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Ministry of Federal Affairs and Local Development
Infrastructure Policy Coordination Section
Singhadurbar, Kathmandu

Municipal Transport Master Plan (MTMP) of Kageshwari Manahara Municipality

Final Report

July, 2016

Acknowledgement

The consultant team would like to take this opportunity to convey sincere thanks and gratitude to executive officer of the municipality who has helped for overall planning, formation of MRCC, organizing meetings and from very beginning to the completion of report. Again, the team would like to acknowledge the technical team of the municipality including planning section engineer, urban planner, environmental engineer, geomatic engineer, oversears, sub-oversears and assistant sub-oversears regarding their technical inputs about road classification, environmental friendly planning, formation of rings etc. The team also expresses sincere thanks to secretary and all other officials of the ward offices who helped for conducting ward level meeting for the collection of demands. The very important feedback has been received from representative of political parties; the team would like to express sincere thanks to all the parties for their cooperation and valuable feedbacks. Finally, the consultant team would like to express sincere thanks to all the concerned officials of Kageshwari Manahara Municipality, Kathmandu who have helped directly or indirectly and contributed at every step up to this phase towards the completion of this project.

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Study Team

Executive Summary

Municipal Transport Master Plan (MTMP) shall be defined as the process of Identification, classification and prioritization of roads within municipality; construction, upgrading, maintenance and rehabilitation of prioritized roads on the basis of approved criteria with calculation of financial budget. The basic approach for the preparation of MTMP is the bottom up and participatory approach. The ultimate goal of most transportation is “access,” people’s ability to reach desired goods, services and activities. Transportation decisions often involve tradeoffs between different forms of access. The pattern of road network in municipality area has found concentrated towards Central Business District (CBD) of Kathmandu valley flowing in terms of ring and link basis. The pattern of traffic at morning peak and evening peak is just opposite. The Right of Way (RoW) and the carriageway width of the existing road are about 4 to 6 m only. For the development of city with efficient transportation system it is inherent to provide appropriate roadway width. Thus the major constraint for the implementation of MTMP is to provide sufficient right of way to the roads.

Kageshwari-Manahara municipality lies in Kathmandu district of Central Development Region. It is a newly declared municipality formed by agglomerating 6 existing VDCs into single Kageshwari-Manahara Municipality. The agglomerated VDCs are Aalapot, Bhadrabas, Daanchhi, Gagalphedi, Gothatar and Mulpani VDCs. Kageshwari-Manahara Municipality stretches from Kathmandu Metropolitan City in the South-West to Sindhupalchowk district in the North. It has Shankharapur municipality in the east and Chandragiri Municipality in the west. It covers an area of 27.5 sq. km and population in 2011 was found as 60,237.

The major location potential for the development of tourist point of view are: Kageshwori Temple, View Tower, International Cricket Stadium, Geeta Temple and Krishna Pranami Dham and forest area in the north for trekking as well as visiting. Again the major settlement area includes: Aalapot, Bhadrabas, Daanchhi, Gagalphedi, Gothatar and Mulpani. These residential and potential development areas are considered as the point of interest for travelling. Forest area surrounded in Northern side of the city, River corridor area for vegetation and agro-based industries, Bagmati River area, Manahara River area and Gagalphedi Foreset area are regarded as conservation and sensitive areas for environmental protection. There are about 1000 road sections that are collected from inventory survey. Among them, the transportation facility within the municipality area was found serving via SRN, DRCN and other roads. SRN passed thought municipal includes proposed Outer Rind Road, Chabahil-Pipalbot-Sankhu-Lapsiphedi-Bhotechaur, Pepsikola-Gothatar, Gokarna-Jorpati-Gothatar, Pepsikola-Karkigaun, Karkigaun-Mulpani-Gokarna and Mulpani-Changunarayan-Phedigaun Feeder Road.

Again the DRCN includes Kageswori Ring Road (27DR032) and Sundarijal-Alapot Road (27DR034). Along with these roads, four Class A roads, 22 Class B roads are defined under Municipal level roads. While 42 class C roads and 108 class D roads are defined under ward level roads. Along with these roads, some other roads are also surveyed during inventory survey and they are put under tole roads as they don’t satisfy to lie under any of the above road category. Most of the roads in municipality area are gravelled followed by metalled

roads. Few kilometers of road are to be constructed as new roads. About 9% of roads are earthen. About half of the length of roads are below 4.0 m wide while about 70% roads do not meet the criteria for road class, i.e. having existing width below 6.0 m. Only 3% are wider than 10.0 meter and most of these roads fall under SRN. According to national urban strategy the target of urban road density is 7.5 km per square km land area. Road density as determined for total area of municipality is found as 10.81 km road per square km area. Again the density of road per 1000 population is found as 3.61 km. Density is found quite varying from ward to ward at the ratio of about 5 times, however this shall not replicated the very worst to very good accessibility situation. Again the density of the road in municipality is found more than threshold as stated in national strategy. However the major challenge for the development of road is to make them more operational.

