number of Filled-Up Official Accident Reporting Forms during a Year

** NMV = Non-Motorized Vehicle

*** MV = Motorized Vehicle

Source: Dhaka Metropolitan Police Headquarter, 2012.

5.2. Traffic Accident Severity

Out of 2,720 traffic accidents 1,875 were fatal accidents, 553 were injury accidents and 334 were motor collisions. The effects were 2,057 deaths of passengers/ pedestrians/drivers and 870 other people were injured. A total of 3,751 numbers of vehicles were involved in all those 2,720 accidents from 2007-2011 (Table 5.1 and 5.2).
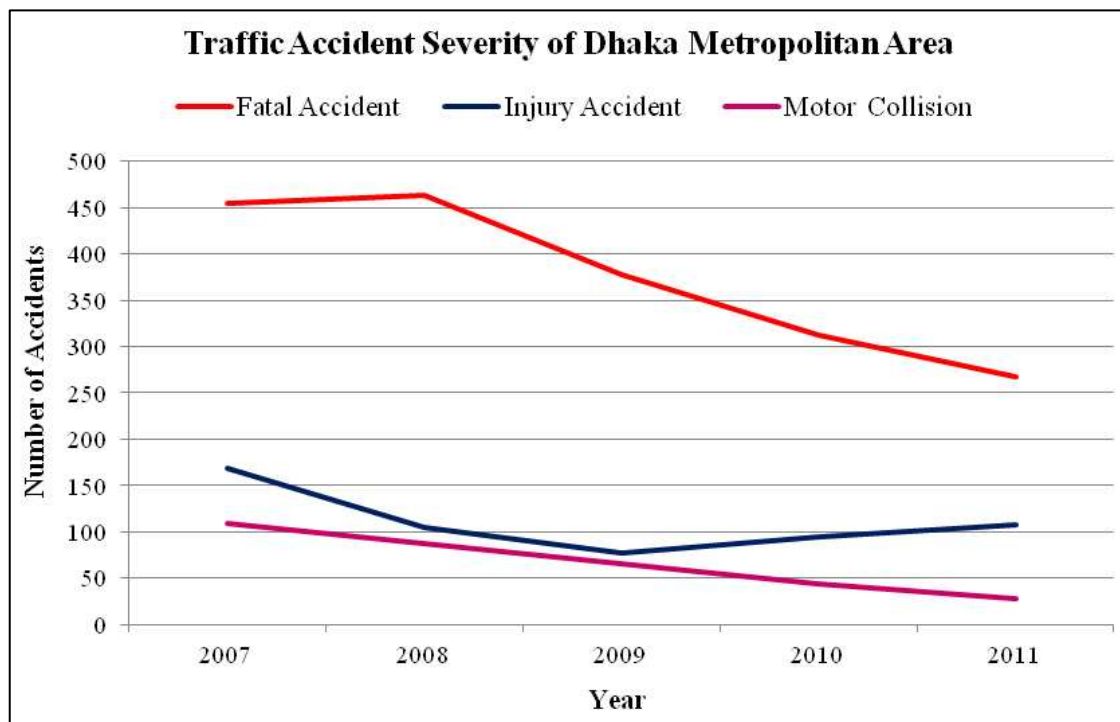
Figure 5.2: Traffic Accident Severity of Dhaka City (2007-2011)

From Figure 5.2, it is clear that numbers of motor collision accidents are decreasing gradually over the years. Moreover, though there was a slight increase in fatal accidents from 2007-2008, but from then it is being decreased in a noticeable way. For the case of injury accidents, in the beginning there were decreasing trends but from 2009, the trend in going upwards.

Figure 5.3 shows the locations of all the traffic accidents occurred within DMP area from 2007-2011. From this kind of map, it is possible to find out the most accident prone roads easily. This kind of GIS based map, to locate the accident hot spots, is first ever produced and can be promoted for further analysis by concerned stakeholders.

The GIS based traffic accident severity maps for individual year (2007, 2008, 2009, 2010 and 2011) are attached in Appendix-II.

TRAFFIC ACCIDENT SCENERIO OF DHAKA METROPOLITAN AREA (2007-2011)

Coordinate System:
Bangladesh Transverse Mercator
Projection: Transverse Mercator
Datum: Everest Bangladesh
False Easting: 500,000.0000
False Northing: -2,000,000.0000
Central Meridian: 90.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter

★ Accident_2011
★ Accident_2010
★ Accident_2009
★ Accident_2008
★ Accident_2007
—+— Rail Network
☐ DMP Boundary
☐ DCC Boundary
☐ Road Network
☐ Water Body

KM
0 0.5 1   2   3   4

Shapefile Source: Dhaka South City Corporation &

The Capital Development Authority (RAJUK)

Data Source: Dhaka Metropolitan Police (DMP)

Author: BAYES AHMED

Date: 13/05/2012

Figure 5.3: Traffic Accident Scenario of Greater Dhaka City (2007-2011)

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5.3. Most Accident Prone Roads of DMP

After analyzing Figure 5.3, thirty different roads/corridors of DMP area have been identified, which are most accident prone (Table 5.3). There roads or corridors or avenues cover approximately 95% of total traffic accidents within DMP area from 2007-2011. Rest of the 5% accidents occurs in other roads of Dhaka City. It means special attention should be put into these vulnerable 30 roads in terms of road safety.

Table 5.3: Most Accident Prone Roads/Corridors/Avenues of DMP (2007-2011)

Name of Road/Corridor/Avenue	Name of Road/Corridor/Avenue
1. Johnson Road	2. Finix Road
3. Panthopath Road	4. Captain Mansur Ali Sharani
5. Shat Masjid Road	6. New Elephant Road
7. Majhar Road	8. Bongo Bondhu (BB) Avenue
9. VIP Road	10. Siddeshwari Road
11. Mawlana Vasani Road	12. North-South Road
13. Darus-Salam Road	14. Dhaka-Demra Road
15. DIT Road	16. Dhaka-Aricha (Gabtoli) Road
17. Dhaka-Ashulia (Tongi) Road	18. Dhaka-Narayanganj Road
19. Circular Road	20. Kazi Nazrul Islam Avenue
21. Sayedabad-Jatrabari-Gulisthan Road	22. Otish Dipangkar/ Biswa Road
23. Shahid Tajuddin Sarani	24. Pragati Sarani
25. Begum Rokeya Sarani	26. Beribadh Road
27. Dhaka-Chittagong Road	28. Mirpur Road
29. Airport Road	30. Dhaka-Mymensing Road

The roads of Table 5.3 are in descending order. It means traffic accidents occur in least number in Johnson Road while Dhaka-Mymensing Road is the most accident prone road of DMP area.
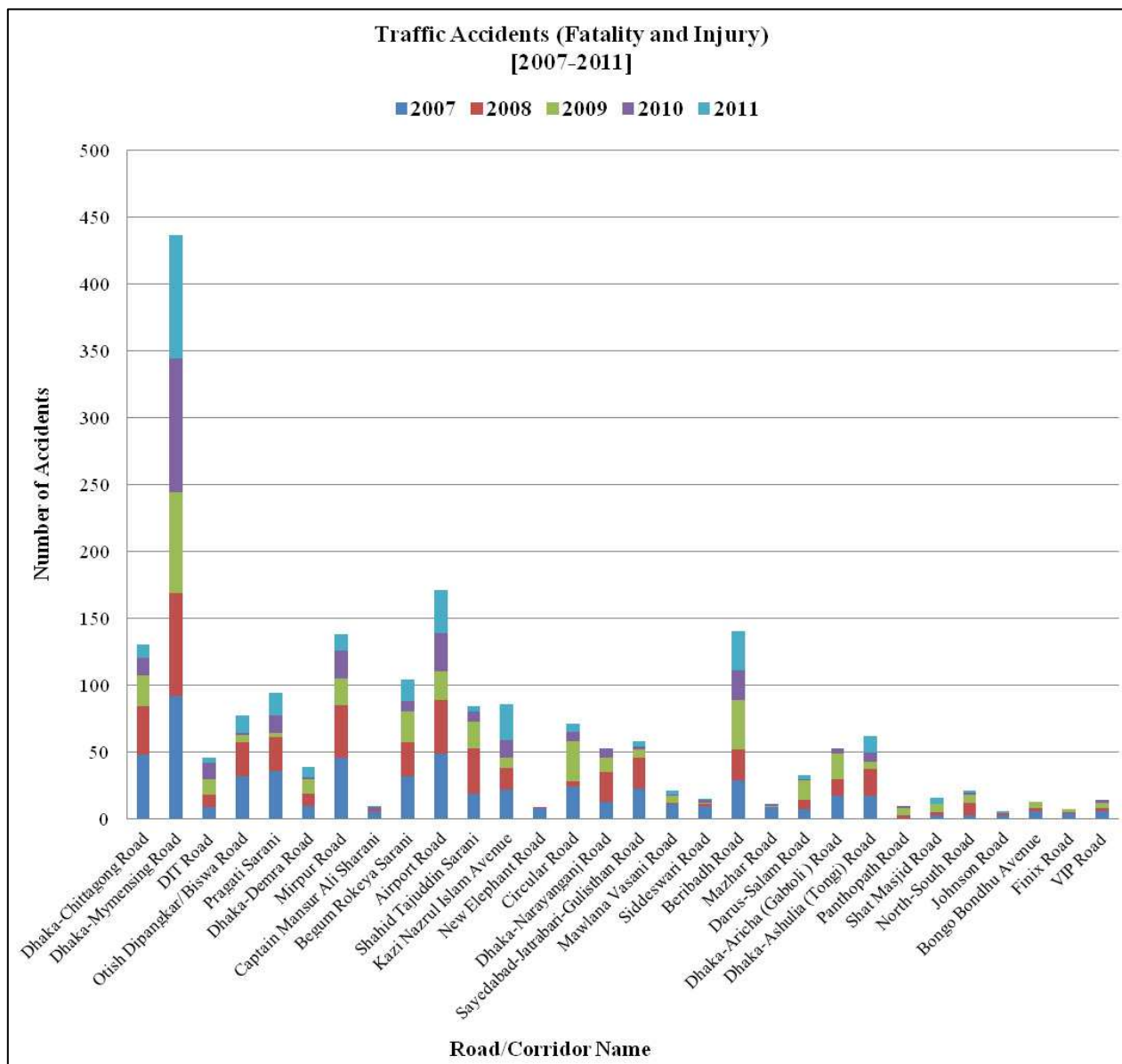
Figure 5.4: Year-wise Traffic Accident Scenario in Different Roads of DMP

Figure 5.4 depicts the number of fatality and injury accidents occurred in each year in the selected most 30 accident prone roads. Again, Figure 5.5 and 5.6 show the most accident prone roads in terms of 'fatality and injury' and 'motor collision' respectively.

In all the cases, it is found that Dhaka-Mymensing Road is the most accident prone road while Airport Road is in second position. Johnson and Finix roads are the least accident prone.
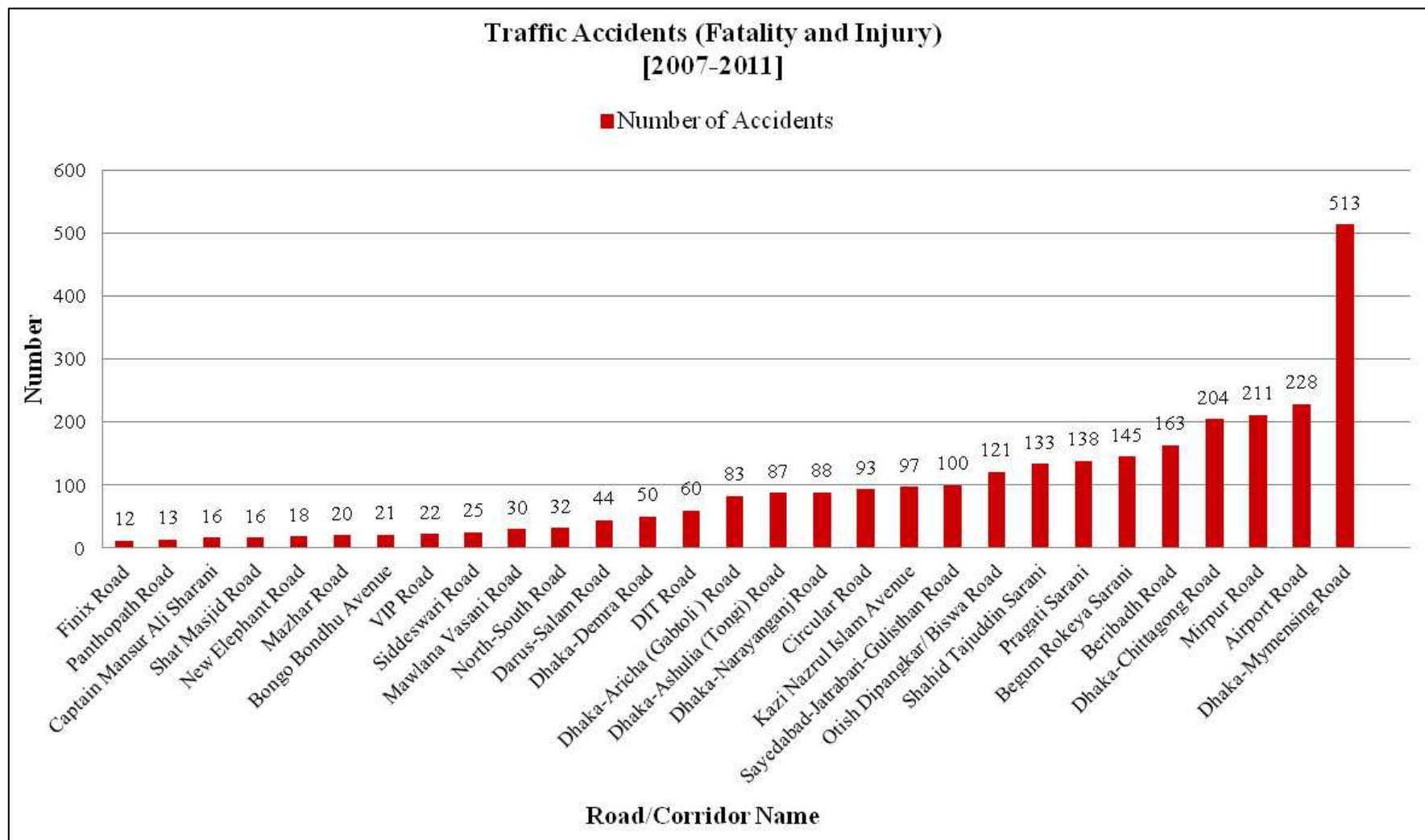
Figure 5.5: Most Accident Prone Roads (in terms of Fatality and Injury) of DMP Area (2007-2011)
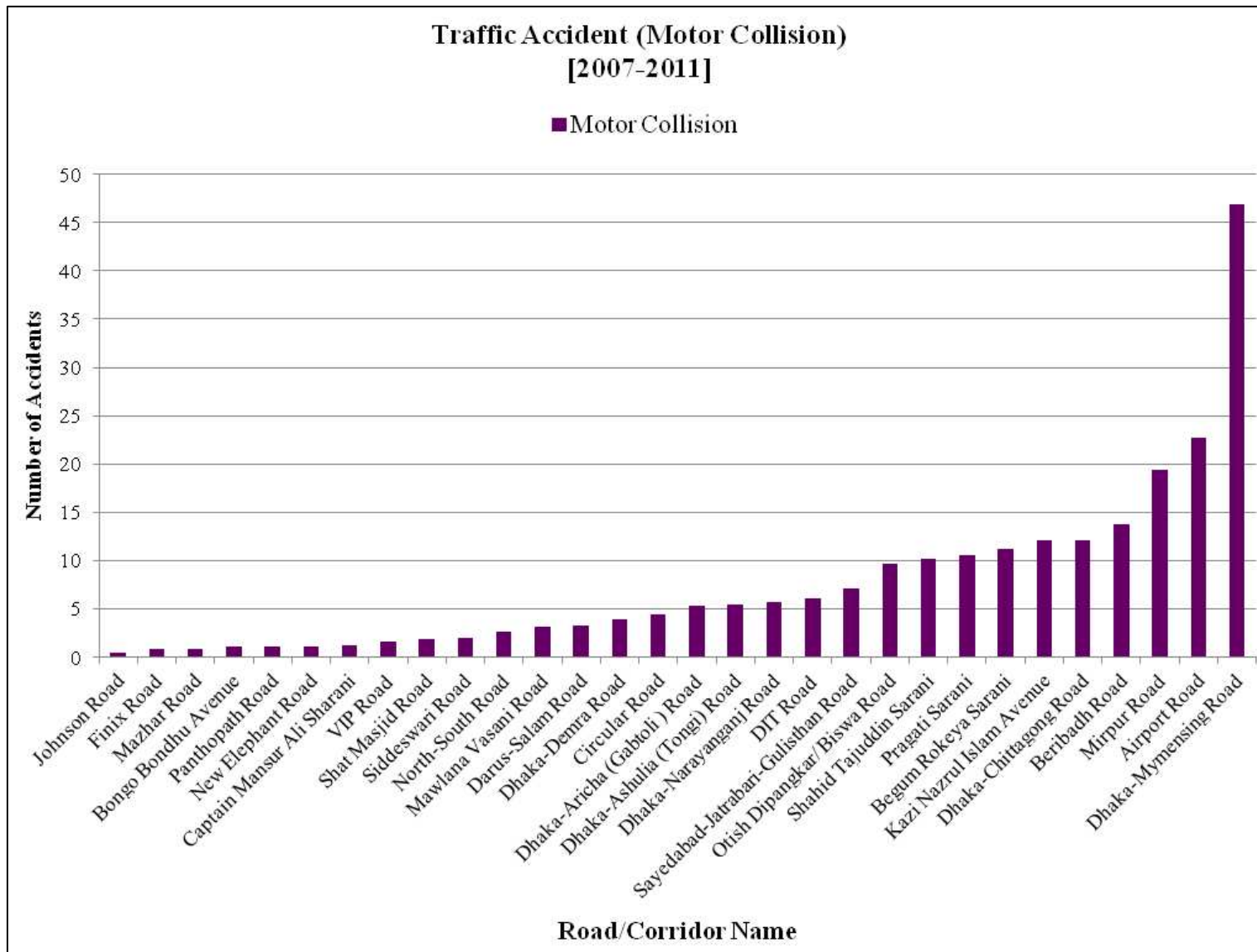
Figure 5.6: Most Accident Prone Roads (in terms of Motor Collision) of DMP Area (2007-2011)

5.4. Traffic Accidents by Month

This section tries to find out is there any correlation between traffic accidents and the month (season) of occurrences. Traffic accidents mostly occur in the months of April and May in DMP area (Figure 5.7). But no greater fluctuations are found for monthly accidents. Accidents are randomly distributed over the years indicating no profound effect of weather on road accidents.
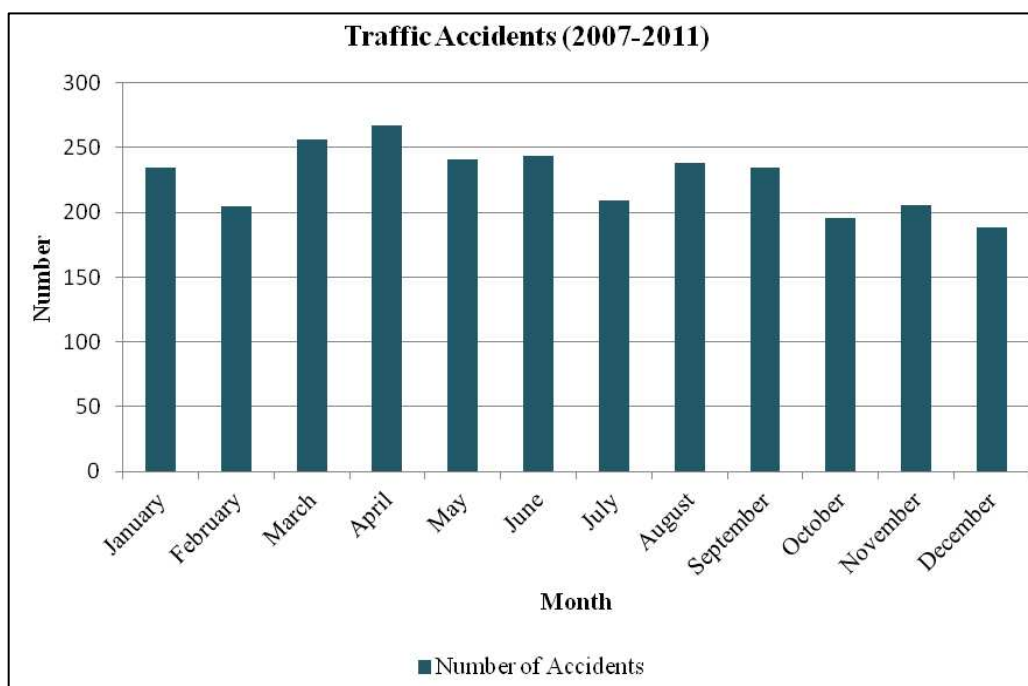
Figure 5.7: Traffic Accidents by Month

5.5. Traffic Accidents by Police Stations

There are 41 police stations in DMP area right now. Traffic accidents take place in the following police stations mostly (2007-2011):

   i.   Jatrabari (236)
  ii.   Tejgaon (210)
 iii.   Gulshan (202)
  iv.   Uttara (182)
   v.   Airport (143)

No traffic accident records are found for 'Uttar Khan' police station. Moreover, accidents occur in least numbers in 'Chawk Bazar' (2), 'Kolabagan' (2), 'Kamrangir Chor' (3), 'Dokkhin Khan' (4) and 'Bongshal' (7) police stations (Figure 5.8).
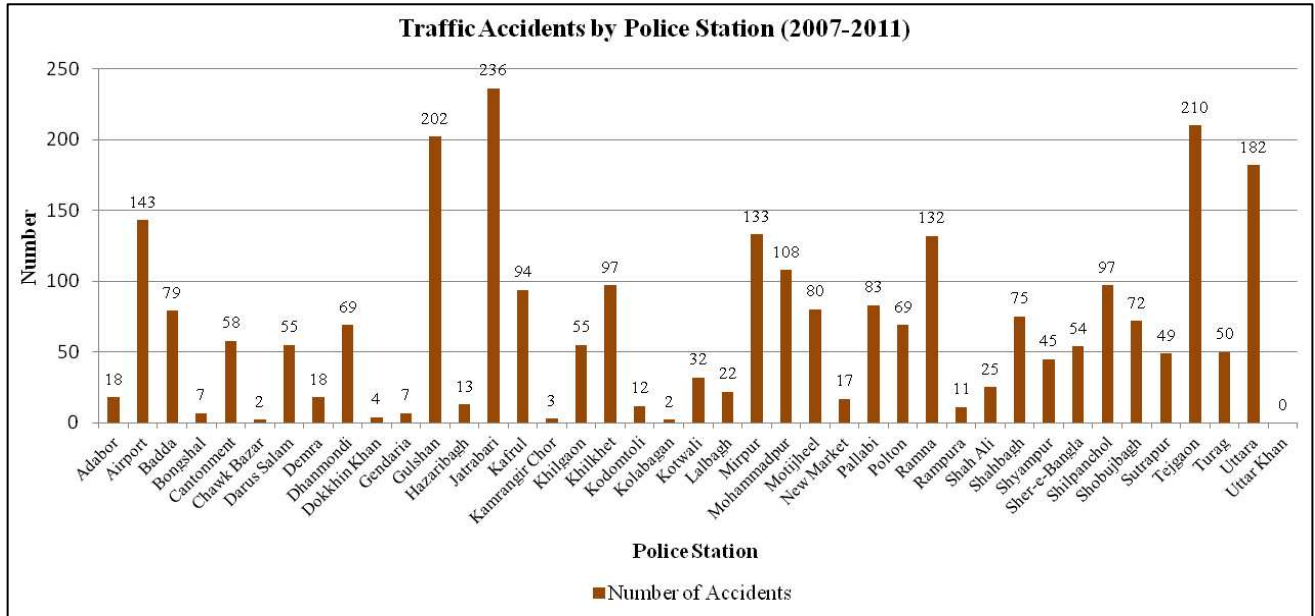
Figure 5.8: Traffic Accidents by Police Station