Ward level meeting in every ward or ward cluster is done and the demand of road from ward level has collected. Development of the scoring criteria and prioritization criteria based on the provided guidelines has prepared and approved from the municipality and MRCC has done. KVDA has planned to construct river corridor road along both side of the Manohara khola, and Bagmati River which lies along approximate North-South direction of the municipality. The construction of the corridor under construction.

There is a possibility of inter-connection with neighboring municipality as well as neighboring districts. The proposed outer ring road and existing KTM ring road shall pass nearby the municipal area. The cost for the construction each road has determined based on the rate provided in the guideline. The total cost of interventions excluding SRN and DRCN was found as NRs. 6,293,169,414.9 (6.3 billion) for the length of 212.118 km. The detailed of five year and abstract of twenty year implementation plan has been developed. The implementation plan has prepared based on the priority/rank obtained from the prioritization criteria.

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List of Abbreviations and Acronyms

AD	Anno Domini
BS	Bikram Sambat
DDC	District Development Committee
DoR	Department of Road
DRCN	District Road Core Network
GIS	Geographic Information System
IDPM	Indicative Development Potential Map
INGO	International Non-Governmental Organizations
LSGA	Local Self-Governance Act
MIM	Municipality Inventory Map
MoFALD	Ministry of Federal Affairs and Local Development
MRCC	Municipality Road Coordination Committee
MTMP	Municipal Transport Master Plan
MTPP	Municipal Transport Perspective Plan
NGO	Non-Governmental Organizations
NUDS	National Urban Development Strategy
RoW	Right of Way
SRN	Strategic Road Network
ToR	Terms of Reference
VDC	Village Development Committee

Chapter-1 Introduction

Municipal Transport Master Plan (MTMP) shall be defined as the process of Identification, classification and prioritization of roads within municipality; construction, upgrading, maintenance and rehabilitation of prioritized roads on the basis of approved criteria with calculation of financial budget. The background for preparation of transport master plan along with the objectives and the scope of planning has stated in this chapter. The basic approach for the preparation of MTMP is the bottom up and participatory approach.

1.1 Background

A broader perspective on urban transportation is proposed in National Urban Strategy 2015. The strategies include the integration of land use and transportation in urban as well as regional planning and development of related institutional mechanisms and capacity. The provision of hierarchically balanced urban road infrastructure; promotion of sustainable urban public transport, and preparation and implementation of comprehensive transport management standards and plans for urban areas are the boarder perspective that has focused in the strategy. In prioritized regions the provision of high- speed inter-urban transport infrastructure is also proposed [1].

Local Self-Governance Act (LSGA) provisions formulation of local development plan according to needs-based, bottom-up and participatory approach. It has prominently defined tangible steps for formulation of such development plan. The main objective of this plan is to make investment for planned development within each of the local bodies' territory. Ultimately, development endeavors help attaining sustainable livelihood and improved well-being of people. People's needs for sustainable livelihood and improved well-being are such that they require better access to information, markets and opportunities; they need better access to health, education and other goods and services. Hence as a part of MTMP preparation, accessibility planning has recommended as an effective tool to access the existing situation of the services and facilities. Strategic road network is important for national income while local roads are for poverty reduction [2]. The interventions derived from the accessibility planning has shall represent the real needs and priorities of the local people [3]. The population and land area are inherent for economic development but the road density have multiplicative effect while road network connectivity have exponential effect on local economy [4].

Ministry of Federal Affairs and Local Development stepped up to bring forward proposal to create new municipalities from those urban and semi-urban settlements by combining prevalent Village Development Committees. Government of Nepal approved the proposal leading to creation of 159 new municipalities in various steps. There are altogether total 217 municipalities in Nepal till June, 2016. Kageshwari Manahara municipality is one, which has established in December, 2014 through agglomeration of 5 existing Village Development Committees. Since these municipalities are at an early stage of infrastructure development they require appropriate long term plan so that organized and beautiful cities shall be developed. MTMP has considered as an objective tool for prioritizing the projects and it will fulfill partially the lacking part of LSGA.

1.2 Objectives of MTMP

The overall objective of this study is to prepare the Municipal Transport Master Plan (MTMP/MTPP) for Kageshwari Manahara Municipality. The specific objectives are to:

- Finalize visionary city development plan if Comprehensive Town Development Plan is not prepared.
- Analyze the accessibility situation.
- Identify and priorities the interventions based on the accessibility situation.
- Prepare Indicative Developmental Potential Map (IDPM).
- Prepare the Municipality Inventory Map (MIM) of Road networks.
- Collection of demands for new/rehabilitation transport linkages from Municipalities/Settlements based on city development plan.
- Prepare the Perspective Plan of transport services and facilities.
- Synchronize the draft Perspective Plans of adjoining VDCs/Municipalities/districts.
- Develop scoring criteria and its approval from Municipality.
- Prepare the five years Municipal Transport Master Plan (MTMP).
- Prepare a realistic physical and financial implementation plan of prioritized roads for the MTMP period; and
- Prepare Municipal Transport Perspective Plan (MTPP).

1.3 Scope and Limitations of MTMP

The scope of the works and services of the consultant for the project are given below.

a. Assist in the Formulation of the Municipality Roads Coordination Committee (MRCC).
b. Secondary Sources of Information and Review of the existing MTMP.
c. Accessibility data collection and analysis.
d. Prepare the Indicative Municipality Development Potential Map (IDPM).
e. Prepare MIM of urban roads, main trails and bridges within the municipality.
f. Collection of demands for new/upgrading/rehabilitation transport linkages from wards/settlements.
g. Developing Scoring Criteria and its Approval from Municipality.
h. Road classification and nomenclature.
i. Analyze Fund Availability for Roads.
j. Preparation of Perspective Plan of interventions of services and facilities.
k. Preparation of the Municipal Transport Master Plan (MTMP).
l. Prepare a realistic Physical and Financial Implementation Plan of prioritized roads for the MTMP period.

3.1 Planning Approach and Methodology

Municipal Transport Master Plan is prepared using participatory bottom-up approach from the settlement level. Techno-Political interface is incorporated in the planning process, where active participation from representatives of political parties, line agencies, municipality officials is crucial. The Municipality Road Coordination Committee (MRCC) is constituted as an authorized legislative body of municipality.

Table 1, Planning Matrix for the Preparation of MTMP

Objectives	Data Type	Sources of Data	Analysis Tools or Methods	Expected Output
1. Finalize visionary city development plan.	Primary & Secondary	Local People, Planner and Experts	Visualization of Plan	VCDP
2. Analyze the accessibility situation.	Primary	GPS & HH Survey	GIS Mapping	Accessibility Situation
3. Identify and priorities the interventions based on the accessibility situation.	Primary	Local People, Planner and Experts	PTAL, WLT, WT	Accessibility Mapping and Buffering
4. Prepare Indicative Develop-mental Potential Map (IDPM).	Primary & Secondary	Local People, Planner and Experts	Land use and Planning	IDPM
5. Prepare the Municipality Inventory Map (MIM)	Primary & Secondary	Field Inventory Survey & Map by GIS Expert	GIS Mapping	MIM
6. Collection of demands for new/ rehabilitation transport linkages from Municipalities/ Settlements.	Primary	Ward Level Meetings by Enumerators	Checklists	Demands of each wards
7. Prepare the Perspective Plan of transport services and facilities.	Primary & Secondary	Engineer and Planner	Network Analysis and Accessibility Analysis	MTPP
8. Synchronize Perspective Plans of adjoiningVDCs/Municipalities/districts.	Primary & Secondary	Engineer and Planner	Transportation Networking	Inter-linkages among Municipalities
9. Develop scoring criteria and its approval from Municipality.	Primary	Approved by Municipality & MRCC	Checklists	Prioritization Criteria
10. Prepare five years Municipal Transport Master Plan (MTMP).	Primary & Secondary	All Previous Results	Perspective Plan and Financial Plan	MTMP
11. Prepare a physical and financial implementation plan of prioritized roads for the MTMP period.	Primary & Secondary	Municipality Office and all Previous Results	Implementation Plan	Implementation Plan

Conceptual Framework

Prioritization of roads collected from demand form is done and interventions are proposed based on the analysis of projected budget available for road within MTMP period. Based on it Municipal Transport Perspective Plan (MTPP) has been prepared. Finally, Municipal Transport Master Plan (MTMP) and it's Physical and Financial Implementation Plan has prepared. The Conceptual framework of the methodology adopted is shown in Figure-1.