5.6. Traffic Accidents by Severity

From Figure 5.9, it is found that fatal accidents are dominant in DMP area. About 69% accidents cause fatality, while 19% accidents cause injury. Motor collision accidents occur in least numbers in Dhaka City.
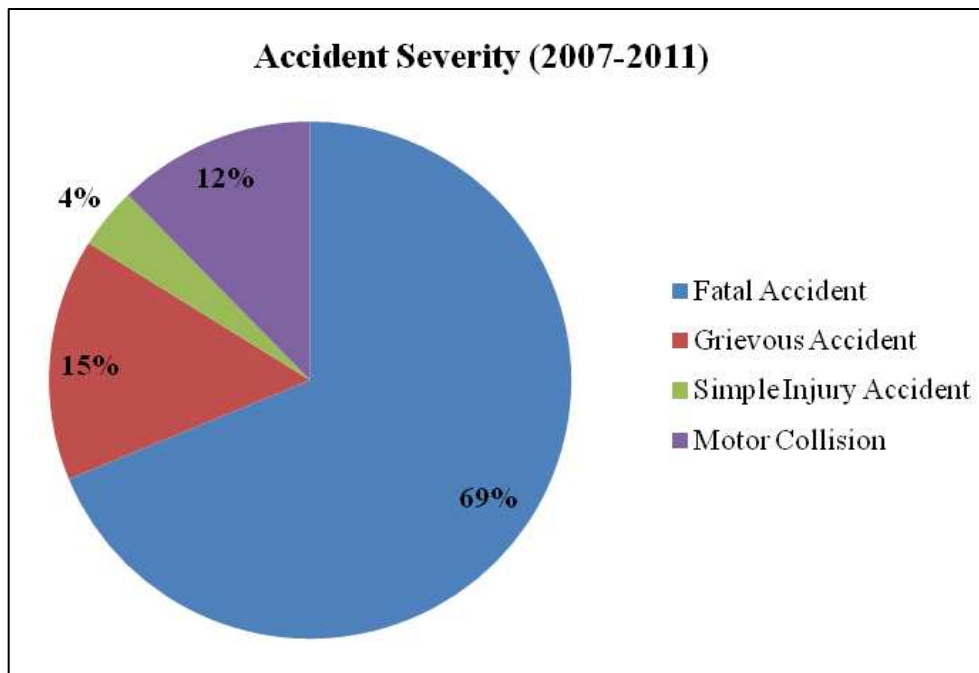
Figure 5.9: Traffic Accidents by Severity

5.7. Traffic Accidents in Junctions

The interesting thing is that most accidents take place in no junction area. Figure 5.10 illustrates that about 71% accidents (1925 out of 2720) occur where there is no junctions. Then 'Tee-Junction' is in second position (16%). Another vulnerable junction type is 'Cross-Junction' (12%). Accidents in 'Staggered-Junctions' and Railway Crossings are the least (Figure 5.10).
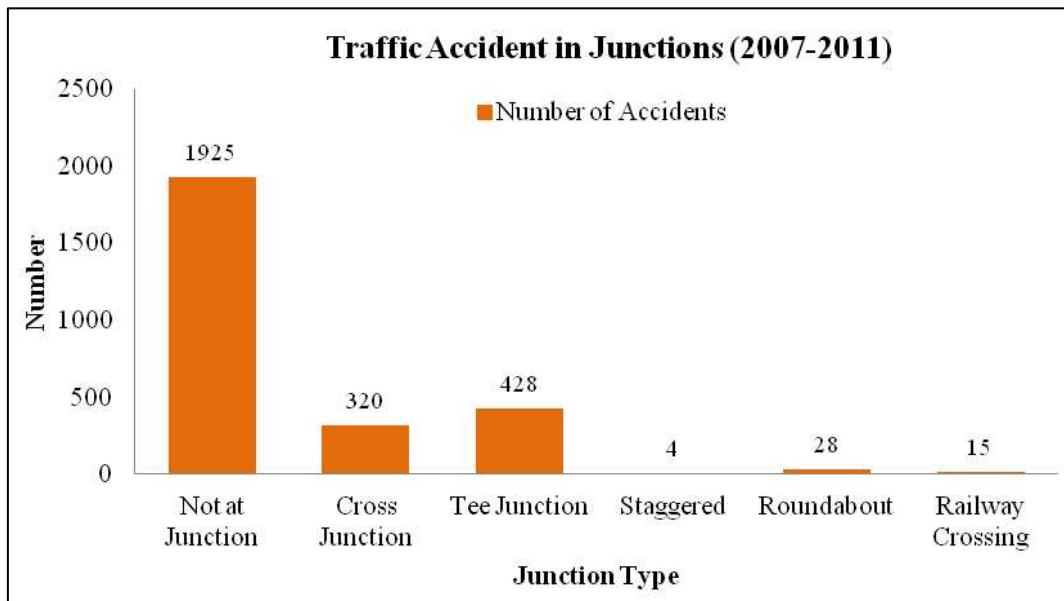
Figure 5.10: Traffic Accidents in Junctions

5.8. Traffic Control

In DMP area, over the years (2007-2011), most accidents occurred where there is no traffic control. This is nearly 63%, which means 1711 accidents out of 2720. Again, accidents in the presence to Police Control are also evident (33%). This is in second position.

Most distinctive part is that accidents both in the existence of traffic lights and police control are also high. Another aspect should be put into consideration is that about 1% accidents take place in zebra-crossings or due to pedestrian crossing. Though this number is quite low but it should be a matter of real concern (Figure 5.11).
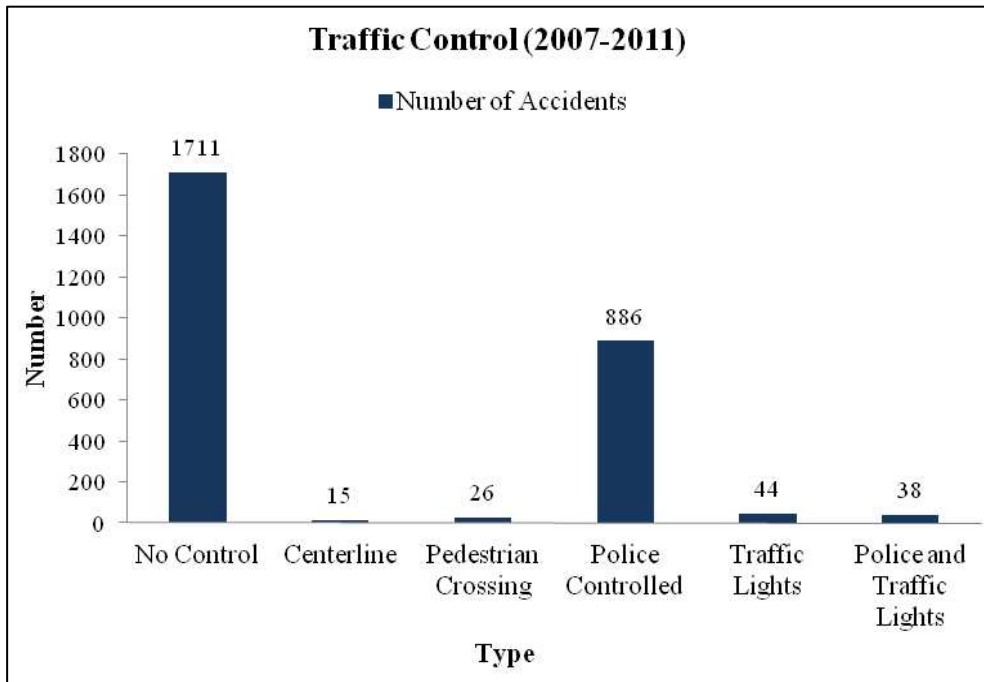
Figure 5.11: Traffic Control

5.9. Collision Type

In terms of collision type, an accident due to hitting a pedestrian is dominant (60%). Rear end accident type is in second position (25%). Head on (4%) collision is the third highest cause for traffic accidents (Figure 5.12).
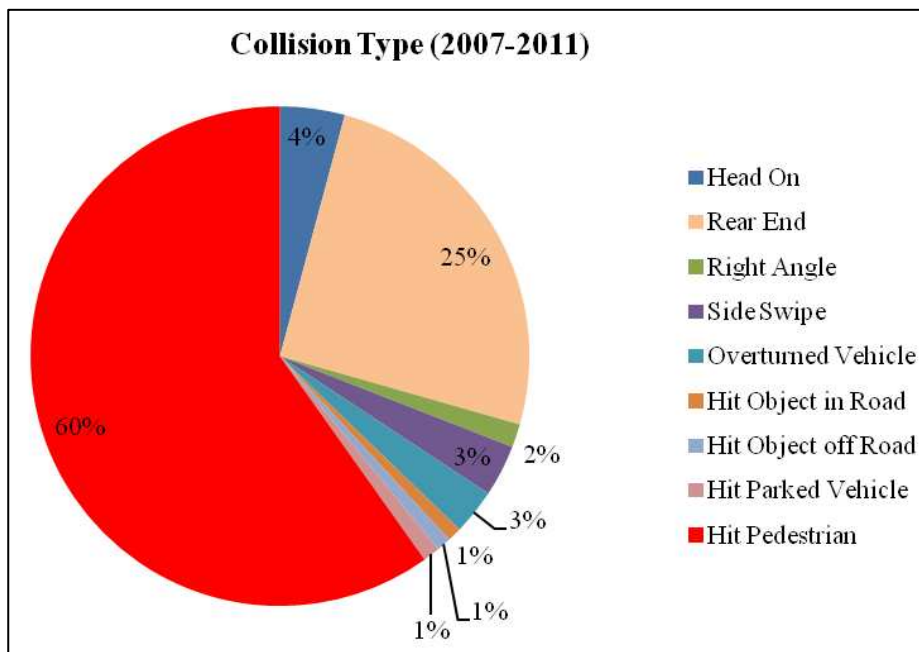
Figure 5.12: Collision Types

5.10. Traffic Movement and Road Divider

It is evitable from Figure 5.13 that most accidents (73%) take place in one-way streets. It means streets with road divider is more accident prone than streets without dividers. About 80% accidents occur where road dividers exist (Figure 5.14).
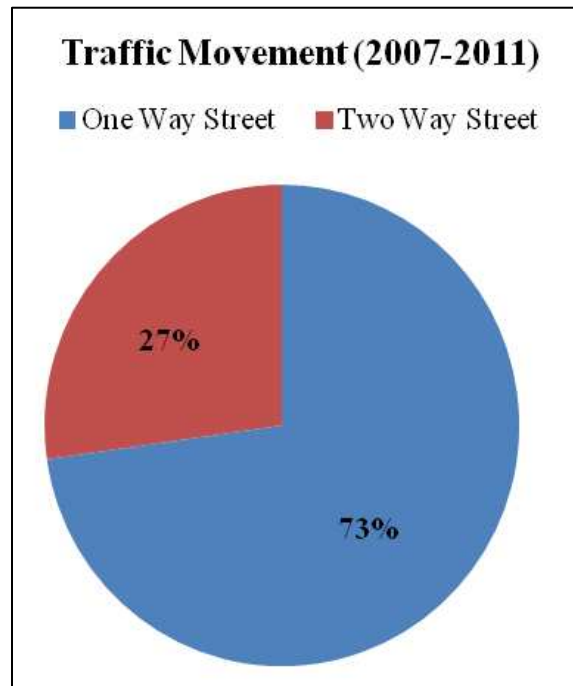
Figure 5.13: Traffic Movement
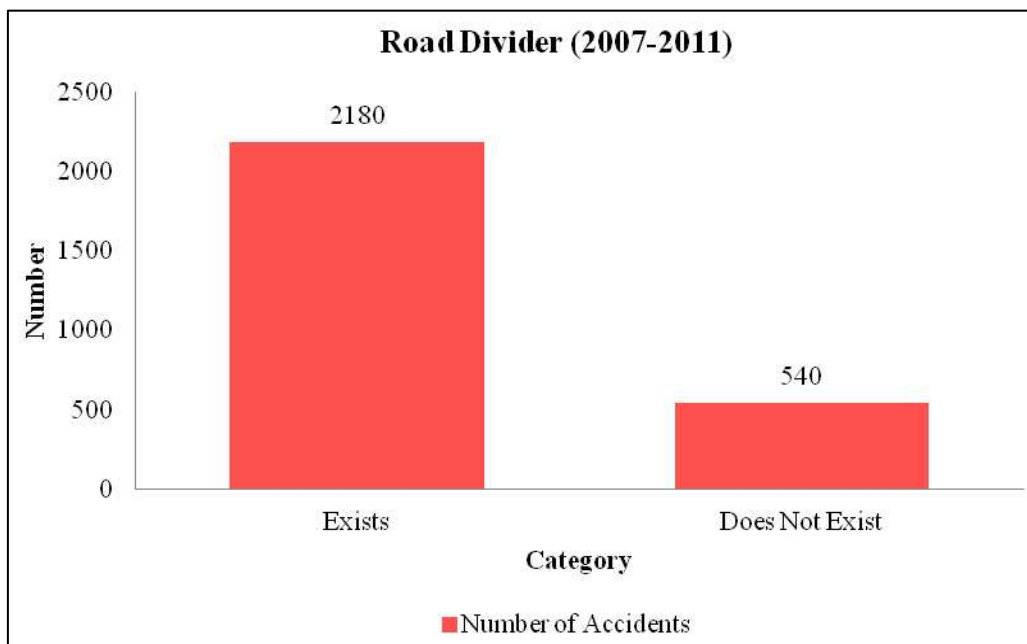
Figure 5.14: Road Divider

In normal situation, mostly road accidents take place in roads without dividers. This is a common scenario for national highways in the case of head-on collision. But for DMP area, the percentage of head-on collision is low (4%). Pedestrian collision is evident in Dhaka (60%). Therefore, road dividers play almost no role in traffic accidents. This is the reason for most accidents occurring in streets without road dividers.

5.11. Light

Most accidents (54%) take place in Daylight for Dhaka City (Figure 5.15). Accidents at night (with street lights) are in second position (30%).
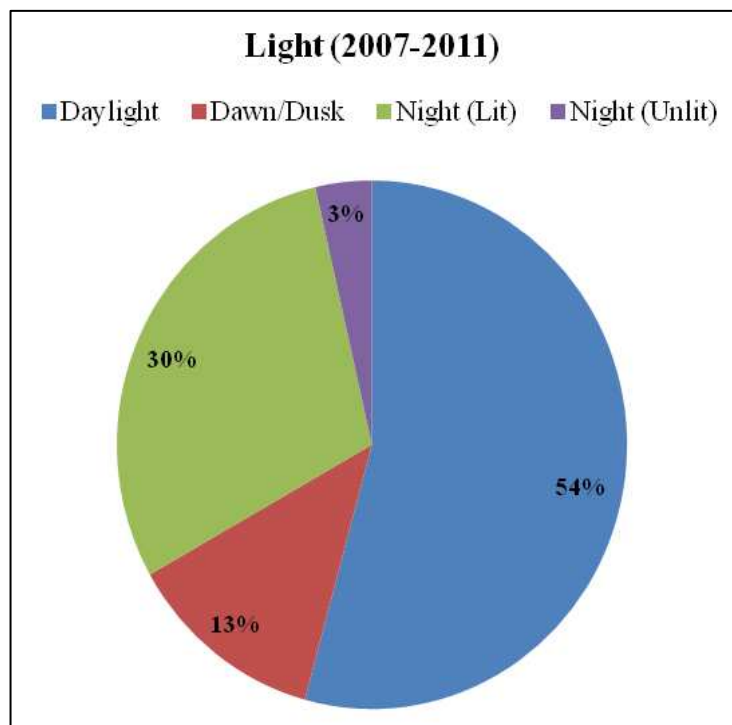
Figure 5.15: Light

5.12. Road Geometry

Traffic accidents are dominant in straight and flat roads (97%) of Dhaka City (Figure 5.16). Out of 2720 accidents, 2635 accidents took place in flat roads over the years of 2007-2011 while only 2% accidents occurred in curve streets (Figure 5.16).
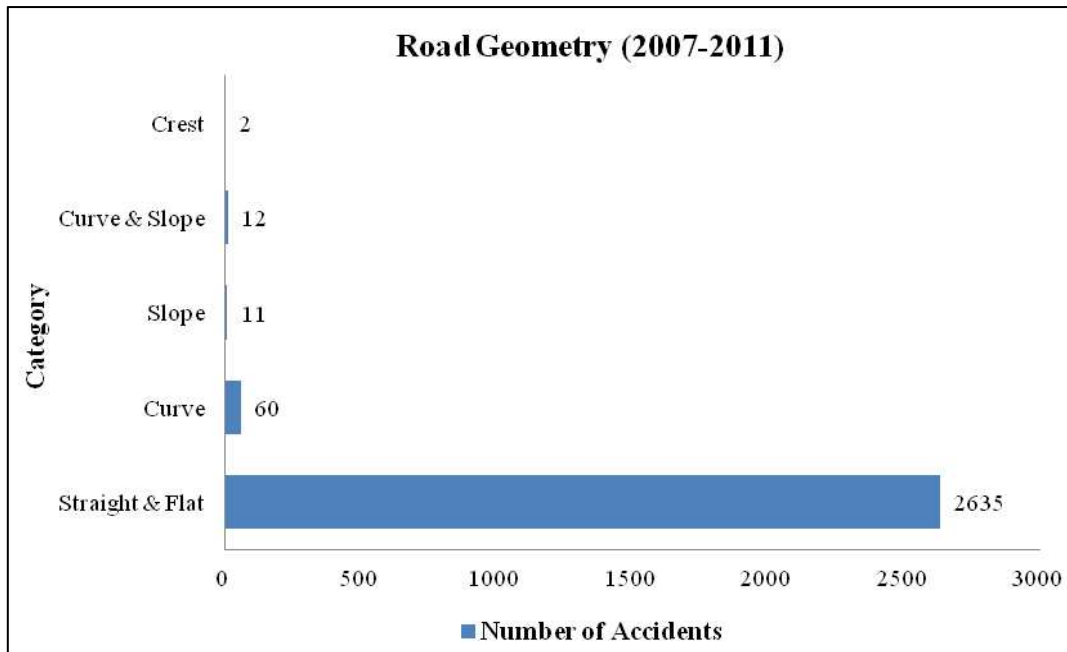
Figure 5.16: Road Geometry

5.13. Road Class

About 67% of the accidents took place in City Roads (Figure 5.17). Accidents occurring in National Highways are in second dominant position (32%).
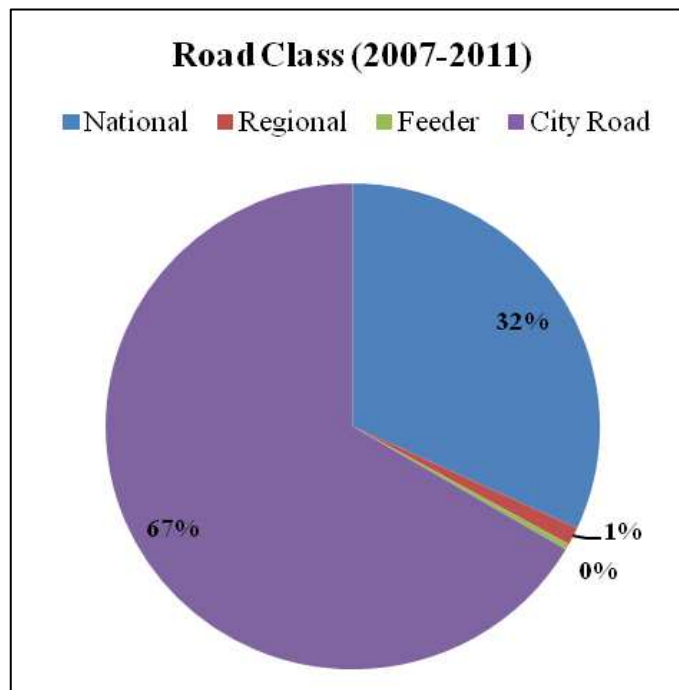
Figure 5.17: Road Classification

The relevant tables of this chapter are attached in Appendix-IV.

Chapter 6
Detailed Analysis of Mirpur Road

The combination of rapid urbanization and motorization has been a key cause of numerous transport problems in Dhaka City. It has resulted in accessibility, service levels, safety, comfort, operational efficiency and the urban environment.

The rapid urbanization process, high vehicular population growth, inadequate transportation facilities and policies, varied traffic mix with over concentration of non-motorized vehicles, absence of dependable public transport system and parking facilities have created a significant worsening of traffic problems in Dhaka.

6.1. Background of Mirpur Road

The following roads have been found most accident prone in DMP area (Figure 5.5):

    i.   Dhaka-Mymensing Road
    ii.   Airport Road
    iii.   **Mirpur Road**
    iv.   Dhaka-Chittagong Highway
    v.   Beribadh Road

The above mentioned roads are the top five most accident prone roads of Dhaka City. Mirpur Road is in third position. Massive construction of flyover is on-going in Airport Road. One part of Dhaka-Chittagong Highway is not under the jurisdiction of DCC area while in another part construction of flyover is on-going.

Moreover, Beribadh Road is also not under the jurisdiction of DCC area, this road vests on Water Development Board of Bangladesh. Dhaka-Mymensing road is under consideration of future Bus Rapid Transit (BRT) and Mass Rapid Transit (MRT) projects of DTCB.

Therefore, in a meeting with the World Bank mission [Fifth Implementation Support Mission, Aide Memoire: January 8-19, 2012 (Paragraph 46)], Mirpur Road has been selected as a new project area. This project, therefore, attempts to reduce traffic accident of Mirpur Road by 10% and increase the mobility by 10%.

Mirpur Road is one of the busiest roads of Dhaka City and plays a vital role in the integrated connection with various civic functions. It is considered as one of the major arterial roads of the city channeling the North-South flow of the vehicular traffics. It is serving as the key linkage among different prominent land uses of the city system.