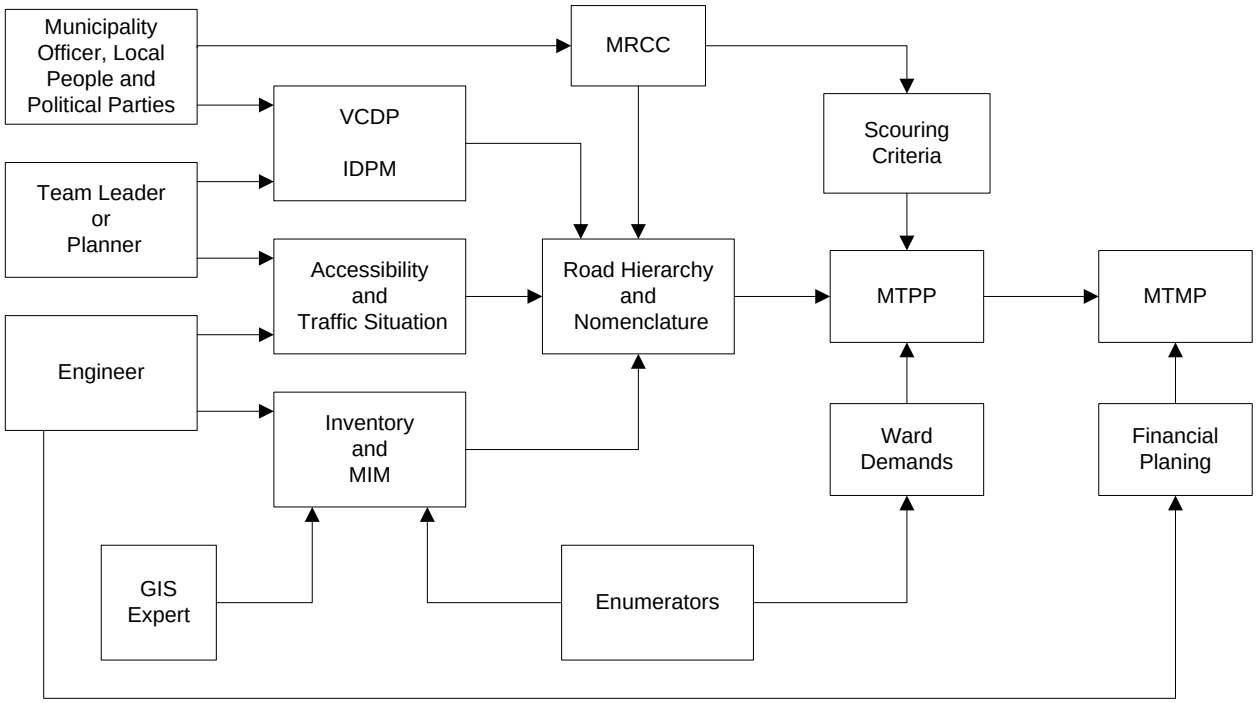

Figure 1, Conceptual Framework of MTMP Preparation

a) Formation of MRCC

The main task of MRCC is to provice support to the municipality in formulating, managing and monitoring municipality road transport infrastructure plicies, rules and regulations. In the presence of municipality staffs, representatives of political parties and other selective persons orientation workshop in the Kageshwari Manahara municipality was held. The main objective of the workshop was to provide the concept, objective and methodology of the MTMP and the scope of works of the consulting firm. Municipality formed the MRCC including the designated members.

The MRCC composition as recommended in Terms of Reference has presented below:

Table 2 Municipality Road Coordination Committee (MRCC) Members [3]

Representative organization/ community/ political parties	**Position held**
Infrastructure Development Committee Chair	Chairperson MRCC
Executive Officer of municipality	Member
Two elected or nominated Municipality Members	Member

Representative organization/ community/ political parties	Position held
One representative from different political parties	Member
Chiefs of Line agencies within the municipality (max. 3 nos. from prevalent offices)	Member
Representative from women and ethnic minority groups	Member
DTO representative	Member
Planning section chief of municipality	Member
Technical section chief	Member secretary

b) Secondary Sources of Information and Review of the existing DTMP

The secondary information has collected from the various district based line agencies, project/program, INGOs/NGOs, and other regional and central level organizations as required. The team has reviewed the available existing DTMP of Kathmandu district.

c) Accessibility Data Collection and Analysis

Accessibility data shall be collected using a standard questionnaire sheet through household survey. Accessibility shall be assessed by three ways including, accessibility to roads, accessibility to public transportation and accessibility to the services. The ward wise boundaries shall be considered as zones for accessibility as well as trip pattern.

d) Preparation of the Indicative Municipality Development potential Map (IDPM)

The Municipality's Indicative Development Potential has prepared based on visionary city development plan. The visionary city Development plan has prepared based the characteristics of the location along with the consultation with the people and MRCC. The final potential map shall be validated trough the MRCC and Municipality. The base map will be prepared on a 1:25,000 scale topographical map.

e) Preparation of the Municipality Inventory Map (MIM) Municipality Inventory Map (MIP) has prepared based on field inventory survey. The field survey has been carried out by mobilizing enumerators via walkover surveys. The Inventory includes the roadway length, width, surface type, carriageway width, drainage condition, number of served population, administrative buildings, educational offices and hospitals/health posts.

f) Collection of Demands for NewAlpgrading/Rehabilitation Transport Linkages from wards

The formal requests for new construction or rehabilitation of different linkages from has collected from wards and settlements, on their needs basis using format as recommended by ToR. The demand has been collected in the order of priority from each ward. The collected demand shall be screened and harmonized at municipality level through workshop. Again the socio-economic data of all requested transport linkages were also collected from wards as well as from inventory by enumerators. The framework that has been using in the whole process is as per ToR and DoLIDAR approach manual.

g) Developing Scoring Criteria and its Approval from Municipality

The study and planning team has developed weight system for the scoring and prioritization criteria for screening and prioritized demanded following the recommended guidelines for interventions. The scoring and prioritization criteria shall be approved by the municipality. All the demanded linkages shall be processed and undergo through the screening and prioritization process.

h) Road classification and nomenclature

The planning team has prepared road classification criteria, and the nomenclature has developed as the Terms of Reference.