As result, traffic with various purposes with different origins and destinations are circulating through this artery for sustain these linkages as flow entities of the entire transportation system of DMP area.

6.2. Traffic Accident Scenario of Mirpur Road

In this study, Mirpur Road actually covers the corridor from Azimpur to Gabtali (Bus Terminal). After analyzing Table 6.1 and Table 6.2, it is found that traffic accidents are decreasing over the years. In 2007, 67 traffic accidents took place in Mirpur Road which was reduced by 70% to only 19 accidents in year 2011.

Another characteristic like pedestrian casualties have been found higher (83%) in Mirpur Road. Figure 6.1-Figure 6.5; show the accident maps of different years (2007-2011) of this road. From the maps, it is easily visible which intersections of Mirpur Road are more vulnerable to traffic accidents. The following intersections are found most vulnerable (in ascending order of severity) for Mirpur Road:

1. Dhaka-Aricha Highway (Gabatali Bus Terminal)
2. Technical Training Center Intersection
3. Shishu Mela Intersection
4. New Market Intersection
5. Science Laboratory Intersection
6. Shyamoli Intersection
7. Pantha Path Intersection
8. College Gate Intersection
9. Azimpur Intersection
10. Aarong and Asad Gate Intersections

About 8% of the total accidents of DMP area occur only on this Mirpur arterial road (Table 5.1 and Table 6.1). Therefore, special measures relating to traffic engineering, enforcement and education (awareness) to reduce traffic accidents should be implemented as soon as possible.

Table 6.1: Traffic Accident Scenario of Mirpur Corridor [Azimpur to Gabtali] (Cause)

Year	* Total Number of Recorded Accidents	Number of Fatal Accidents			Number of Injury Accidents (Grievous and Simple)			Number of Motor Collision
		Pedestrian	**NMV	***MV	Pedestrian	**NMV	***MV	
2007	67	33	2	2	3	2	5	20
2008	52	29	1	6	2	2	7	8
2009	51	30	2	2	1	2	5	9
2010	36	23	1	2	5	1	1	3
2011	19	8	1	1	4	2	2	2

Table 6.2: Traffic Accident Scenario of Mirpur Corridor [Azimpur to Gabtali] (Effect)

Year	* Total Number of Recorded Accidents	Number of Fatal Casualties (Passengers or Drivers)			Number of Injury Casualties (Passengers or Drivers)			Total Number of Vehicles Involved in Traffic Accidents
		Pedestrian	**NMV	***MV	Pedestrian	**NMV	***MV	
2007	67	38	2	3	4	4	8	93
2008	52	30	3	7	3	5	9	70
2009	51	32	3	2	1	4	5	67
2010	36	23	1	2	5	1	1	43
2011	19	8	1	2	4	4	3	26

Note: One accident may cause fatality and injury at the same time. Moreover, one accident can cause more than one casualties.

* Number of Filled-Up Official Accident Reporting Forms during a Year

** NMV = Non-Motorized Vehicle

*** MV = Motorized Vehicle
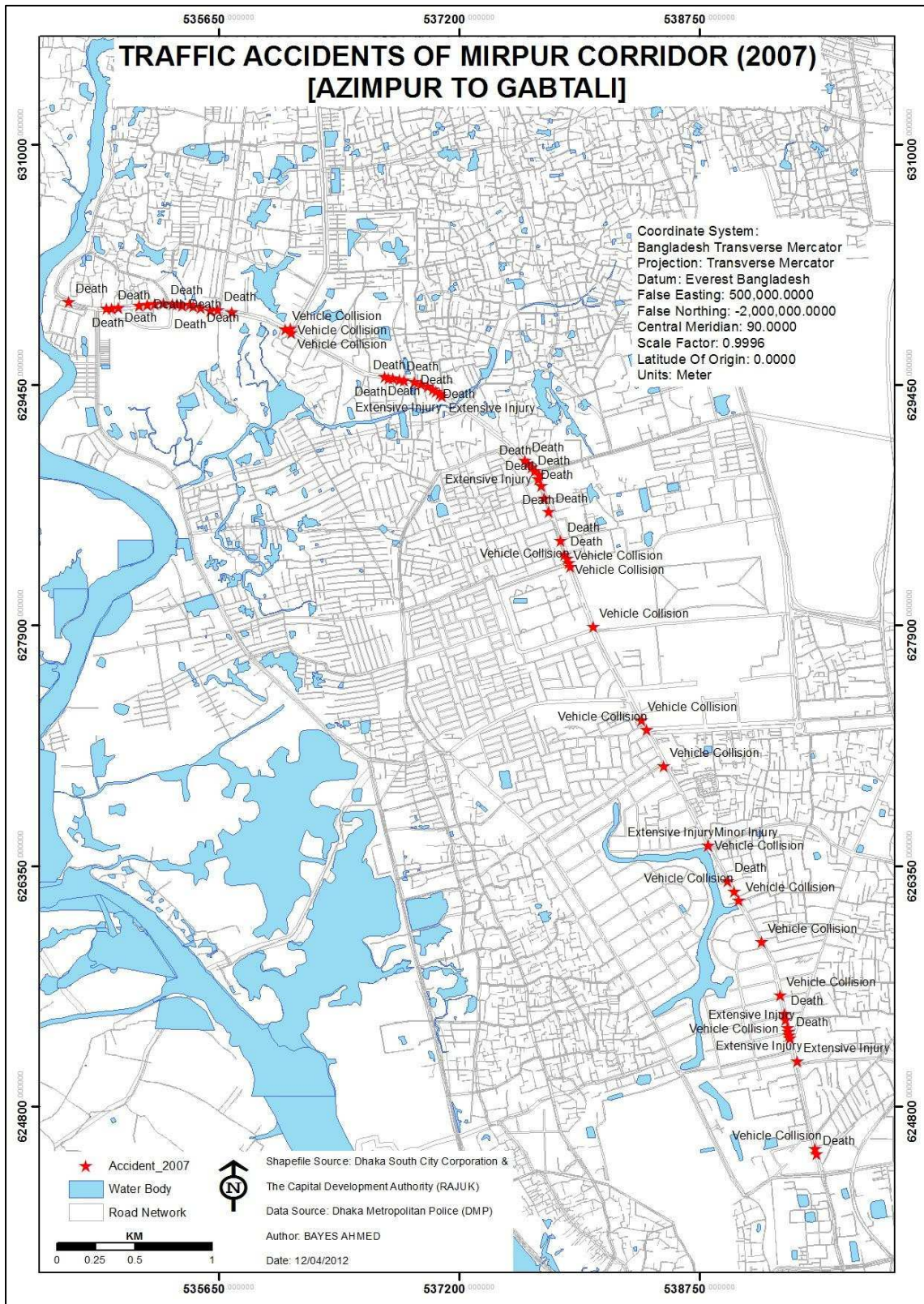
Figure 6.1: Traffic Accident Scenario of Mirpur Road (2007)
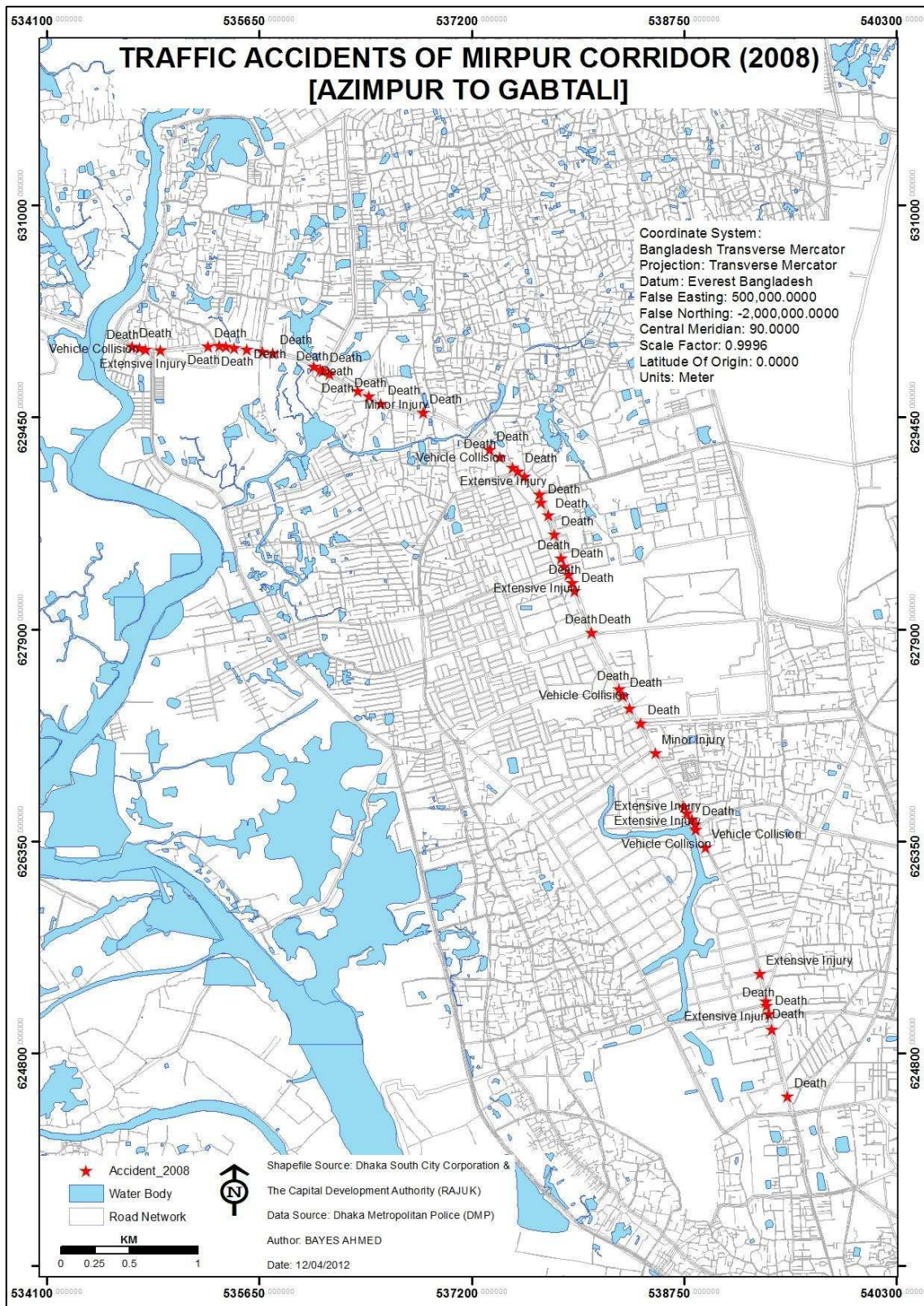
Figure 6.2: Traffic Accident Scenario of Mirpur Road (2008)
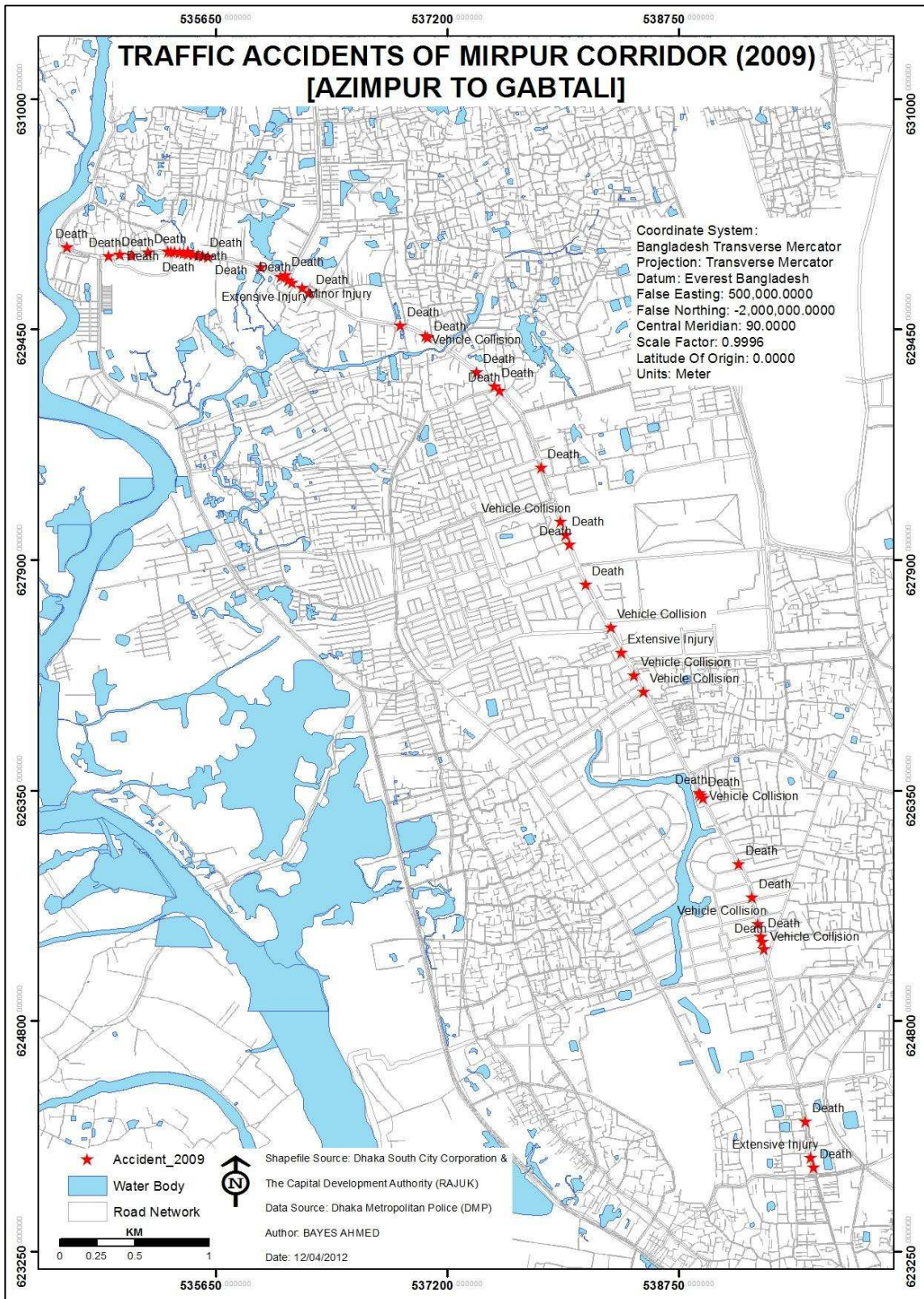
Figure 6.3: Traffic Accident Scenario of Mirpur Road (2009)
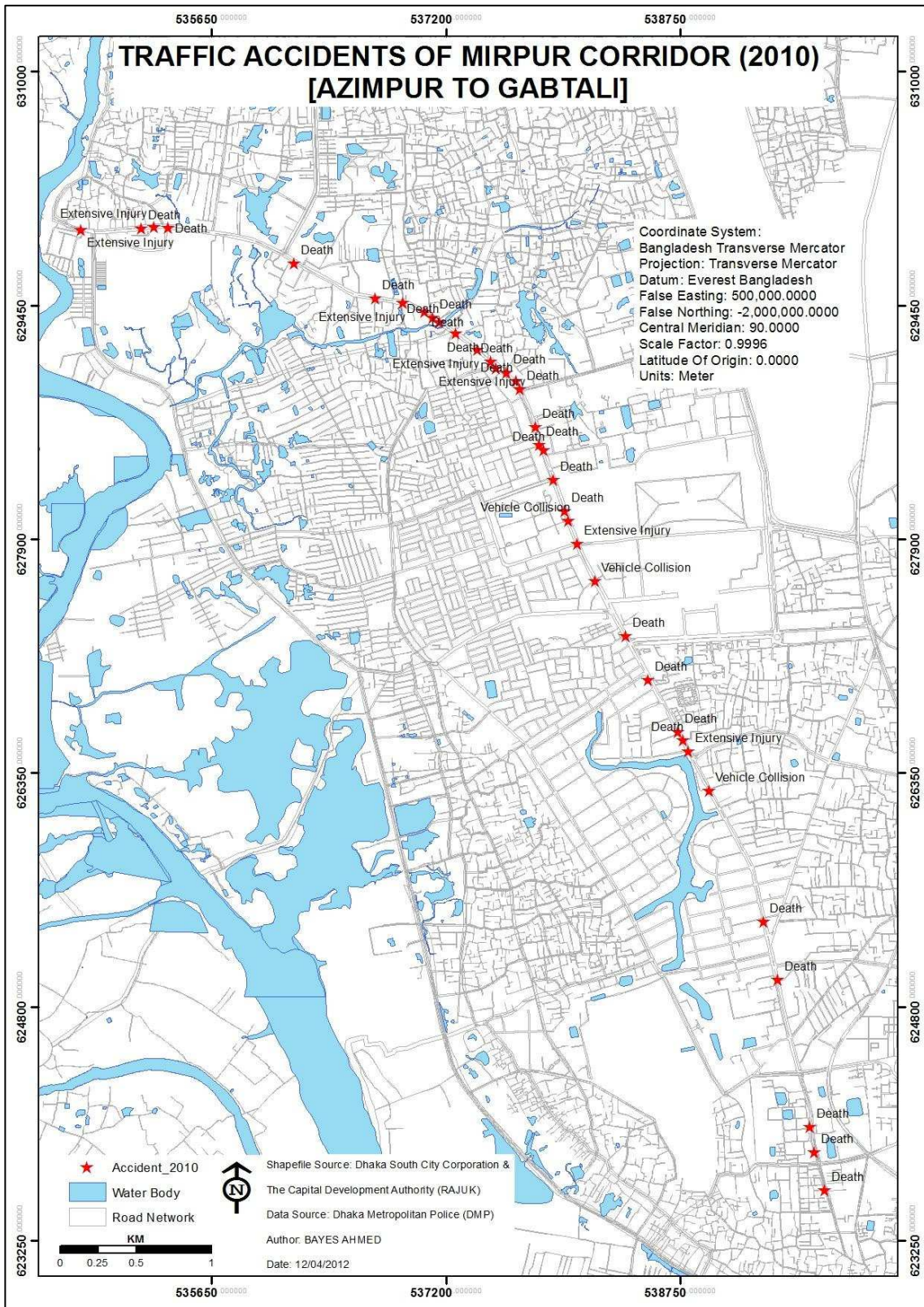
Figure 6.4: Traffic Accident Scenario of Mirpur Road (2010)
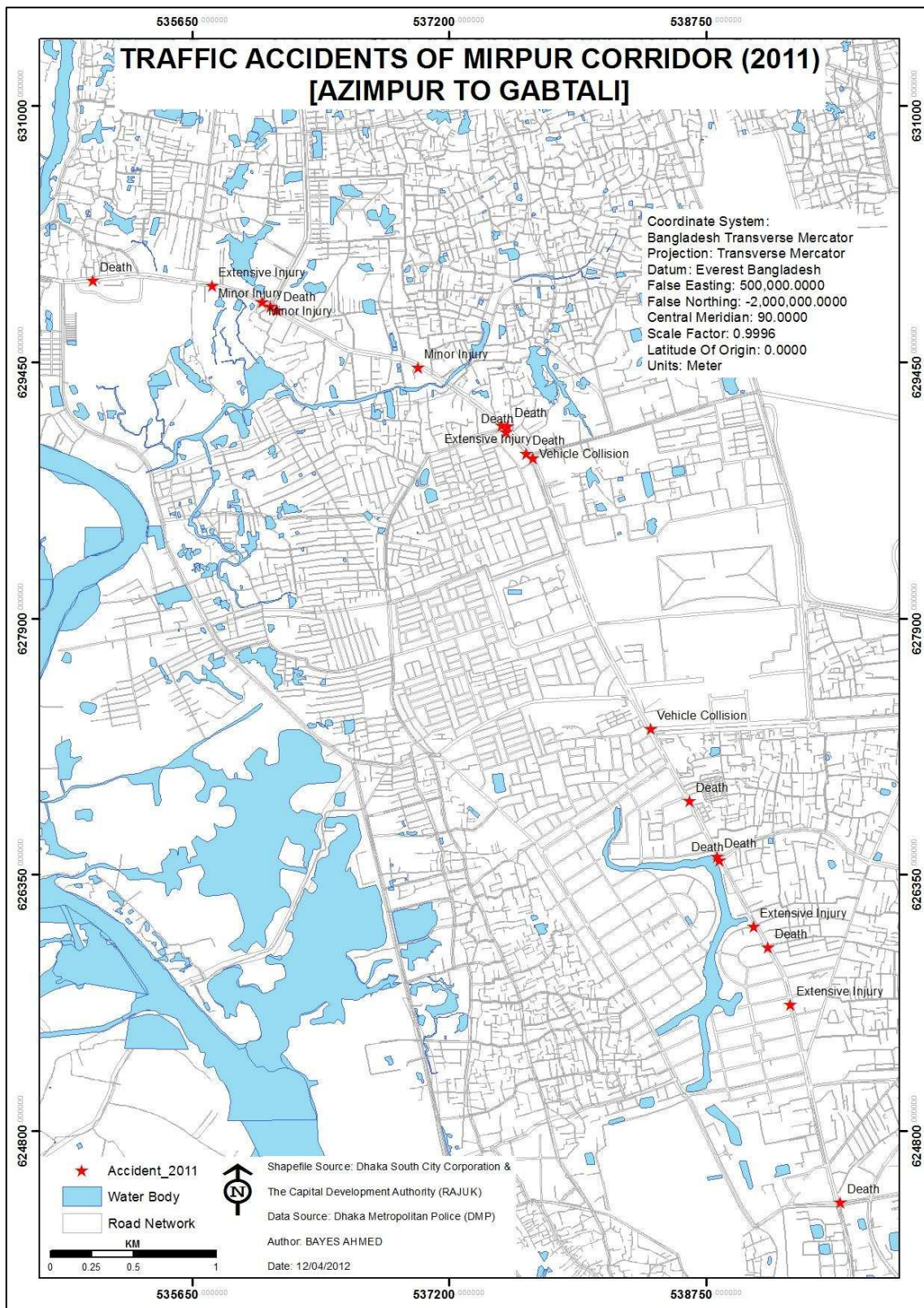
Figure 6.5: Traffic Accident Scenario of Mirpur Road (2011)

Chapter 7
Recommendations and Conclusion

Safety and efficiency are the two primary objectives of transportation engineering, planning and management. Traffic accidents cause a huge tangible as well as intangible burden on the society. Significant progress in crash reduction can be achieved through a comprehensive information system of traffic accident database and analyzing it properly. In this study, the road safety situation and trends of DMP area are discussed elaborately. It also discusses some contemporary issues and priorities in addressing the road safety problems.

7.1. Findings of the Study

The findings of this study are as follows:

a. Bangladesh Perspective

1. Bangladesh has one of the highest fatality rate in road accidents in the World.
2. The number of registered vehicles of Bangladesh is increasing gradually.

b. Scenario of Dhaka Metropolitan Area

1. Among all the major cities of Bangladesh, Dhaka is the most vulnerable both in terms of total number of accidents and accident rates.
2. Most accidents are occurring in the major arterial roads of Dhaka City, not in the tertiary access roads.
3. Indiscriminate use of footpath, uncontrolled pedestrian crossing, unskilled drivers and lack of adequate penalty are the major reasons for traffic accidents.
4. Dhaka Metropolitan Police is the only Government authorized legal source for collecting accident information.
5. Under-reporting, under-recording and improper transcription of accident reporting forms are some of the major drawbacks for accident data collection.
6. On an average, the total numbers of traffic accidents are reducing by 11% each year.
7. Fatal accidents and motor collisions are decreasing while injury accidents are increasing.
8. Approximately 95% of the total accidents take place in the selected 30 roads.

9. The following roads are most accident prone:

      i.   Dhaka-Mymensing Road

      ii.   Airport Road

      iii.   Mirpur Road

      iv.   Dhaka-Chittagong Highway

      v.   Beribadh Road

10. No profound effect of weather/season on road accidents is found.

11. Most traffic accidents:

      i.   Cause fatality (69%)

      ii.   Hit a pedestrian (60%)

      iii.   Dominant in straight and flat roads (97%)

12. Most traffic accidents occur:

⇨ where there is 'No Junction' (71%)

⇨ where there is 'No Traffic Control' (63%)

⇨ in 'One-Way Streets' (73%)

⇨ where 'Road Dividers' exist (80%)

⇨ in 'Daylight' (54%)

⇨ in 'City Roads' (67%)

7.2. Recommendations

Key factors affecting the urban transport sector of Dhaka are characterized by [2]:

a) Rapid growth in urban population

b) Generally poor infrastructure or lack of infrastructure with low level of maintenance

c) Weak local government institutions with inadequate capacity for planning and implementing projects

d) Overlapping and poor coordination among different ministries, departments and municipal agencies entrusted with managing urban transport and

e) Inadequate public transport regulation.

Based on the findings of this study the following recommendations are made:

a. Engineering Aspects

1. Small changes/improvements in road geometric layout and use of roundabouts where necessary.

2. Provision for and augmenting of adequate pedestrian facilities like safe crossing, treatments or construction of sidewalks/footpaths and foot-over bridges, safer zones, grade separation, time separation, raised meridians etc.

3. Provision of special facilities (e.g. separate lanes) for non-motorized vehicles and designated bus lanes.

4. Intersections design improvements like channelization, traffic islands etc.

5. Improvements of narrow and deteriorated lanes, bridges and culverts.

6. Improved access controls, road surface, roadway shoulder, cross-sections, sight distances, alignments, traffic signs, traffic signals, road markings, traffic calming devices and lighting.

7. Speed control in specific vulnerable areas.

8. Treatment of known hazardous roads or corridors or black-spots.

9. Pedestrian count and travel speed survey of the most vulnerable roads should be performed on regular basis.

b. Enforcement Aspects

10. Forcing the pedestrians to use the foot-over bridges or over-passes or under-passes through proper channelization.

11. Ensure safer vehicle standard for road worthiness as well as for crash worthiness.

12. Effective enforcement of laws and provision for adequate penalty for violating the rules.

13. Strict driving licensing is critically important.

14. Improvement of the existing 'Motor Vehicle Ordinance'.

15. Ensure vehicle standard and fitness requirements by strengthening technical inspection system for checking and testing of vehicles.

16. Periodic safety audits in existing roads.

17. Controlling dangerous and undesirable over takings using appropriate traffic calming measures.

18. Haphazard parking on road side and illegal use of footpath should be eradicated.

19. Detail landuse master plan must be developed and proper implementation should be ensured.

c. Educational Aspects

20. Training of the police officers and concerned staffs regarding traffic management, accident data collection and filling the ARFs properly.

21. Incorporating modern technologies (e.g. using GIS techniques instead of MAAP5 software) in analyzing and upgrading traffic accidents related issues.

22. Intensifying road safety awareness and publicity campaigns including pragmatic measures to improve and rectify road user behaviors through public motivational programs.

23. Developing and implementing community based road safety programs frequently.

24. Develop appropriate road safety resource materials and promote road safety education in schools.

25. Strengthening institutional and professional capacity of all the concerned agencies, stakeholders, NGOs, private companies and organizations for the successful implementation of road safety measures.

26. Introduction to road safety audit process into road planning, design and construction process.

27. Intensified and effective high profile police enforcement should be promoted to deter unsafe behaviors and violations using both actual and perceived enforcement strategies.

28. Promote strategies to counteract the effect of drivers fatigue in driving for long periods.

29. Secure legitimate and adequate funding to support road safety initiatives including research, training and road safety promotional activities.

30. To strengthen and co-ordinate accident and casualty data collection system involving different agencies and research organizations.

31. Rehabilitation of street hawkers, mobile vendors and slum dwellers from carriageways and footpaths would be ensured.

32. Alternative income sources for drivers to reduce over-duty.

33. Electronic and print media should publish articles and news on traffic safety rules and accident incidents on regularly.

d. Emergency Response Aspects

34. Prompt emergency assistance and efficient trauma care management are clearly important in minimizing the road accident deaths and therefore should be introduced.
35. Trauma care specialists to be trained and employed in all general hospitals.
36. Specialized rehabilitation centers should be established in different zones.

7.3. Conclusion

The global forecast has indicated that over the next 10 years developing countries like Bangladesh will experience an alarming increase in road accidents and casualties. Addressing the safety problems thus emerges a serious challenge in the absence of requisite transport safety professionals and resources [6].

Critical measures needed to reduce the national burden of deaths and injuries include adequate management and co-ordination of the problem, sustainable funding, the development of a strategic plan, an adequate database and a well trained dedicated group of experts working on the problems.

Analysis of traffic accident is a complex task, as many factors can play important role in the occurrence of the event. An integrated approach using scientific and technological advances should be adopted to mitigate and manage traffic accidents which will be a pioneer research work in the context of Dhaka City or especially for Bangladesh.

There is urgent need and scope for improving the road safety situation by implementing an effective and coordinated safety policy and actions which require significant improvements in relevant sectors.

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Appendix-I

Accident Reporting Form (ARF)

গণপ্রজাতন্ত্রী বাংলাদেশ সরকার
পুলিশ হেডকোয়ার্টার্স, ঢাকা।

নং-এস, আর, ও   প্রজ্ঞাপন   তারিখ ঃ

Police Act, 1861 (V of 1861) এর section 12 এ প্রদত্ত ক্ষমতাবলে মহা-পুলিশ পরিদর্শক, সরকারের পূর্বানুমোদনক্রমে, Police Regulations Bengal, 1943 এর নিম্নরূপ অধিকতর সংশোধন করিল, যথা:-

উপরি-উক্ত Regulations এর Volume II এর B.P. Form No. 34/Bengal Form No-403Q এর পরিবর্তে নিম্নরূপ Form প্রতিস্থাপিত হইবে, যথা:-

__B.P. Form No. 34__
Bengal Form No. 403Q

1. ACCIDENT REPORT NO.	**BANGLADESH POLICE** Register of Road Traffic Accident (REPORT FORM) [Regulation 254(b)]	3. THANA
2. FIR NO.		4. DISTRICT/MET. POL.

5. NUMBER OF VEHICLES INVOLVED		9. ACCIDENT SEVERITY	DATE OF OCCURRENCE	11. DATE 12. MONTH 13. YEAR
6. NUMBER OF DRIVER CASUALTIES		F. Fatal Accident / G. Grievous Accident	........../............/...........	
7. NUMBER OF PASSENGER CASUALTIES		S. Simple Injury Accident / M. Motor Collision	14. TIME OF OCCURRENCE	
			Date Of Reporting	
8. NUMBER OF PEDESTRIAN CASUALTIES		10. DAY	Time Of Reporting	

15. JUNCTION TYPE
1. Not at Junction
2. ✚
3. ┳
4. ┻
5. ⟳ (roundabout)
6. Railway
7. Other ....

16. TRAFFIC CONTROL
1. No Control
2. Centreline
3. Pedestrian Crossing
4. Police Controlled
5. Traffic Lights
6. Police + Traffic Lights
7. Stop/Give Way sign
8. Other ....

17. COLLISION TYPE
1. Head On
2. Rear End
3. Right Angle
4. Side Swipe
5. Overturned Vehicle
6. Hit Object in Road
7. Hit Object off Road
8. Hit Parked Vehicle
9. Hit Pedestrian
10. Hit Animal
11. Other ....

18. MOVEMENT
1. 1-Way Street
2. 2-Way Street

19. DIVIDER ?
1. Yes
2. No

20. WEATHER
1. Fair
2. Rain
3. Wind
4. Fog

21. LIGHT
1. Daylight
2. Dawn/Dusk
3. Night (lit)
4. Night (unlit)

22. ROAD GEOMETRY
1. Straight + Flat
2. Curve Only
3. Slope Only
4. Curve + Slope
5. Crest

23. SURFACE CONDITION
1. Dry
2. Wet
3. Muddy
4. Flooded
5. Other ....

24. SURFACE TYPE
1. Sealed
2. Brick
3. Earth

25. SURFACE QUALITY
1. Good
2. Rough
3. Under Repair

26. ROAD CLASS
1. National
2. Regional
3. Feeder
4. Rural Road
5. City

27. ROAD FEATURE
1. None
2. Bridge ....
3. Culvert
4. Narrowing/Restriction
5. Speed Breakers

28. LOCATION TYPE
1. Urban Area
2. Rural Area

OFFICE USE ONLY
29. XY MAP
30. X
31. Y
32. ROUTE
33. KM
34. 100m
35. NODE MAP
36. NODE 1
37. NODE 2

LOCATION

Name of City/Town/Village .... Distance: .... (km/m)

Name of Road .... Between { Landmark 1 .... Distance: .... (km/m)

Landmark 2 .... Distance: .... (km/m)

JUNCTION ACCIDENT ONLY Name of SECOND Road .... Distance: .... (km/m)

LOCATION SKETCH Show site in relation to prominent landmarks such as KM posts, bridges or road intersections. Mark distances to the landmarks.

COLLISION DIAGRAM SKETCH mark the position and direction of each vehicle and details of the road layout at the site of the accident

SUMMARY OF ACCIDENT
....
....
....
....
....
....
....
....
....
....

WITNESSES
1. Name & Address ....
....
2. Name & Address ....

RECORDING OFFICER
Name/Rank .... Date ....

INVESTIGATING OFFICER
Name/Rank .... Date ....

SUPERVISING OFFICER
Name/Rank .... Date ....

SECTION OF LAW

STATUS OF CASE
1. Charge Sheet
2. Final Report
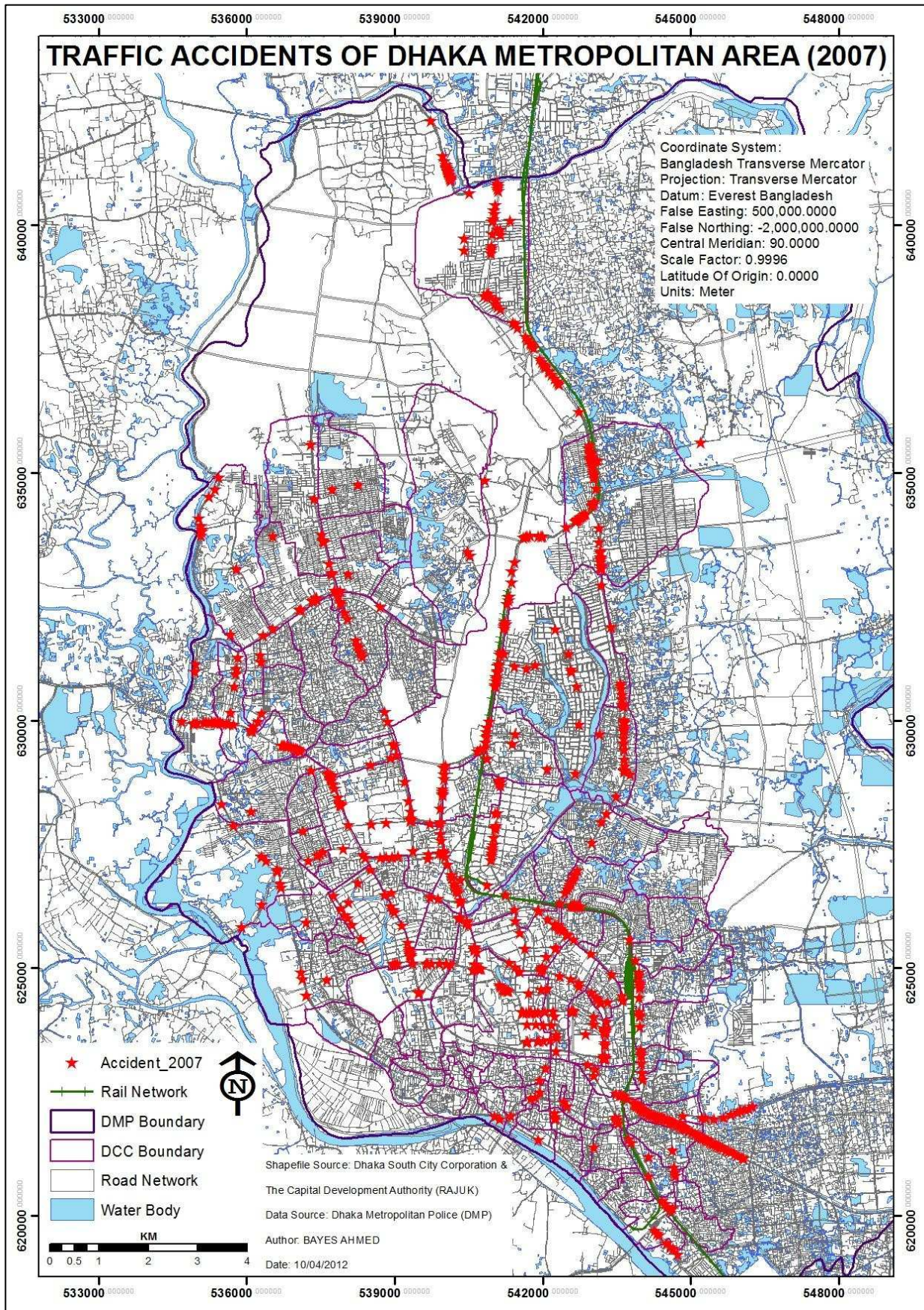3. Under Investigation

Contd P/2

Appendix-I

Accident Reporting Form (ARF)

Additional form(s) will be needed if there are more than 2 vehicles, more than 8 passenger casualties or more than 3 pedestrian casualties. Mark each additional form with the REPORT NUMBER, THANA, DISTRICT/MET POL. and YEAR. Fix forms together

VEHICLE 1 — OWNER'S NAME | DRIVER 1 — NAME

OWNER'S ADDRESS | ADDRESS

VEHICLE MANUFACTURER | VEHICLE REGISTRATION | DRIVING LICENSE

38. DISTRICT | 39. NUMBER | 46. DISTRICT | 47. NUMBER

40. VALID FITNESS CERTIFICATE 1. Yes 2. No 3. n/a | INSURANCE COVER 1. Third Party 2. Comprehensive | LICENSE TYPE + CATEGORY   EXPIRY DATE

41. VEHICLE TYPE
1. Bicycle
2. Rickshaw
3. Push Cart
4. Motor Cycle
5. Baby Taxi
6. Tempo
7. Microbus
8. Minibus
9. Bus
10. Car
11. Jeep
12. Pick Up
13. Truck (<3.5t)
14. Heavy Truck
15. Artic. Truck
16. OilTanker
17. Tractor
18. Animal Drawn
19. Other ....

42. VEHICLE MANOEUVRE
1. Left Turn
2. Right Turn
3. 'U' Turn
4. Crossing Road
5. Overtaking
6. Going Ahead
7. Reversing
8. Sudden Start
9. Sudden Stop
10. Parked
11. Other ....

48. DRIVER SEX
1. Male
2. Female

49. DRIVER INJURY
F. Fatal
G. Grievous
S. Simple Injury
N. Not Injured

50. DRIVER AGE

43 VEHICLE LOADING
1. Legal
2. Illegal/Unsafe

44. VEHICLE DEFECT (from MVI report)
1. None
2. Lights
3. Brakes
4. Steering
5. Tyres
6. Multiple
7. Other

45. VEHICLE DAMAGE (Sustained in accident)
1. None
2. Front
3. Rear
4. Right
5. Left
6. Roof
7. Multiple
8. Other ....

51. ALCOHOL
1. Alcohol Suspected
2. Not Suspected

52 SEAT BELT/HELMET
1. Seat Belt/Helmet Worn
2. Not Worn

VEHICLE 2 — OWNER'S NAME | DRIVER 2 — NAME

OWNER'S ADDRESS | ADDRESS

VEHICLE MANUFACTURER | VEHICLE REGISTRATION | DRIVING LICENSE

38. DISTRICT | 39. NUMBER | 46. DISTRICT | 47. NUMBER

40. VALID FITNESS CERTIFICATE 1. Yes 2. No 3. n/a | INSURANCE COVER 1. Third Party 2. Comprehensive | LICENSE TYPE + CATEGORY   EXPIRY DATE

41. VEHICLE TYPE
1. Bicycle
2. Rickshaw
3. Push Cart
4. Motor Cycle
5. Baby Taxi
6. Tempo
7. Microbus
8. Minibus
9. Bus
10. Car
11. Jeep
12. Pick Up
13. Truck (<3.5t)
14. Heavy Truck
15. Artic. Truck
16. OilTanker
17. Tractor
18. Animal Drawn
19. Other ....

42. VEHICLE MANOEUVRE
1. Left Turn
2. Right Turn
3. 'U' Turn
4. Crossing Road
5. Overtaking
6. Going Ahead
7. Reversing
8. Sudden Start
9. Sudden Stop
10. Parked
11. Other ....

48. DRIVER SEX
1. Male
2. Female

49. DRIVER INJURY
F. Fatal
G. Grievous
S. Simple injury
N. Not Injured

50. DRIVER AGE

43. VEHICLE LOADING
1. Legal
2. Illegal/Unsafe

44. VEHICLE DEFECT (from MVI report)
1. None
2. Lights
3. Brakes
4. Steering
5. Tyres
6. Multiple
7. Other

45. VEHICLE DAMAGE (Sustained in accident)
1. None
2. Front
3. Rear
4. Right
5. Left
6. Roof
7. Multiple
8. Other ....

51. ALCOHOL
1. Alcohol Suspected
2. Not Suspected

52 SEAT BELT/HELMET
1. Seat Belt/Helmet Worn
2. Not Worn

PASSENGER CASUALTIES

Complete 1 FULL line for each passenger casualty   * = See Reference boxes below

NAME AND ADDRESS	53. VEH. NO	54. SEX	55. AGE	56.* INJURY	57.* POSITION	58.* ACTION
1.						
2.						
3.						
4.						
5.						
6.						

PEDESTRIAN CASUALTIES

Complete 1 FULL line for each pedestrian casualty   * = See Reference boxes below

NAME AND ADDRESS	59. VEH. NO	60. SEX	61.* AGE	62.* INJURY	63.* LOCATION	64.* ACTION
1.						
2.						
3.						

FOR REFERENCE ONLY — DO NOT CIRCLE

56. PASSENGER INJURY / 62. PEDESTRIAN INJURY
F. Fatal
G. Grievous Injury
S. Simple Injury

57. PASSENGER POSITION
1. Inside Vehicle
2. Outside Vehicle
3. On Roof

58. PASSENGER ACTION
1. No action
2. Boarding
3. De-boarding
4. Falling off
5. Other

63. PEDESTRIAN LOCATION
1. On pedestrian crossing
2. Within 50m of ped.crossing
3. Central Island/divider
4. Road centre
5. Footpath
6. Road side
7. Bus stop

64. PEDESTRIAN ACTION
1. No action
2. Crossing the road
3. Walking along the road
4. Walking along road side
5. Playing on the road

CONTRIBUTORY FACTORS
1. Speeding
2. Careless driving
3. Driver fatigue
4. Driving too close
5. Bad driver signals
6. Bad overtaking
7. Bad turning
8. Drunk driver
9. Pedestrian action
10. Passenger action
11. Road condition
12. Road Feature
13. Weather
14. Vehicle Defect
15. Unsafe Loading
16. Tyre Burst
17. Animal Action
18. Other ....

65.
66.
67.