i) Preparation of Perspective Plan of Interventions of Services and Facilities

The study and planning team shall prepare perspective plan of interventions of services and facilities, which re indentified from the accessibility analysis and municipality level workshops. All the identified interventions shall be screened and rated on the basis of approved criteria. The team shall discuss with the municipality technical team and the MRCC relating to interventions of services and facilities for the improvement of the access situation and shall forward to Municipaliil Council meetines with recommendation. Accordingly, the final perspective plan of municipality roads will be developed. The perspective plan shall be shown in GIS maps also.

j) Analyze Fund Availability for Roads

The internal and external financial resources available in the municipality shall be reviewed by the consultant discussing with the municipality authorities so that the financial recourses available for the transport interventions during the five year MTMP period can be estimated. Sources of funding include annual budget allocated in the municipality, the budget allocated through GoN central agencies such as DoLIDAR. Other possible sources of funds could be from road tolls, royalties, land taxes etc. Prospects of funding from other external sources, including possible and committed funding from donors, are reviewed and shall be taken into account.

k) Preparation of the Municipal Transport Master Plan (MTMP)

Considering the Perspective Plan, the team shall prioritize the Perspective Plan subsequently, the team shall prepare the five year MTMP of the municipality by selecting transport interventions (maintenance, upgrading and new construction of main trails, trial bridges and roads) from among top priority in the Perspective Plan starting from first and that could be implemented in the next five year period. This shall be based on cost estimates of maintenance, upgrading, rehabitation and new construction of main trails, bridges and roads and available financial resources.

l) Prepare a Realistic Physical and Financial Implementation Plan of Prioritized Roads for the MTMP Period

The study team shall collect information on existing resources spent on transport infrastructure and possible available resources, and make a projection for the next five years period. From the total projected resources, the team shall discuss with the municipality to find out the appropriate proportion to be spent on on-going roads and new interventions (construction/ rehabilitation/ maintenance etc) proposed. This step involves matching the estimated resources that are expected to be available to the municipality over the plan period, with the interventions for on-going roads and proposed ones. The total numbers of

road and interventions proposed for the MTMP period shall match with the projected available resources and should avoid proposing a long list for the MTMP period.

1.5 Study Area

Kageshwari-Manahara municipality lies in Kathmandu district of Central Development Region. It is a newly declared municipality formed by agglomerating 6 existing VDCs into single Kageshwari-Manahara Municipality. The agglomerated VDCs are Aalapot, Bhadrabas, Daanchhi, Gagalphedi, Gothatar and Mulpani VDCs. Kageshwari-Manahara Municipality stretches from Kathmandu Metropolitan City in the South-West to Sindhupalchowk district in the North. It has Shankharapur municipality in the east and Chandragiri Municipality in the west. It covers an area of 27.5 sq. km. The location/index map of the municipality has presented in Figure 2.