Appendix-II

Traffic Accident Scenario of Dhaka Metropolitan Area (2007)

TRAFFIC ACCIDENTS OF DHAKA METROPOLITAN AREA (2007)

Coordinate System:
Bangladesh Transverse Mercator
Projection: Transverse Mercator
Datum: Everest Bangladesh
False Easting: 500,000.0000
False Northing: -2,000,000.0000
Central Meridian: 90.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter

★ Accident_2007
Rail Network
DMP Boundary
DCC Boundary
Road Network
Water Body

Shapefile Source: Dhaka South City Corporation &
The Capital Development Authority (RAJUK)
Data Source: Dhaka Metropolitan Police (DMP)
Author: BAYES AHMED
Date: 10/04/2012

KM
0 0.5 1   2   3   4

Appendix-II

Traffic Accident Scenario of Dhaka Metropolitan Area (2007)

FATAL ACCIDENTS OF DHAKA METROPOLITAN AREA (2007)

Coordinate System:
Bangladesh Transverse Mercator
Projection: Transverse Mercator
Datum: Everest Bangladesh
False Easting: 500,000.0000
False Northing: -2,000,000.0000
Central Meridian: 90.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter

★ Fatality_2007
Rail Network
DMP Boundary
DCC Boundary
Road Network
Water Body

N

KM
0 0.5 1 2 3 4

Shapefile Source: Dhaka South City Corporation &
The Capital Development Authority (RAJUK)
Data Source: Dhaka Metropolitan Police (DMP)
Author: BAYES AHMED
Date: 11/04/2012

Appendix-II

Traffic Accident Scenario of Dhaka Metropolitan Area (2007)

INJURY ACCIDENTS OF DHAKA METROPOLITAN AREA (2007)

Coordinate System:
Bangladesh Transverse Mercator
Projection: Transverse Mercator
Datum: Everest Bangladesh
False Easting: 500,000.0000
False Northing: -2,000,000.0000
Central Meridian: 90.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter

★ Injury_2007
Rail Network
DMP Boundary
DCC Boundary
Road Network
Water Body

KM
0 0.5 1 2 3 4

Shapefile Source: Dhaka South City Corporation &
The Capital Development Authority (RAJUK)
Data Source: Dhaka Metropolitan Police (DMP)
Author: BAYES AHMED
Date: 11/04/2012

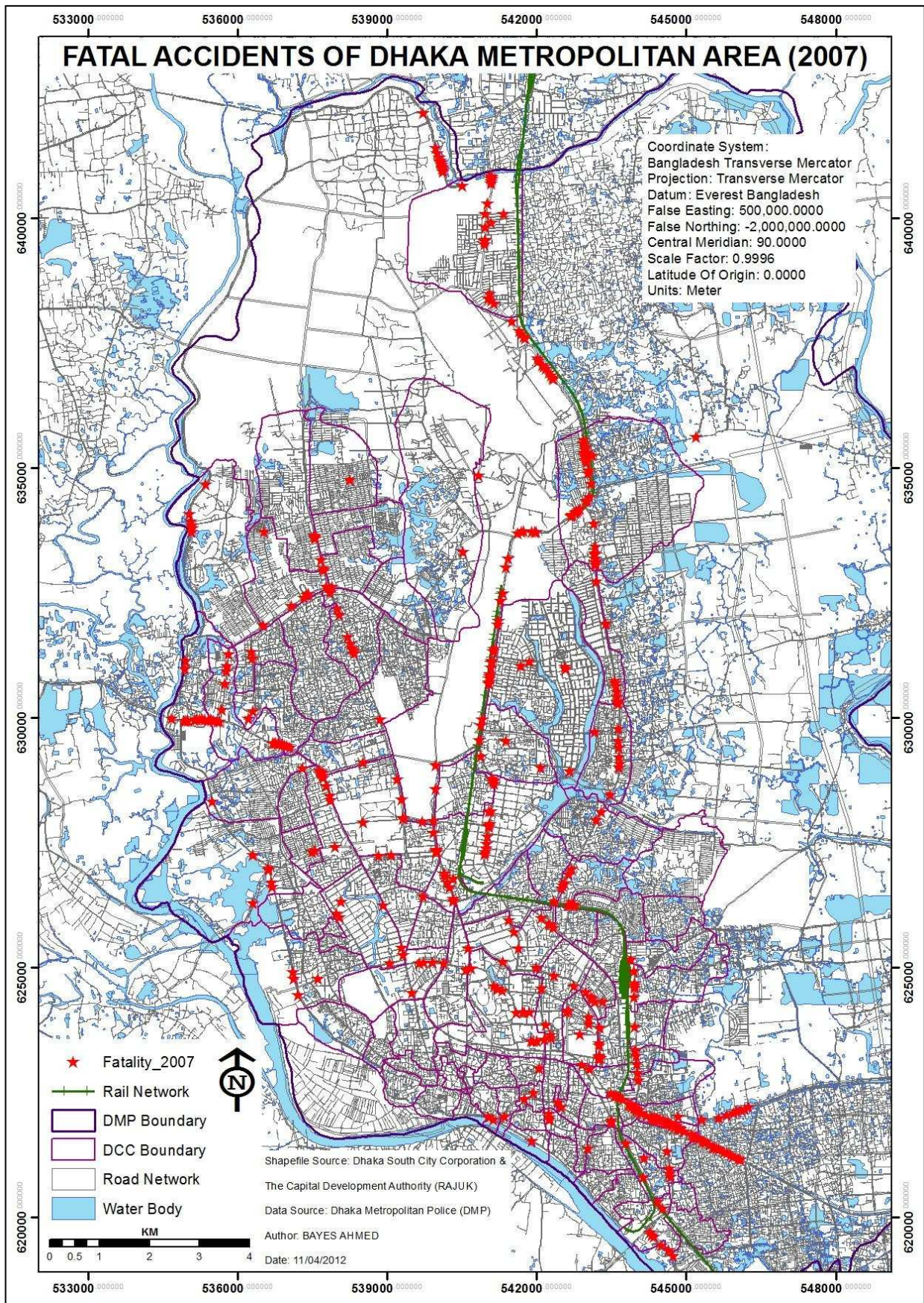**Traffic Accident Scenario of Dhaka Metropolitan Area (2007)**

Traffic Accident Scenario of Dhaka Metropolitan Area (2008)

Traffic Accident Scenario of Dhaka Metropolitan Area (2008)

FATAL ACCIDENTS OF DHAKA METROPOLITAN AREA (2008)

Coordinate System:
Bangladesh Transverse Mercator
Projection: Transverse Mercator
Datum: Everest Bangladesh
False Easting: 500,000.0000
False Northing: -2,000,000.0000
Central Meridian: 90.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter

★ Fatality_2008
╬ Rail Network
▭ DMP Boundary
▭ DCC Boundary
▭ Road Network
▬ Water Body

Shapefile Source: Dhaka South City Corporation &
The Capital Development Authority (RAJUK)
Data Source: Dhaka Metropolitan Police (DMP)
Author: BAYES AHMED
Date: 11/04/2012

KM
0 0.5 1   2   3   4
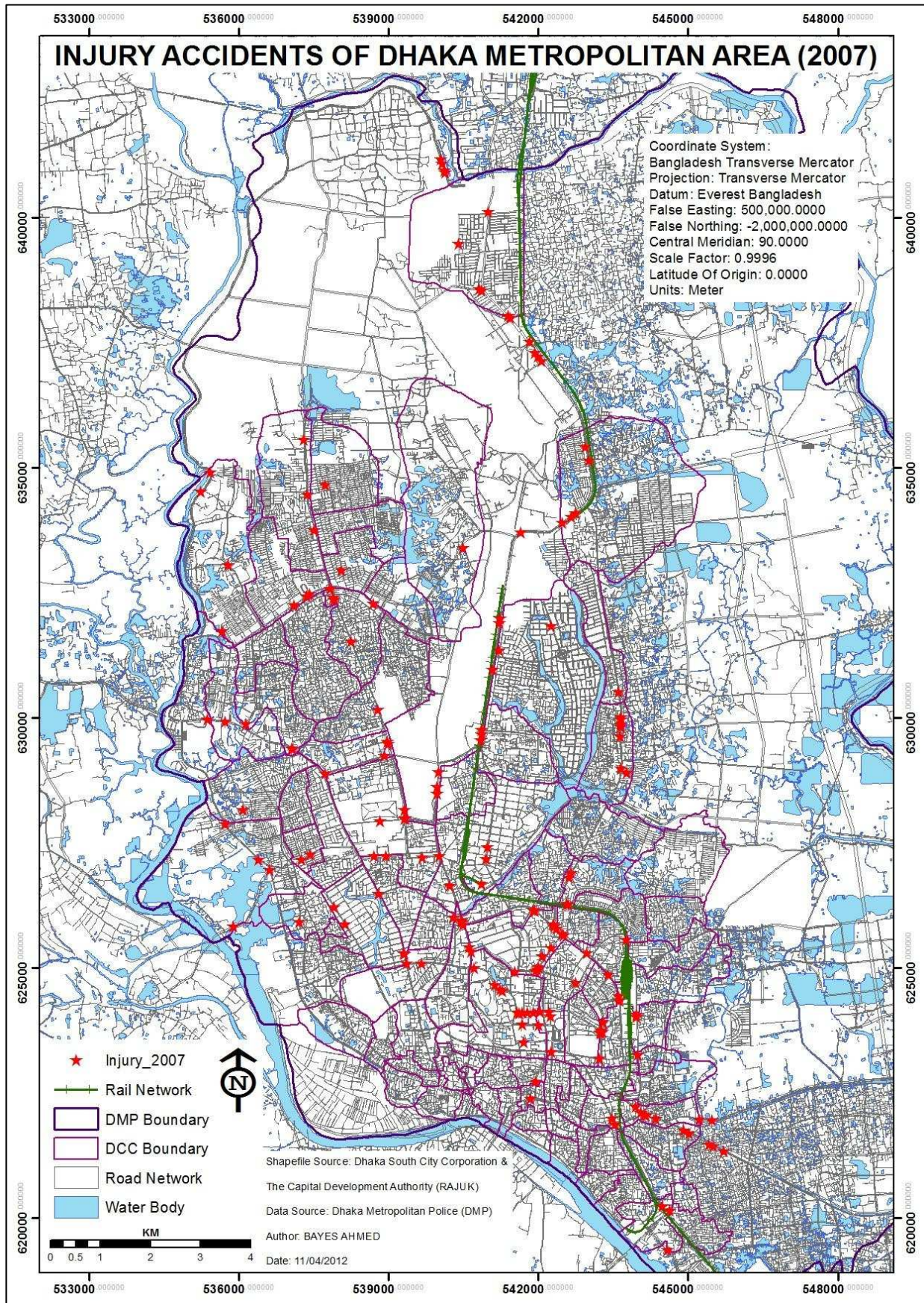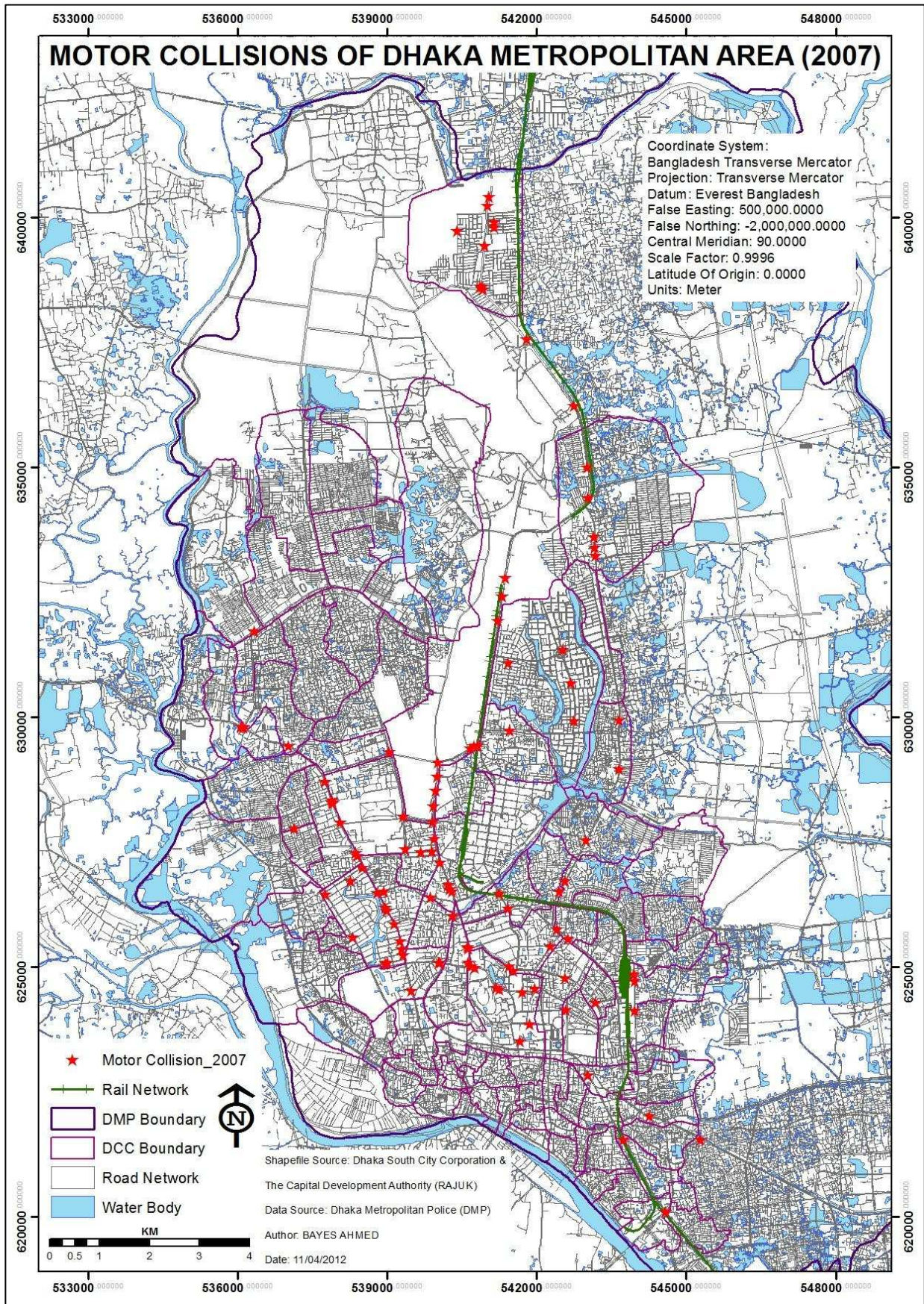
Traffic Accident Scenario of Dhaka Metropolitan Area (2008)

Traffic Accident Scenario of Dhaka Metropolitan Area (2008)

Appendix-II

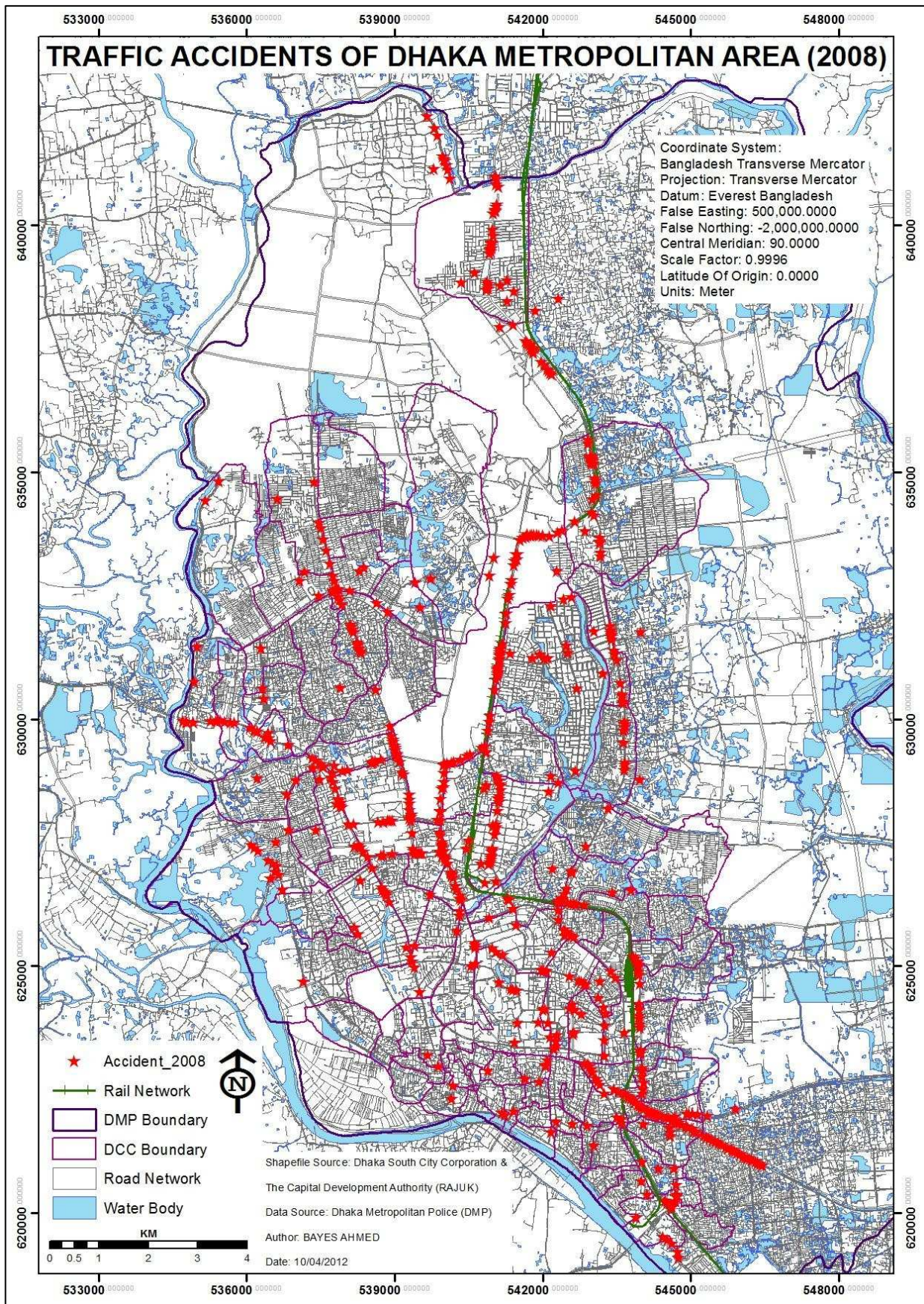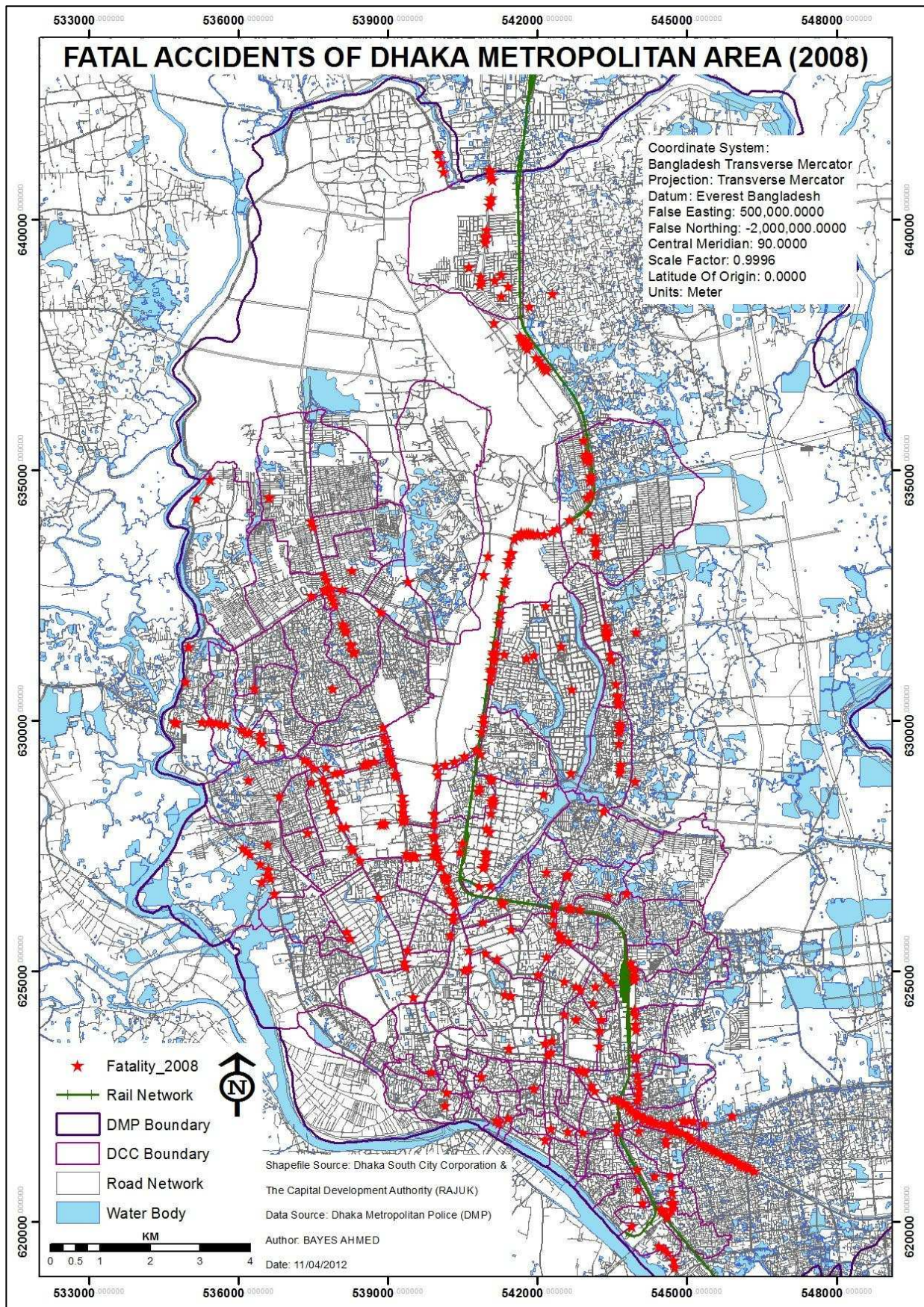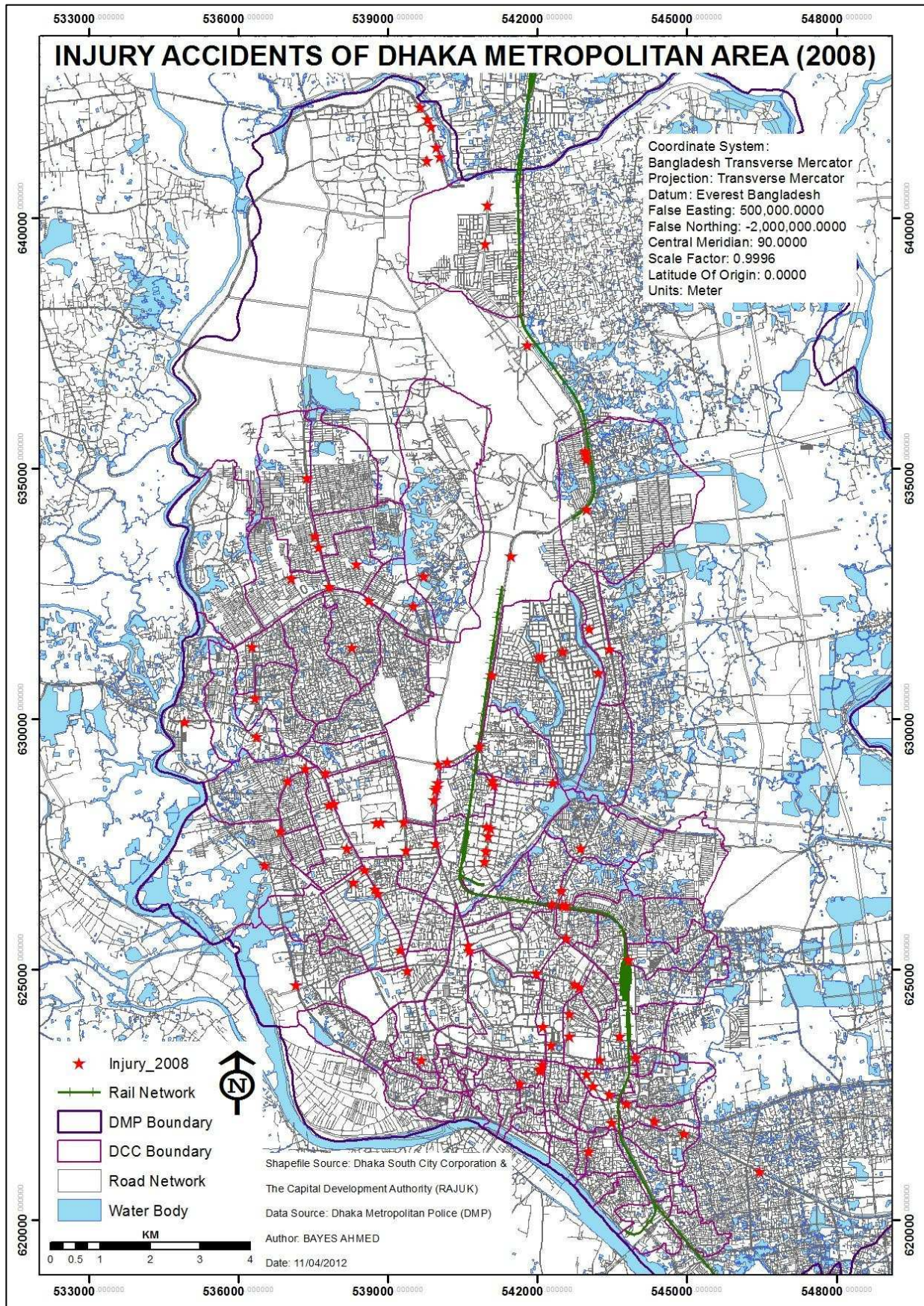**Traffic Accident Scenario of Dhaka Metropolitan Area (2009)**