Kageshwari Manahara Municipality

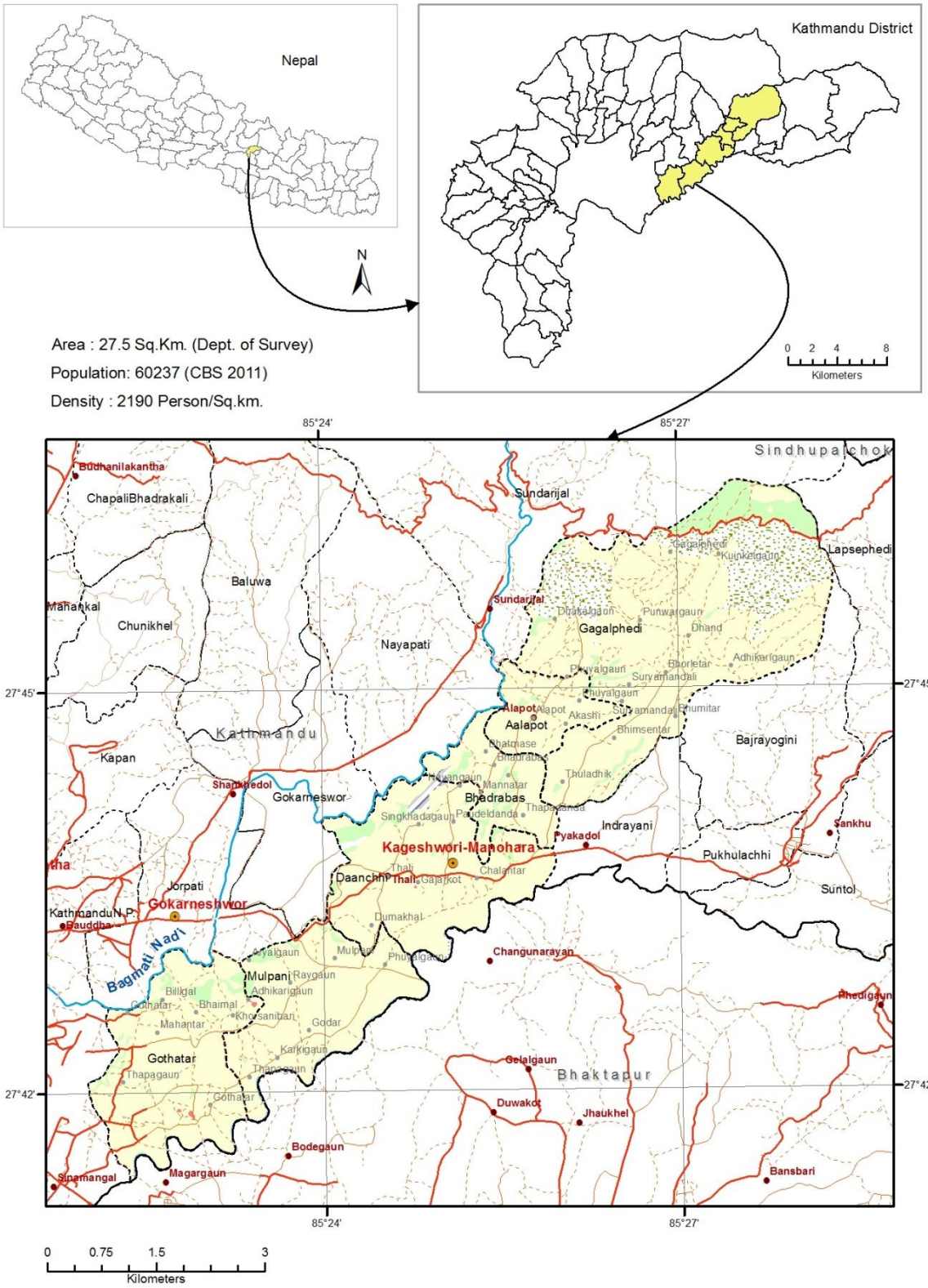

Figure 2, Index Map of Municipality

Chapter-2 Review of Existing Infrastructure Situation

Before going through Municipal Transport planning it is fundamental to know about the present condition transport infrastructure. This chapter includes the existing road and roadside infrastructure along with their current condition. The physical infrastructure which has indirect effect to the transportation system such as urbanization, apartment system has also been assessed.

2.1 Assessment of Existing Infrastructure Situation

Kageshwari-Manahara municipality has directly linked with Kathmandu Metropolitan via a wide road which lies under SRN. The city has a river corridor, Bagmati corridor and Mahadev ikhola corridor. Again it has connected with six feeder roads. Again the proposed outer ring road shall pass through it. Most of the roads at city area are metallic with bituminous surfaced while the river corridors and the roads at hilly portion with small settlement are under planning and construction stage. Again the city is important based on religious point of view, as Kageshwari temple lies at the Northen part of the municipality.

Strategic Road Network (SRN)

There is no National Highway which passes through the municipality area, while it has four Feeder Roads that has passed through it till 2016 [5]. However, during transportation planning the existing strategic road in neighbor municipality and district shall play as an instrumental role for providing service to the municipality. So, for overall travel pattern and the traffic movement, the ring road has also considered as a link of road. Again, the planned outer ring road shall facilitate the municipality area.

Table 3, Existing SRN within the Municipality Area [5]

S.N.	Name of Road	Class	Ref No	Length (km)
1.	Outer Rind Road	National Highway	H21	Planned
2.	Chabahil-Pipalbot-Sankhu-Lapsiphedi-Bhotechaur	Feeder Road	F026	25.43
3.	Pepsikola-Gothatar	Feeder Road	F087	3.5
4.	Gokarna-Jorpati-Gothatar	Feeder Road	F088	3.6
5.	Pepsikola-Karkigaun	Feeder Road	F089	6.4
6.	Karkigaun-Mulpani-Gokarna	Feeder Road	F092	4.1
7.	Mulpani-Changunarayan-Phedigaun	Feeder Road	F095	(1.5 P)

The map in Figure 3 shows the pattern of strategic road network in Kathmandu district. The map identifies that the pattern of road network is concentrated at Central Business District (CBD) of Kathmandu valley explaining in terms of ring and link basis. The construction of outer ring road shall also intensify its network pattern as radial and circular. The disadvantage of this pattern is the concentration of traffic at CBD and congestion will be

observed as a problem. However, the pattern of traffic at morning peak and evening peak is just opposite, so it shall be easy for traffic analysis.