TRAFFIC ACCIDENTS OF DHAKA METROPOLITAN AREA (2009)

Coordinate System:
Bangladesh Transverse Mercator
Projection: Transverse Mercator
Datum: Everest Bangladesh
False Easting: 500,000.0000
False Northing: -2,000,000.0000
Central Meridian: 90.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter

★ Accident_2009
Rail Network
DMP Boundary
DCC Boundary
Road Network
Water Body

KM
0 0.5 1 2 3 4

Shapefile Source: Dhaka South City Corporation &
The Capital Development Authority (RAJUK)
Data Source: Dhaka Metropolitan Police (DMP)
Author: BAYES AHMED
Date: 10/04/2012

Appendix-II

Traffic Accident Scenario of Dhaka Metropolitan Area (2009)

FATAL ACCIDENTS OF DHAKA METROPOLITAN AREA (2009)

Coordinate System:
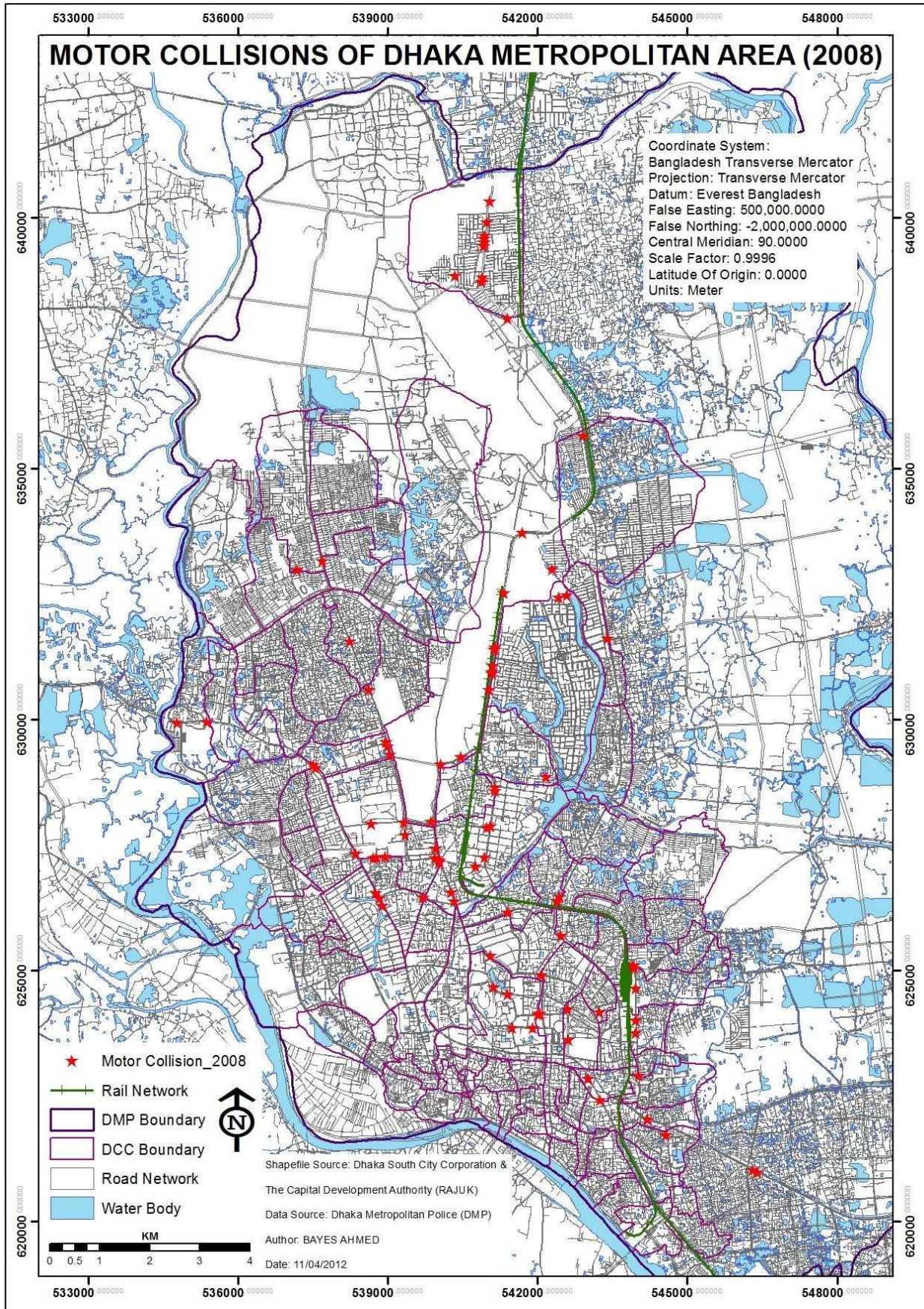Bangladesh Transverse Mercator
Projection: Transverse Mercator
Datum: Everest Bangladesh
False Easting: 500,000.0000
False Northing: -2,000,000.0000
Central Meridian: 90.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter

★ Fatality_2009
＋ Rail Network
□ DMP Boundary
□ DCC Boundary
□ Road Network
■ Water Body

KM
0 0.5 1   2   3   4

Shapefile Source: Dhaka South City Corporation &
The Capital Development Authority (RAJUK)
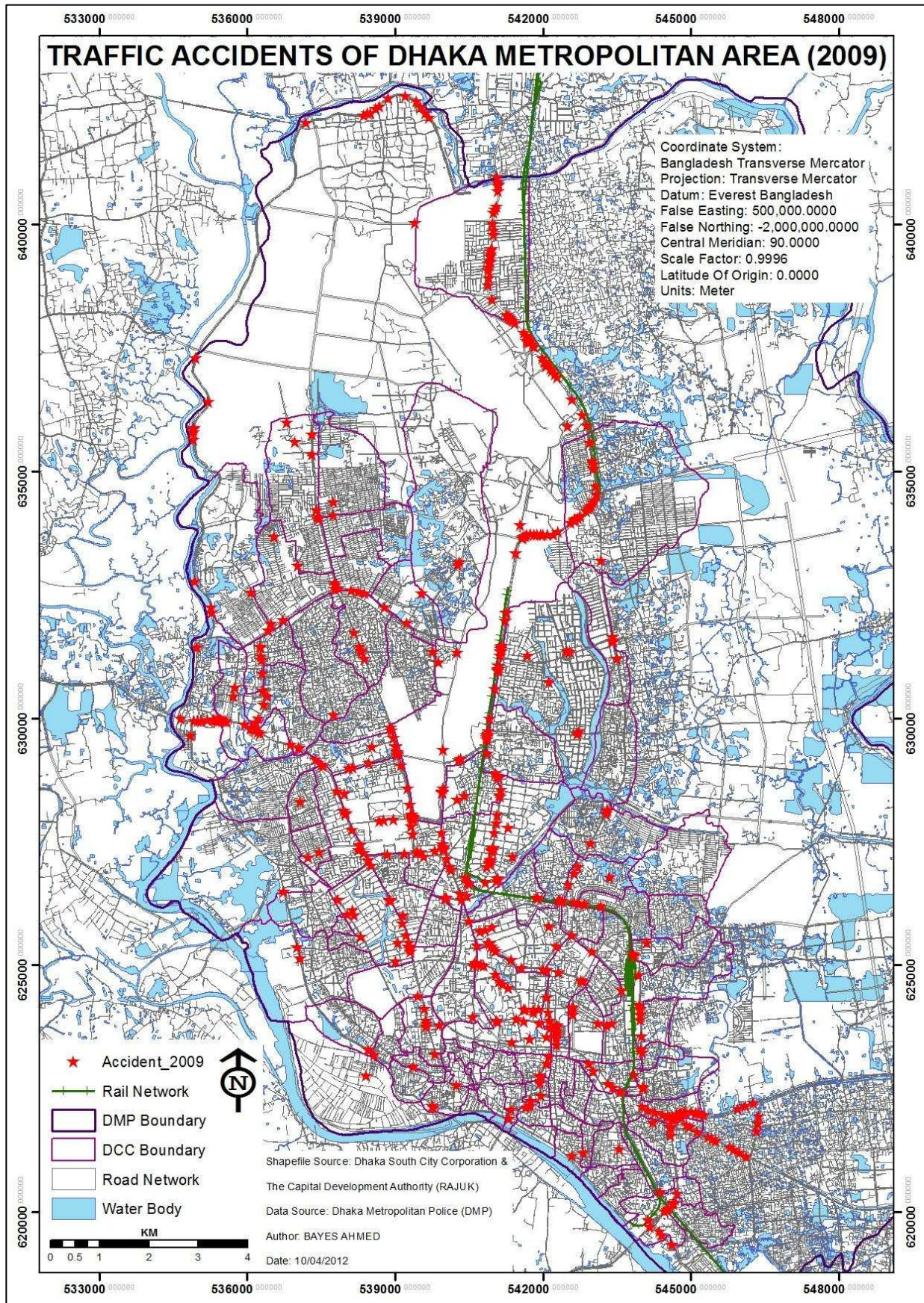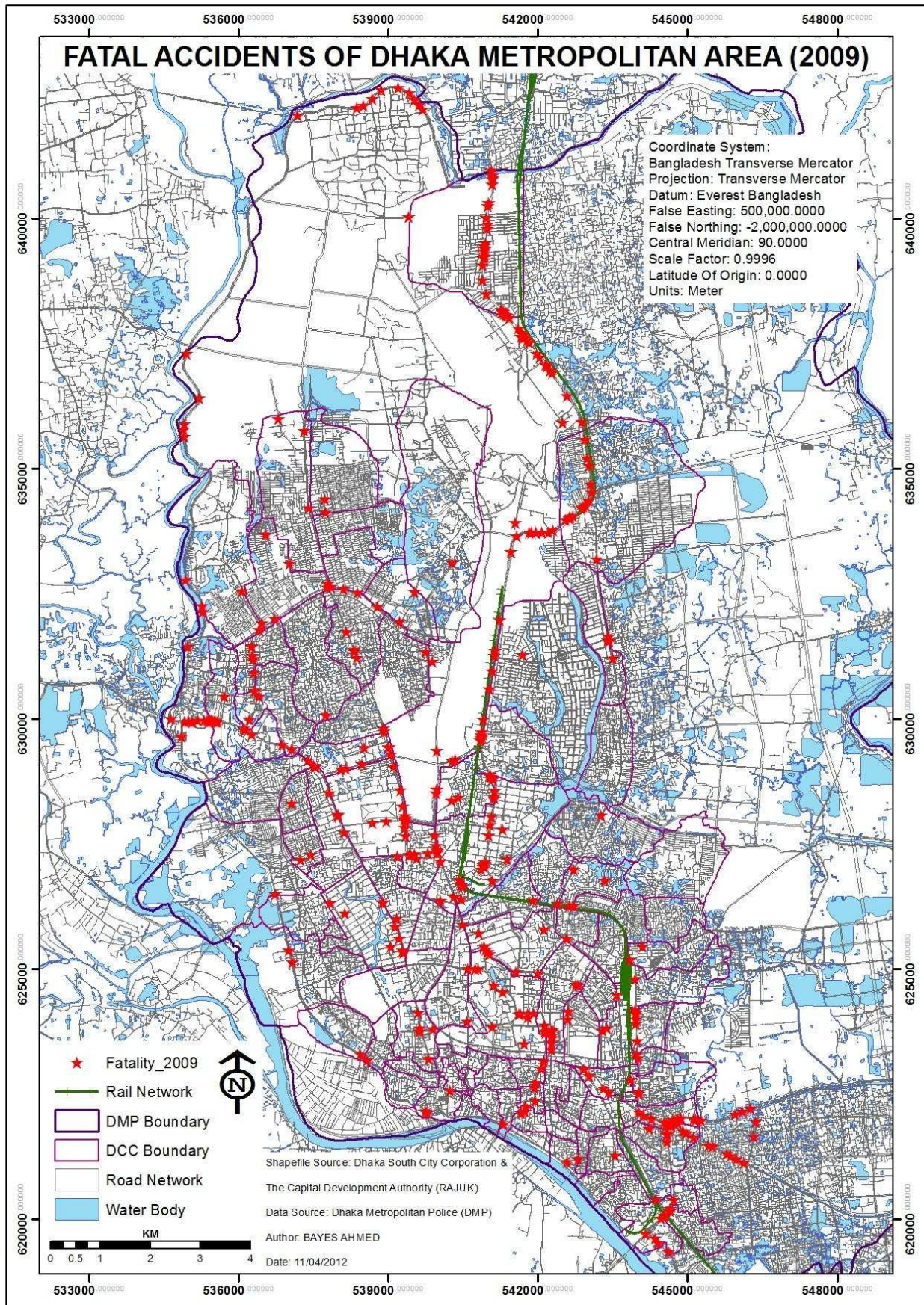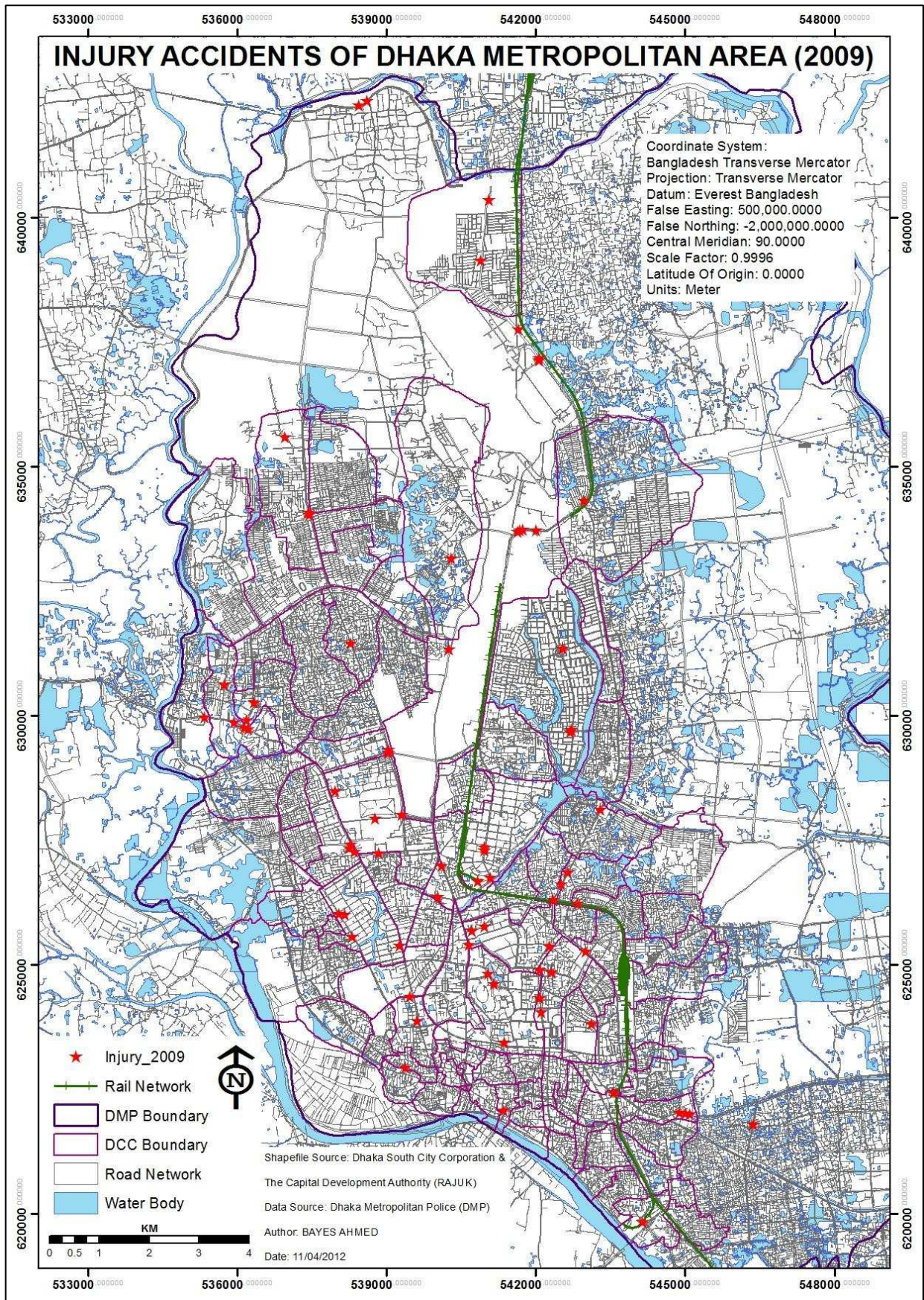Data Source: Dhaka Metropolitan Police (DMP)
Author: BAYES AHMED
Date: 11/04/2012

Appendix-II

Traffic Accident Scenario of Dhaka Metropolitan Area (2009)

INJURY ACCIDENTS OF DHAKA METROPOLITAN AREA (2009)

Coordinate System:
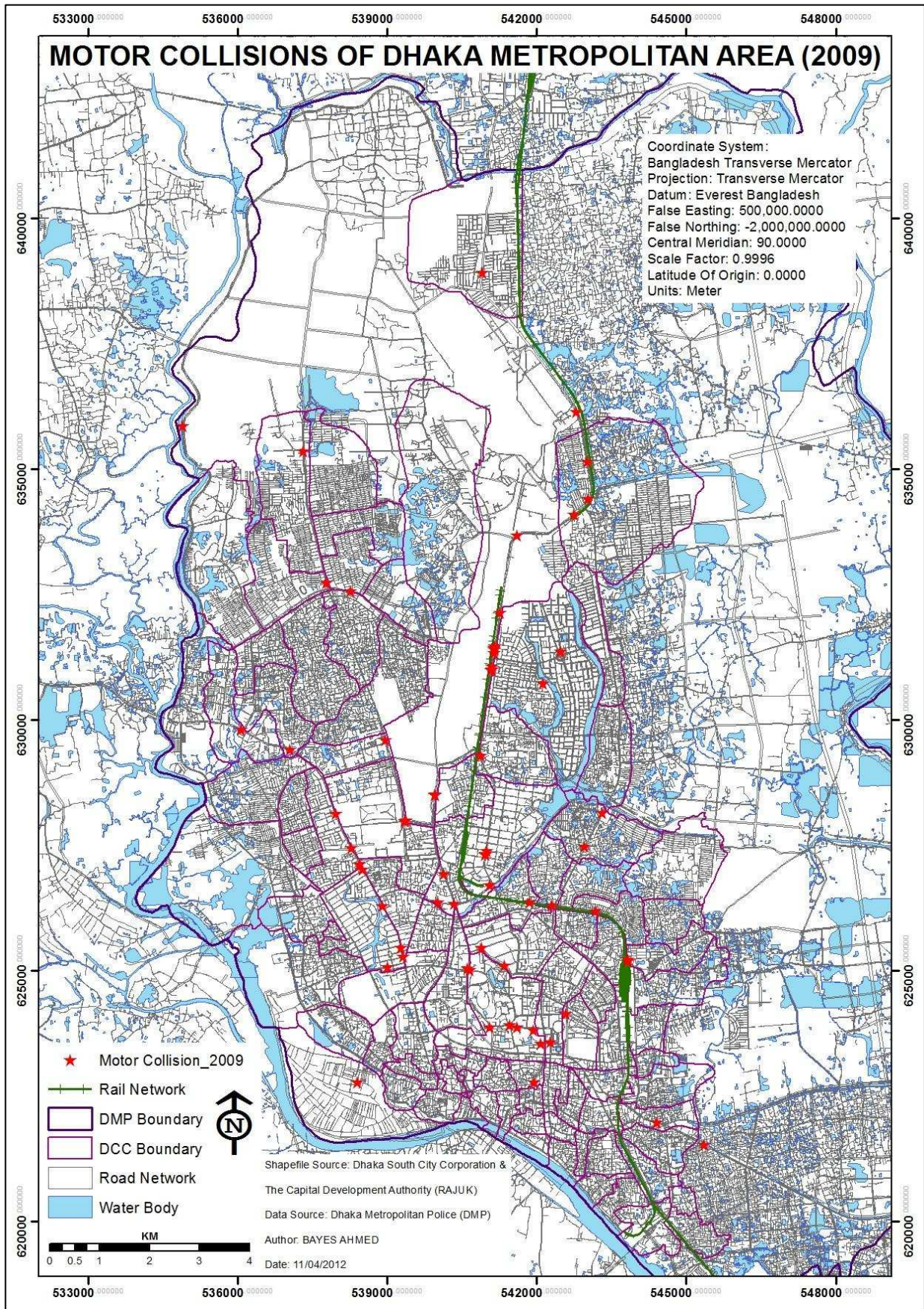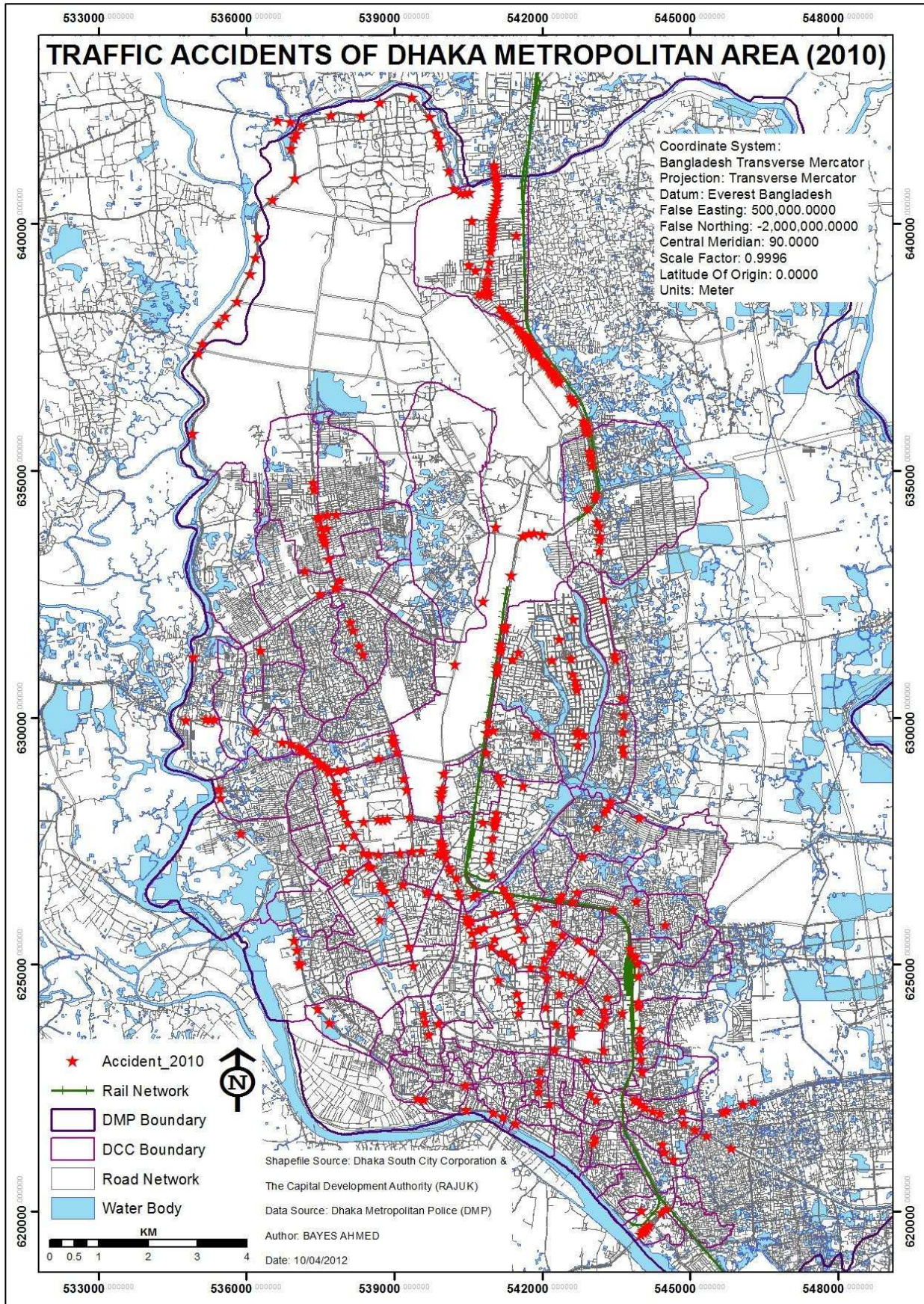Bangladesh Transverse Mercator
Projection: Transverse Mercator
Datum: Everest Bangladesh
False Easting: 500,000.0000
False Northing: -2,000,000.0000
Central Meridian: 90.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter