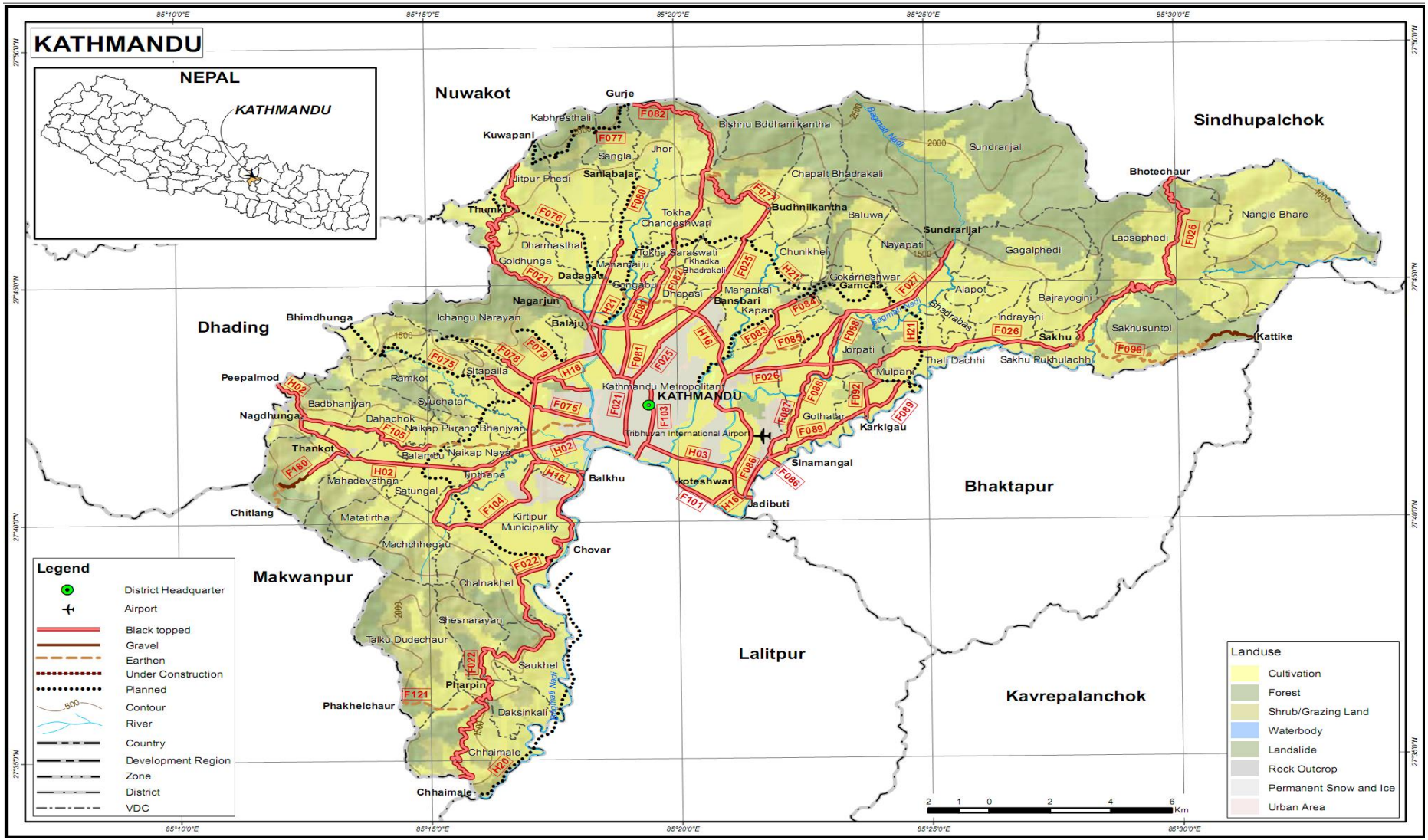

Figure 3, Strategic Road Network of Kathmandu District [5]

Typical cross sections of SRN Roads

National Highways and feeder roads in Municipality area are major arterial and sub-arterial links which serve for through traffic. DoR is responsible for RoW demarcation, planning, design and maintenance of these highways. Typical cross sections are shown in Figure 4, Figure 5 and Figure 6. These cross-sections are prepared based on the recommendations of NRS-2070 [6] and NRRS-2012 [7].

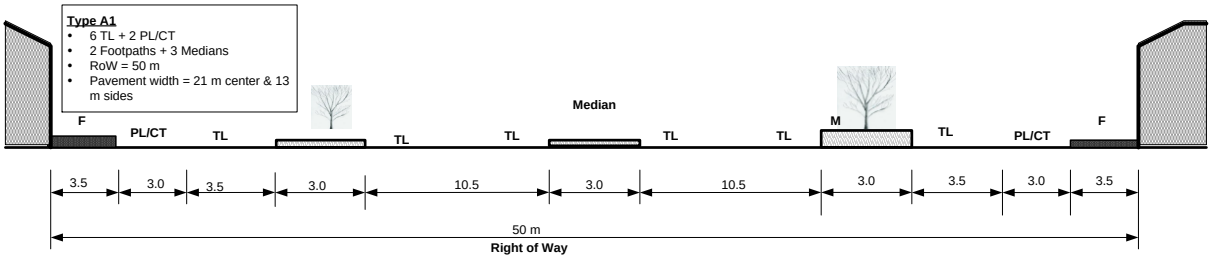

Figure 4 Typical Cross Section of Arterial (National Highway)