Injury_2009
Rail Network
DMP Boundary
DCC Boundary
Road Network
Water Body

Shapefile Source: Dhaka South City Corporation &
The Capital Development Authority (RAJUK)
Data Source: Dhaka Metropolitan Police (DMP)
Author: BAYES AHMED
Date: 11/04/2012

KM
0 0.5 1   2   3   4

Traffic Accident Scenario of Dhaka Metropolitan Area (2009)

MOTOR COLLISIONS OF DHAKA METROPOLITAN AREA (2009)

Coordinate System:
Bangladesh Transverse Mercator
Projection: Transverse Mercator
Datum: Everest Bangladesh
False Easting: 500,000.0000
False Northing: -2,000,000.0000
Central Meridian: 90.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter

★ Motor Collision_2009
Rail Network
DMP Boundary
DCC Boundary
Road Network
Water Body

KM
0 0.5 1   2   3   4

Shapefile Source: Dhaka South City Corporation &
The Capital Development Authority (RAJUK)
Data Source: Dhaka Metropolitan Police (DMP)
Author: BAYES AHMED
Date: 11/04/2012

TRAFFIC ACCIDENTS OF DHAKA METROPOLITAN AREA (2010)

Coordinate System:
Bangladesh Transverse Mercator
Projection: Transverse Mercator
Datum: Everest Bangladesh
False Easting: 500,000.0000
False Northing: -2,000,000.0000
Central Meridian: 90.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter

Legend:
★ Accident_2010
Rail Network
DMP Boundary
DCC Boundary
Road Network
Water Body

Shapefile Source: Dhaka South City Corporation &
The Capital Development Authority (RAJUK)
Data Source: Dhaka Metropolitan Police (DMP)
Author: BAYES AHMED
Date: 10/04/2012

Traffic Accident Scenario of Dhaka Metropolitan Area (2010)

Appendix-II

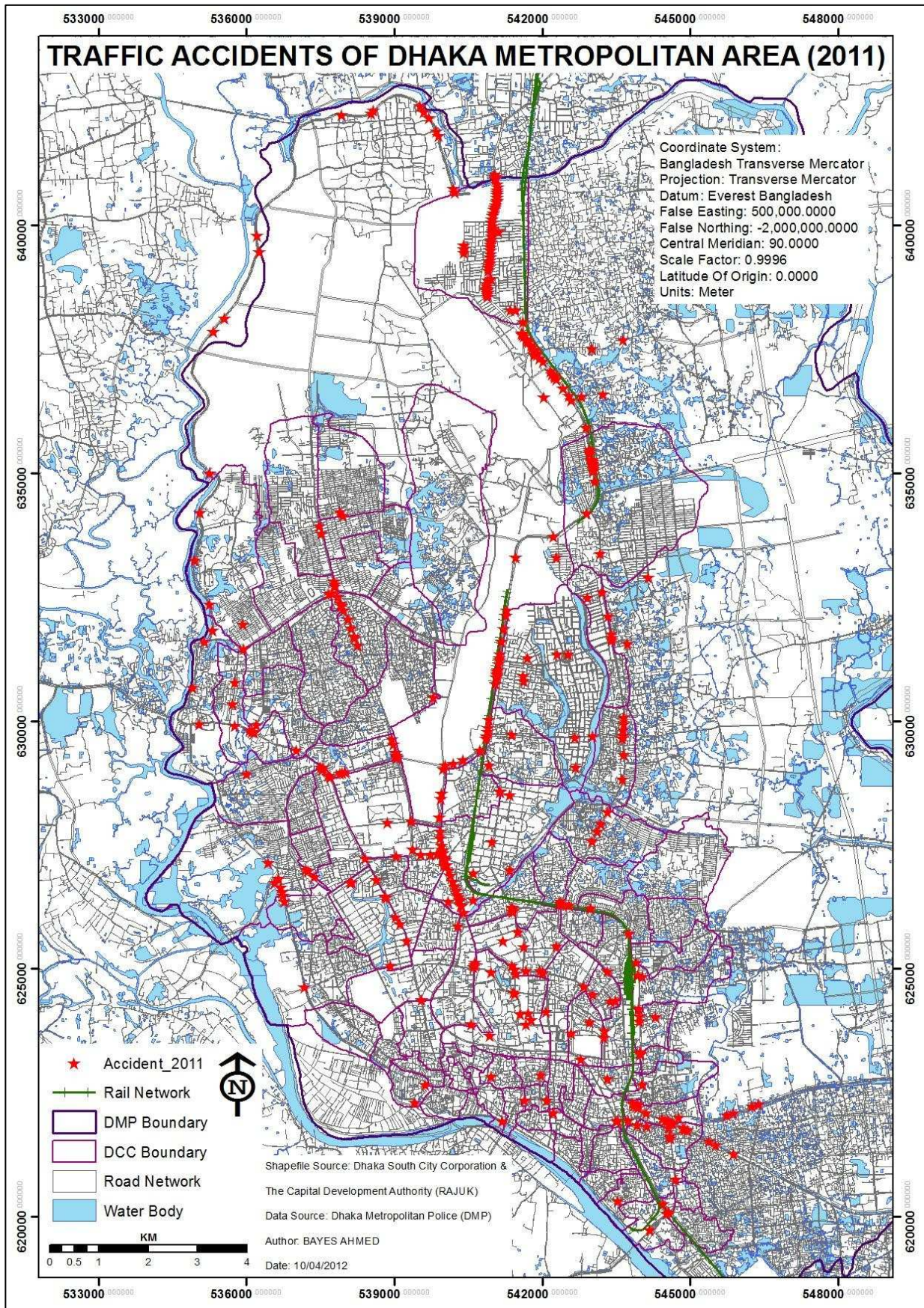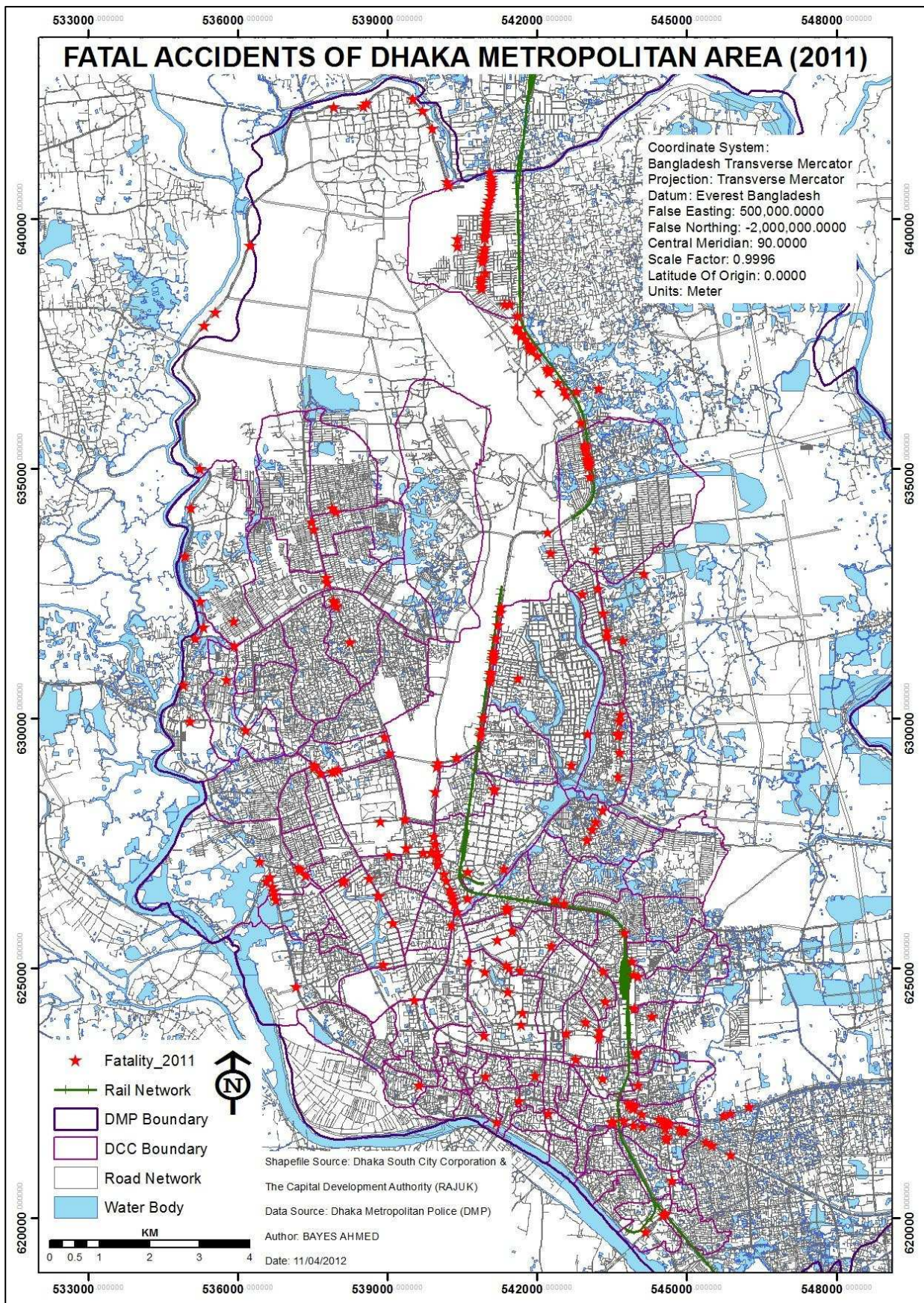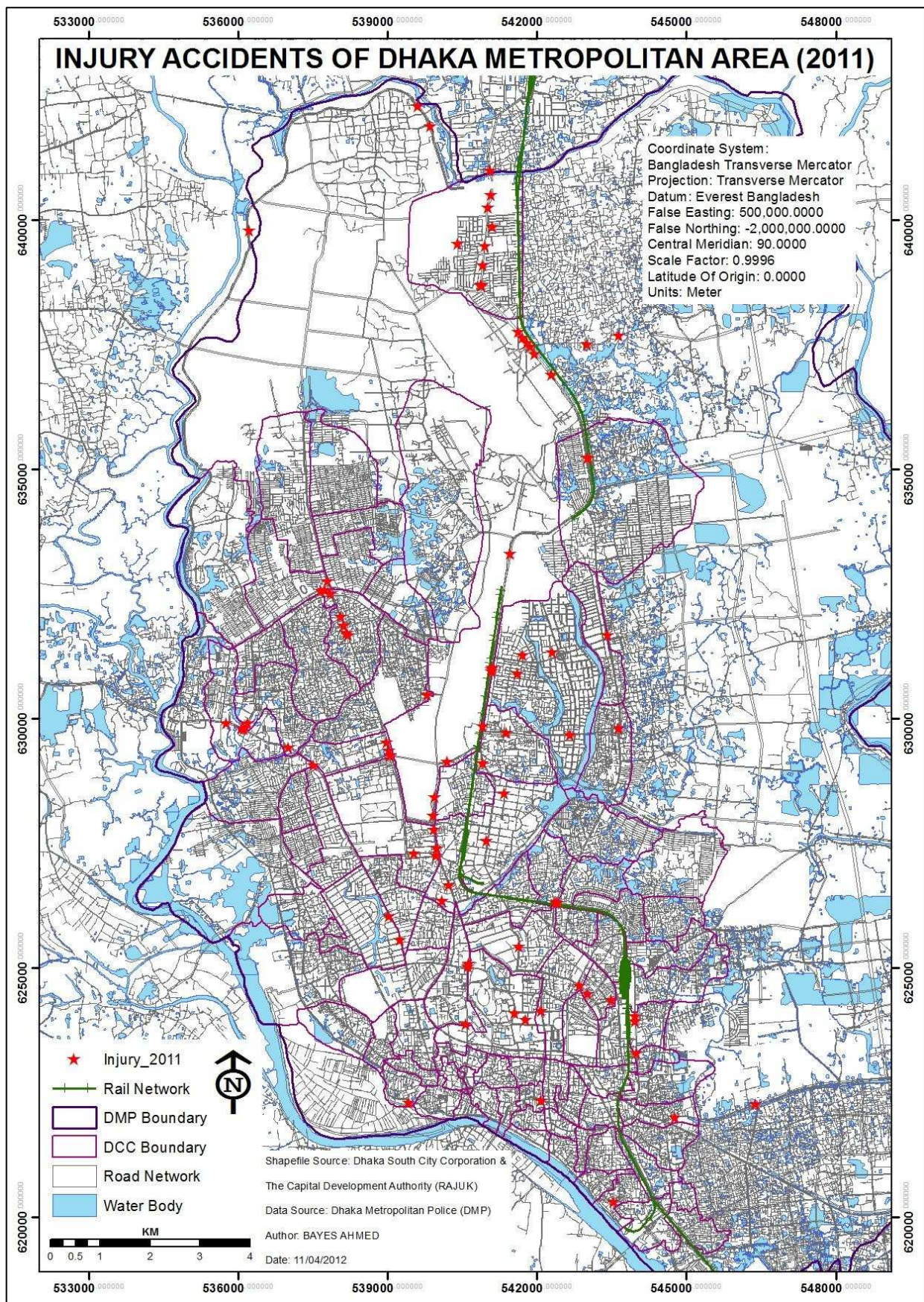## Traffic Accident Scenario of Dhaka Metropolitan Area (2010)

INJURY ACCIDENTS OF DHAKA METROPOLITAN AREA (2010)

Coordinate System:
Bangladesh Transverse Mercator
Projection: Transverse Mercator
Datum: Everest Bangladesh
False Easting: 500,000.0000
False Northing: -2,000,000.0000
Central Meridian: 90.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter

★ Injury_2010
Rail Network
DMP Boundary
DCC Boundary
Road Network
Water Body

Shapefile Source: Dhaka South City Corporation &
The Capital Development Authority (RAJUK)
Data Source: Dhaka Metropolitan Police (DMP)
Author: BAYES AHMED
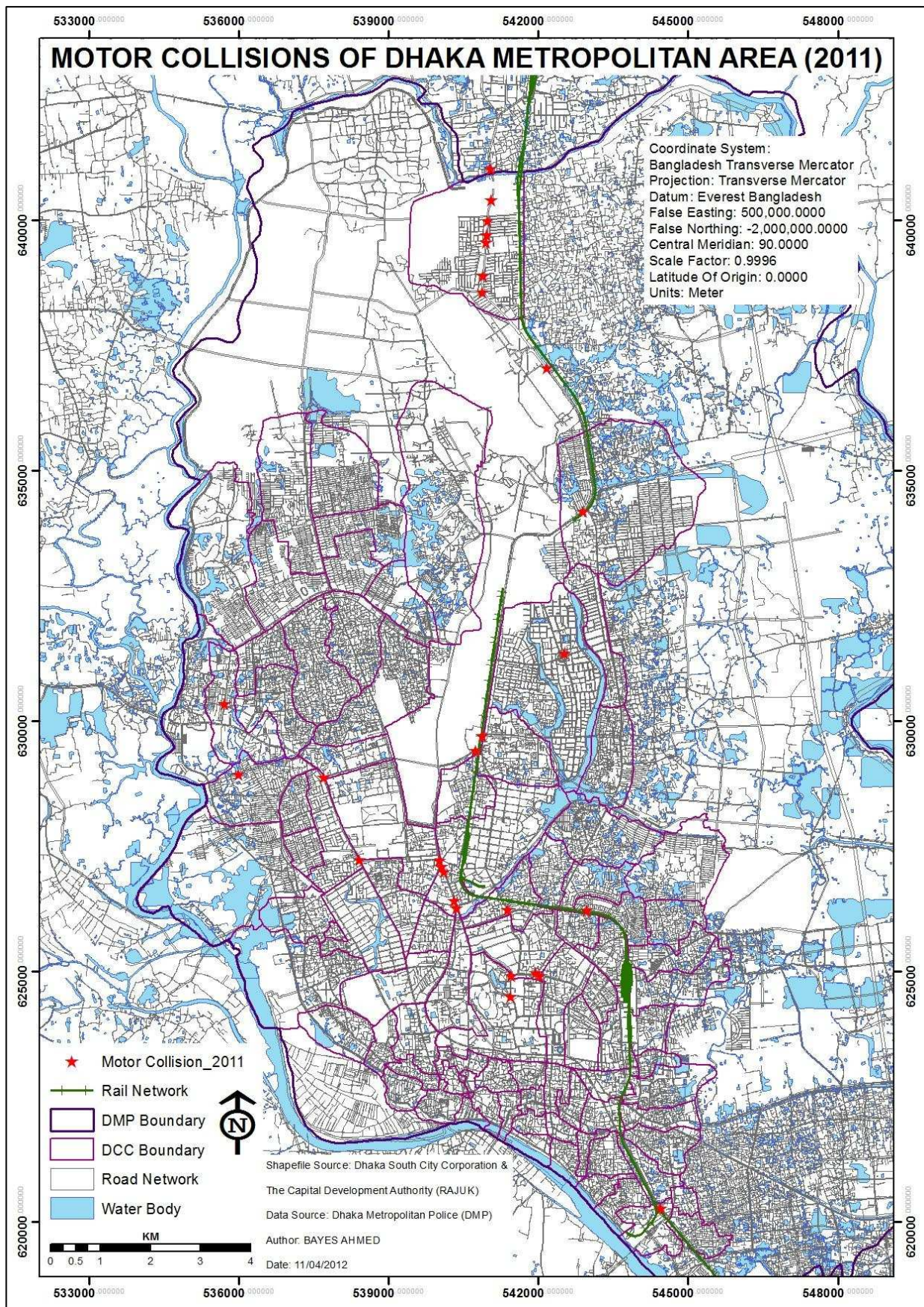Date: 11/04/2012

KM
0 0.5 1   2   3   4

Appendix-II

Traffic Accident Scenario of Dhaka Metropolitan Area (2010)

Traffic Accident Scenario of Dhaka Metropolitan Area (2011)

Appendix-II
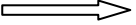
Traffic Accident Scenario of Dhaka Metropolitan Area (2011)

FATAL ACCIDENTS OF DHAKA METROPOLITAN AREA (2011)

Coordinate System:
Bangladesh Transverse Mercator
Projection: Transverse Mercator
Datum: Everest Bangladesh
False Easting: 500,000.0000
False Northing: -2,000,000.0000
Central Meridian: 90.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter

★ Fatality_2011
Rail Network
DMP Boundary
DCC Boundary
Road Network
Water Body

Shapefile Source: Dhaka South City Corporation &
The Capital Development Authority (RAJUK)
Data Source: Dhaka Metropolitan Police (DMP)
Author: BAYES AHMED
Date: 11/04/2012

KM
0 0.5 1   2   3   4

Traffic Accident Scenario of Dhaka Metropolitan Area (2011)

Appendix-II

Traffic Accident Scenario of Dhaka Metropolitan Area (2011)

MOTOR COLLISIONS OF DHAKA METROPOLITAN AREA (2011)

Coordinate System:
Bangladesh Transverse Mercator
Projection: Transverse Mercator
Datum: Everest Bangladesh
False Easting: 500,000.0000
False Northing: -2,000,000.0000
Central Meridian: 90.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter

★ Motor Collision_2011
Rail Network
DMP Boundary
DCC Boundary
Road Network
Water Body

N

KM
0 0.5 1   2   3   4

Shapefile Source: Dhaka South City Corporation &
The Capital Development Authority (RAJUK)
Data Source: Dhaka Metropolitan Police (DMP)
Author: BAYES AHMED
Date: 11/04/2012

Appendix-III

Most Accident Prone Roads of Dhaka Metropolitan Area

Traffic Accident Scenario of Different Roads/Corridors of Dhaka City (2007)

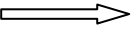| Road or Corridor Name	Panthopath Road	Shat Masjid Road	North-South Road	Johnson Road	Finix Road	Captain Mansur Ali Sharani	Bongo Bondhu (BB) Avenue	VIP Road	Darus-Salam Road	New Elephant Road	DIT Road	Mazhar Road	Dhaka-Demra Road	Siideswari Road	Mawlana Vasani Road	Dhaka-Narayanganj Road	Dhaka-Aricha (Gabtoli) Road	Dhaka-Ashulia (Tongi) Road	Shahid Tajuddin Sarani	Kazi NAzrul Islam Avenue	Sayedabad-Jatrabari-Gulisthan Road	Circular Road	Beribadh Road	Begum Rokeya Sarani	Otish Dipangkar/ Biswa Road	Pragati Sarani	Mirpur Road	Dhaka-Chittagong Road	Airport Road	Dhaka-Mymensing Road
Fatality and Injury	0	3	3	3	4	6	6	6	7	8	9	9	10	10	11	13	17	17	19	22	23	24	29	32	32	36	46	48	49	92

* Here the figures (numbers) indicate the total number of casualties (fatality or injury) of pedestrians and occupants.

** Moreover, one accident can cause more than one casualties or fatalities or injuries at the same time.

Appendix-III

Most Accident Prone Roads of Dhaka Metropolitan Area

Traffic Accident Scenario of Different Roads/Corridors of Dhaka City (2008)

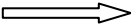| Road or Corridor Name ⟹	Mazhar Road	Captain Mansur Ali Sharani	New Elephant Road	Mawlana Vasani Road	Siideswari Road	Johnson Road	Finix Road	VIP Road	Bongo Bondhu (BB) Avenue	Shat Masjid Road	Panthopath Road	Circular Road	Darus-Salam Road	North-South Road	DIT Road	Dhaka-Demra Road	Dhaka-Aricha (Gabtoli) Road	Kazi N Azrul Islam Avenue	Dhaka-Ashulia (Tongi) Road	Dhaka-Narayanganj Road	Sayedabad-Jatrabari-Gulisthan Road	Beribadh Road	Begum Rokeya Sarani	Otish Dipangkar/ Biswa Road	Pragati Sarani	Shahid Tajuddin Sarani	Dhaka-Chittagong Road	Mirpur Road	Airport Road	Dhaka-Mymensing Road
Fatality and Injury	0	1	1	1	1	1	1	2	2	2	3	4	7	9	9	9	13	16	20	22	23	23	25	25	25	34	36	39	40	77

* Here the figures (numbers) indicate the total number of casualties (fatality or injury) of pedestrians and occupants.

** Moreover, one accident can cause more than one casualties or fatalities or injuries at the same time.

Appendix-III

Most Accident Prone Roads of Dhaka Metropolitan Area

Traffic Accident Scenario of Different Roads/Corridors of Dhaka City (2009)

Road or Corridor Name	Captain Mansur Ali Sharani	New Elephant Road	Johnson Road	Mazhar Road	Siideswari Road	Finix Road	Pragati Sarani	VIP Road	Bongo Bondhu (BB) Avenue	Mawlana Vasani Road	Panthopath Road	Dhaka-Ashulia (Tongi) Road	Shat Masjid Road	North-South Road	Otish Dipangkar/ Biswa Road	Sayedabad-Jatrabari-Gulisthan Road	Kazi NAzrul Islam Avenue	Dhaka-Narayanganj Road	Dhaka-Demra Road	DIT Road	Darus-Salam Road	Dhaka-Aricha (Gabtoli) Road	Mirpur Road	Shahid Tajuddin Sarani	Airport Road	Dhaka-Chittagong Road	Begum Rokeya Sarani	Circular Road	Beribadh Road	Dhaka-Mymensing Road
Fatality and Injury	0	0	0	1	1	2	3	4	5	5	5	6	6	6	6	6	8	11	11	12	15	19	20	20	21	23	23	30	37	75

* Here the figures (numbers) indicate the total number of casualties (fatality or injury) of pedestrians and occupants.

** Moreover, one accident can cause more than one casualties or fatalities or injuries at the same time.

Appendix-III

Most Accident Prone Roads of Dhaka Metropolitan Area

Traffic Accident Scenario of Different Roads/Corridors of Dhaka City (2010)

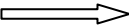| Road or Corridor Name →	New Elephant Road	Johnson Road	Bongo Bondhu (BB) Avenue	Finix Road	Shat Masjid Road	Mawlana Vasani Road	Mazhar Road	Darus-Salam Road	Otish Dipangkar/ Biswa Road	Dhaka-Demra Road	Captain Mansur Ali Sharani	Sayedabad-Jatrabari-Gulisthan Road	Siideswari Road	North-South Road	VIP Road	Panthopath Road	Dhaka-Aricha (Gabtoli) Road	Dhaka-Ashulia (Tongi) Road	Circular Road	Dhaka-Narayanganj Road	Shahid Tajuddin Sarani	Begum Rokeya Sarani	DIT Road	Dhaka-Chittagong Road	Pragati Sarani	Kazi NAzrul Islam Avenue	Mirpur Road	Beribadh Road	Airport Road	Dhaka-Mymensing Road
Fatality and Injury	0	0	0	0	1	1	1	1	1	1	2	2	2	2	2	2	4	7	7	7	7	8	12	13	13	13	21	22	29	100

* Here the figures (numbers) indicate the total number of casualties (fatality or injury) of pedestrians and occupants.

** Moreover, one accident can cause more than one casualties or fatalities or injuries at the same time.

Appendix-III

Most Accident Prone Roads of Dhaka Metropolitan Area

Traffic Accident Scenario of Different Roads/Corridors of Dhaka City (2011)

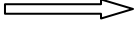| Road or Corridor Name →	Panthopath Road	Johnson Road	Finix Road	Shat Masjid Road	Captain Mansur Ali Sharani	Bongo Bondhu (BB) Avenue	VIP Road	New Elephant Road	Mazhar Road	Siideswari Road	Mawlana Vasani Road	North-South Road	Darus-Salam Road	DIT Road	Dhaka-Demra Road	Circular Road	Dhaka-Aricha (Gabtoli) Road	Dhaka-Narayanganj Road	Dhaka-Ashulia (Tongi) Road	Kazi NAzrul Islam Avenue	Sayedabad-Jatrabari-Gulisthan Road	Beribadh Road	Shahid Tajuddin Sarani	Begum Rokeya Sarani	Otish Dipangkar/ Biswa Road	Pragati Sarani	Dhaka-Chittagong Road	Mirpur Road	Airport Road	Dhaka-Mymensing Road
Fatality and Injury	3	4	5	5	7	8	8	9	9	11	12	12	14	18	19	28	30	35	37	38	46	52	53	57	57	61	84	85	89	169

* Here the figures (numbers) indicate the total number of casualties (fatality or injury) of pedestrians and occupants.

** Moreover, one accident can cause more than one casualties or fatalities or injuries at the same time.

Appendix-III

Most Accident Prone Roads of Dhaka Metropolitan Area

Traffic Accident Scenario of Different Roads/Corridors of Dhaka City (2007-2011)

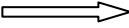| Road or Corridor Name	Johnson Road	Finix Road	Panthopath Road	Captain Mansur Ali Sharani	Shat Masjid Road	New Elephant Road	Mazhar Road	Bongo Bondhu Avenue	VIP Road	Siddeswari Road	Mawlana Vasani Road	North-South Road	Darus-Salam Road	Dhaka-Demra Road	DIT Road	Dhaka-Aricha (Gabtoli) Road	Dhaka-Ashulia (Tongi) Road	Dhaka-Narayanganj Road	Circular Road	Kazi Nazrul Islam Avenue	Sayedabad-Jatrabari-Gulisthan Road	Otish Dipangkar/ Biswa Road	Shahid Tajuddin Sarani	Pragati Sarani	Begum Rokeya Sarani	Beribadh Road	Dhaka-Chittagong Road	Mirpur Road	Airport Road	Dhaka-Mymensing Road
Fatality and Injury	8	12	13	16	16	18	20	21	22	25	30	32	44	50	60	83	87	88	93	97	100	121	133	138	145	163	204	211	228	513

* Here the figures (numbers) indicate the total number of casualties (fatality or injury) of pedestrians and occupants.

** Moreover, one accident can cause more than one casualties or fatalities or injuries at the same time.

Appendix-III

Most Accident Prone Roads of Dhaka Metropolitan Area

Vehicles Involved in Traffic Accidents of Different Roads/Corridors of Dhaka City (2007-2011)

Road or Corridor Name	Johnson Road	Finix Road	Mazhar Road	Bongo Bondhu Avenue	Panthopath Road	New Elephant Road	Captain Mansur Ali Sharani	VIP Road	Shat Masjid Road	Siddeswari Road	North-South Road	Mawlana Vasani Road	Darus-Salam Road	Dhaka-Demra Road	Circular Road	Dhaka-Aricha (Gabtoli) Road	Dhaka-Ashulia (Tongi) Road	Dhaka-Narayanganj Road	DIT Road	Sayedabad-Jatrabari-Gulisthan Road	Otish Dipangkar/ Biswa Road	Shahid Tajuddin Sarani	Pragati Sarani	Begum Rokeya Sarani	Kazi Nazrul Islam Avenue	Dhaka-Chittagong Road	Beribadh Road	Mirpur Road	Airport Road	Dhaka-Mymensing Road
Vehicles Involved	5	10	10	12	13	13	14	18	21	22	30	36	37	44	50	60	61	64	68	80	109	114	118	126	136	136	154	218	255	527

* Here the figures (numbers) indicate the total number of casualties (fatality or injury) of pedestrians and occupants.

** Moreover, one accident can cause more than one casualties or fatalities or injuries at the same time.

[The Roads of the Tables of 'Appendix-III' are in Descending Order]

Appendix-IV

Traffic Accident Statistics

Registered Vehicles (2000-2011)

Year	Registered Vehicles	Deaths	Injury	Total Casualties
2000	28764	3430	3211	6641
2001	42510	3109	3172	6281
2002	54877	3398	3770	7168
2003	59248	3289	3818	7107
2004	49202	2748	1080	5621
2005	65878	3187	2754	5941
2006	80305	3193	2409	5602
2007	121272	3749	3273	7022
2008	144419	3765	3284	7049
2009	145243	2958	2686	5644
2010	161178	2847	1803	4449
2011	172484	2467	1631	3858

Registered Vehicles
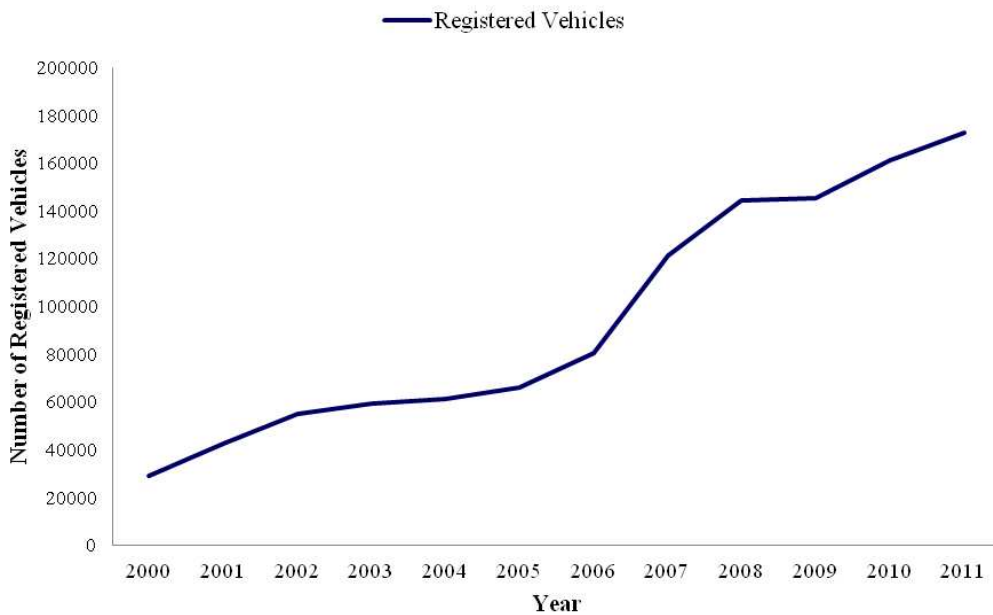
Appendix-IV

Traffic Accident Statistics

Traffic Accidents by Month (2007-2011)

Month	Number of Accidents	Percentage (%)
January	235	9
February	205	7
March	256	9
April	267	10
May	241	9
June	244	9
July	209	8
August	238	9
September	235	9
October	196	7
November	206	7
December	188	7
Total	**2720**	**100**

Accidents by Month
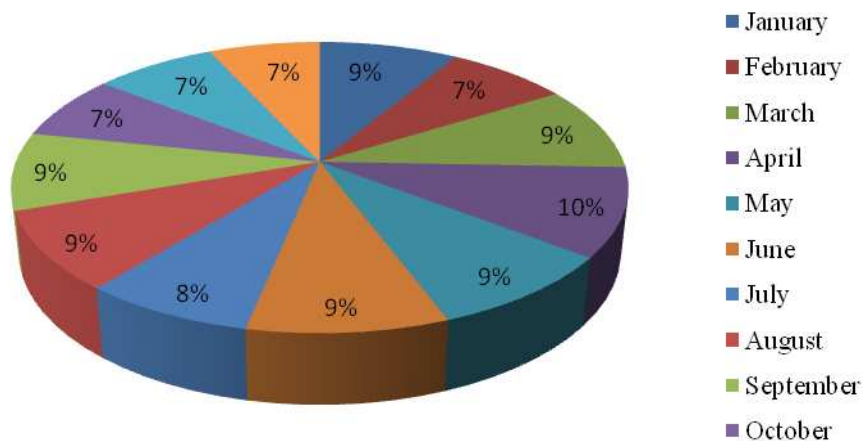
Appendix-IV

Traffic Accident Statistics

Traffic Accidents by Police Station (2007-2011)

Name of Police Station	Number of Accidents	Percentage (%)	Name of Police Station	Number of Accidents	Percentage (%)
Adabor	18	0.662	Lalbagh	22	0.809
Airport	143	5.257	Mirpur	133	4.890
Badda	79	2.904	Mohammadpur	108	3.971
Bongshal	7	0.257	Motijheel	80	2.941
Cantonment	58	2.132	New Market	17	0.625
Chawk Bazar	2	0.074	Pallabi	83	3.051
Darus Salam	55	2.022	Polton	69	2.537
Demra	18	0.662	Ramna	132	4.853
Dhanmondi	69	2.537	Rampura	11	0.404
Dokkhin Khan	4	0.147	Shah Ali	25	0.919
Gendaria	7	0.257	Shahbagh	75	2.757
Gulshan	202	7.426	Shyampur	45	1.654
Hazaribagh	13	0.478	Sher-e-Bangla	54	1.985
Jatrabari	236	8.676	Shilpanchol	97	3.566
Kafrul	94	3.456	Shobujbagh	72	2.647
Kamrangir Chor	3	0.110	Sutrapur	49	1.801
Khilgaon	55	2.022	Tejgaon	210	7.721
Khilkhet	97	3.566	Turag	50	1.838
Kodomtoli	12	0.441	Uttara	182	6.691
Kolabagan	2	0.074	Uttar Khan	0	0.000
Kotwali	32	1.176	**Total**	**2720**	**100**

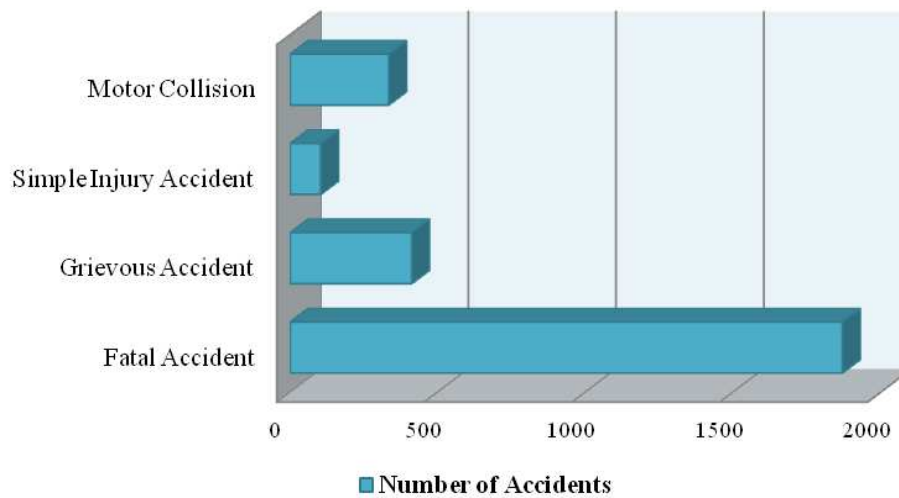# Appendix-IV

Traffic Accident Statistics

Traffic Accidents by Severity (2007-2011)

Accident Severity	Number of Accidents	Percentage (%)
Fatal Accident	1870	68.75
Grievous Accident	412	15.15
Simple Injury Accident	104	3.82
Motor Collision	334	12.28
Total	**2720**	**100**

Accident Severity
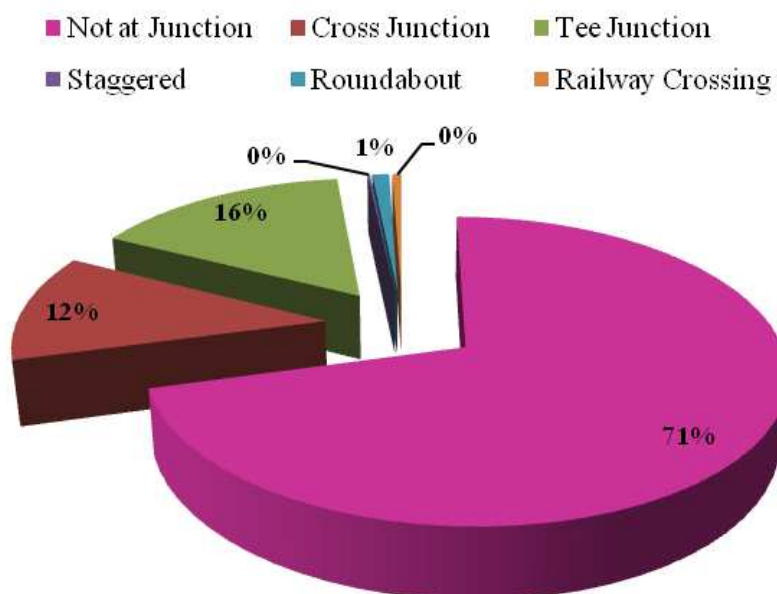

■ Number of Accidents

Appendix-IV

Traffic Accident Statistics

Traffic Accidents in Junctions (2007-2011)

Type of Junction	Number of Accidents	Percentage (%)
Not at Junction	1925	70.77
Cross Junction	320	11.76
Tee Junction	428	15.74
Staggered	4	0.15
Roundabout	28	1.03
Railway Crossing	15	0.55
Total	**2720**	**100**

Accidents in Junctions

- Not at Junction
- Cross Junction
- Tee Junction
- Staggered
- Roundabout
- Railway Crossing

Appendix-IV

Traffic Accident Statistics

Traffic Control (2007-2011)

Traffic Control	Number of Accidents	Percentage (%)
No Control	1711	62.904
Centerline	15	0.551
Pedestrian Crossing	26	0.956
Police Controlled	886	32.574
Traffic Lights	44	1.618
Police and Traffic Lights	38	1.397
Total	**2720**	**100**

Traffic Control
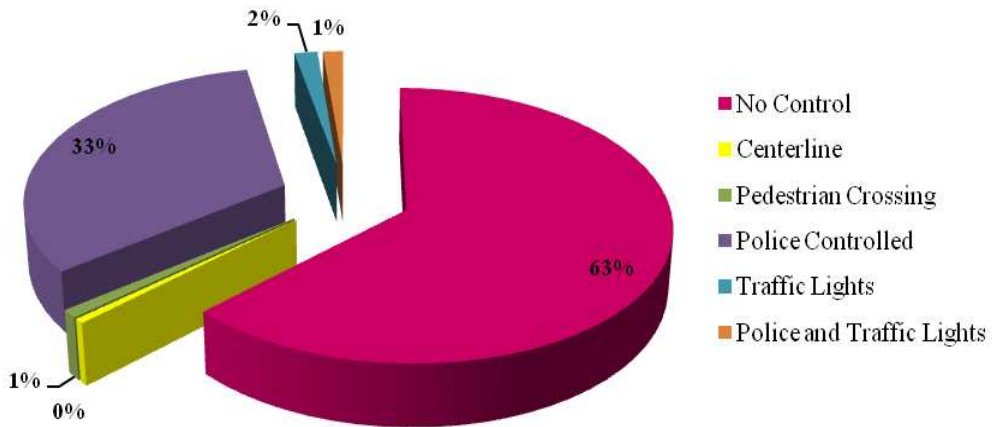
Appendix-IV

Traffic Accident Statistics

Collision Type (2007-2011)

Collision Type	Number of Accidents	Percentage (%)
Head On	114	4.191
Rear End	686	25.221
Right Angle	41	1.507
Side Swipe	91	3.346
Overturned Vehicle	80	2.941
Hit Object in Road	25	0.919
Hit Object Off Road	25	0.919
Hit Parked Vehicle	30	1.103
Hit Pedestrian	1628	59.853
Total	**2720**	**100**

Collision Type
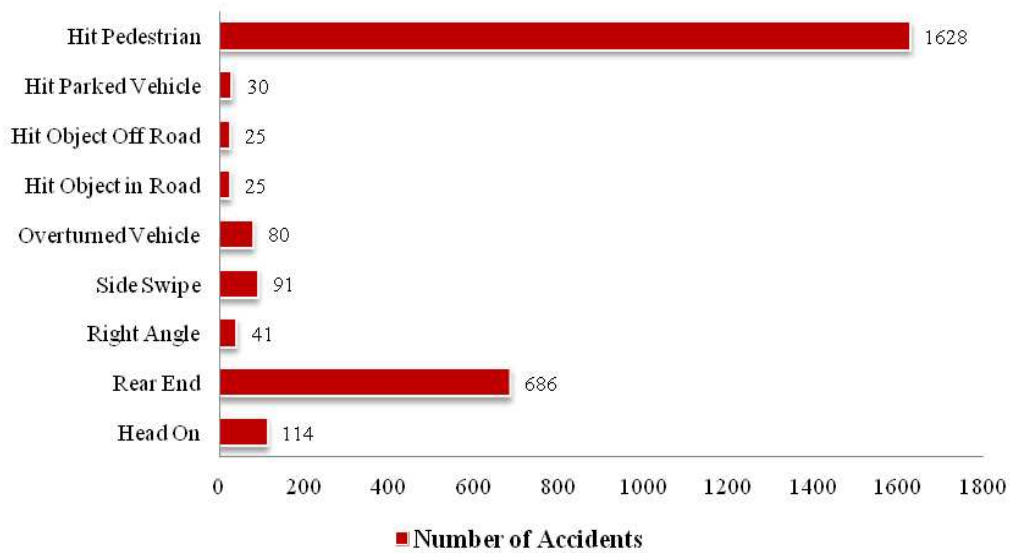
Appendix-IV

Traffic Accident Statistics

Traffic Movement (2007-2011)

Traffic Movement	Number of Accidents	Percentage (%)
One Way Street	1979	72.757
Two Way Street	741	27.243
Total	**2720**	**100**

Road Divider (2007-2011)

Road Divider	Number of Accidents	Percentage (%)
Exists	2180	80.147
Does Not Exist	540	19.853
Total	**2720**	**100**

Light (2007-2011)

Light	Number of Accidents	Percentage (%)
Daylight	1476	54.265
Dawn/Dusk	342	12.574
Night (Lit)	805	29.596
Night (Unlit)	97	3.566
Total	**2720**	**100**

Appendix-IV

Traffic Accident Statistics

Road Geometry (2007-2011)

Road Geometry	Number of Accidents	Percentage (%)
Straight & Flat	2635	96.875
Curve	60	2.206
Slope	11	0.404
Curve & Slope	12	0.441
Crest	2	0.074
Total	**2720**	**100**

Road Classification (2007-2011)

Road Class	Number of Accidents	Percentage (%)
National	867	31.875
Regional	32	1.176
Feeder	11	0.404
City Road	1810	66.544
Total	**2720**	**100**

Road Class

■ Number of Accidents