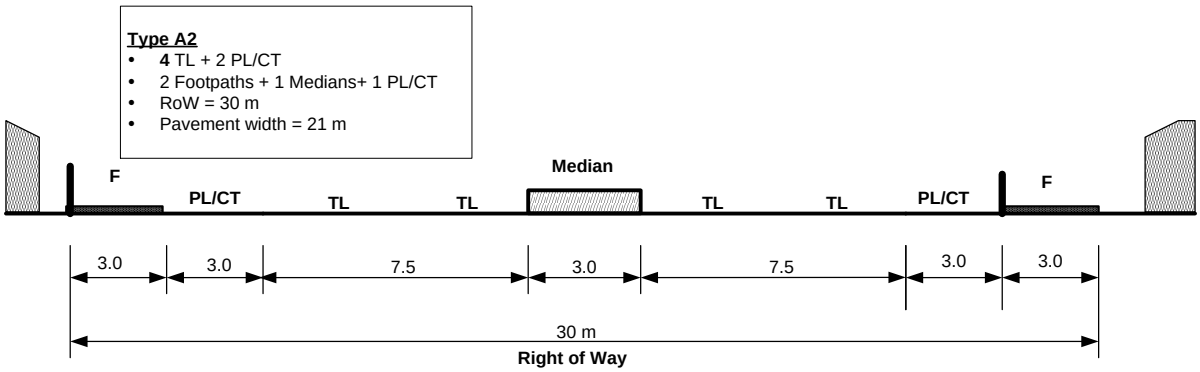

Figure 5 Typical cross section of Sub-arterial (Feeder Roads)

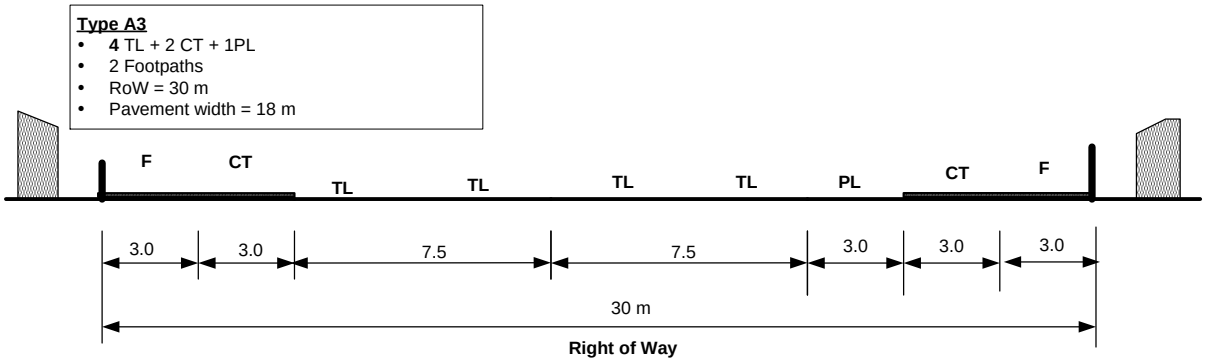

Figure 6 Typical cross-section of Sub-Arterial (Feeder Roads)

District Road Core Network (DRCN)

These are the roads connecting old VDCs centres of the district with SRN. The planning of these roads was carried out by the district itself. According to the final report of DTMP of the district, which was done by Sitara consultancy, the district roads are listed in Table 4 [8].

Table 4, Existing DCRN in Kageshwari Manahara Municipality

S. N.	Name of Road	Class	Road Code	Length (km)
1.	Kageswori Ring Road	DRCN	27DR032	8.9
2.	Sundarijal-Alapot Road	DRCN	27DR034	1.5

Based on NRRS-2012, [7] the minimum RoW of DRCN is 20 m, i.e. 10.0 m on either side. These roads served as feeder for SRN however as a collector from municipality roads.

Typical cross sections of DRCN Roads

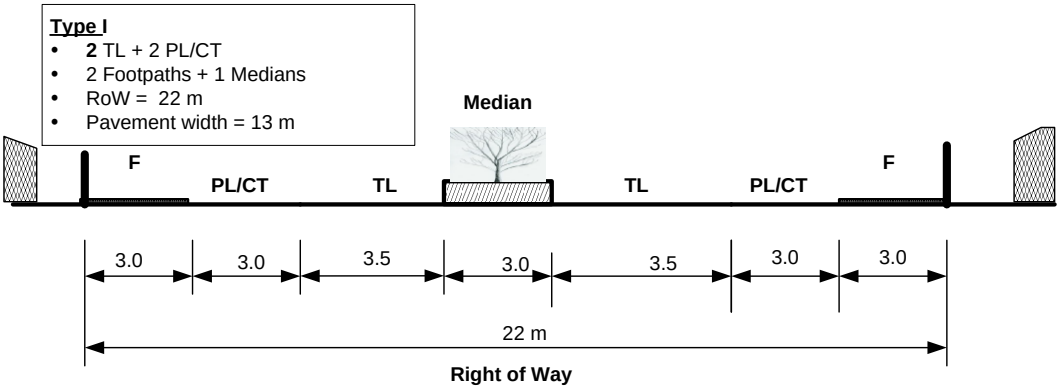

Figure 7, Typical Cross-section for DCRN Roads (with RoW 22m)

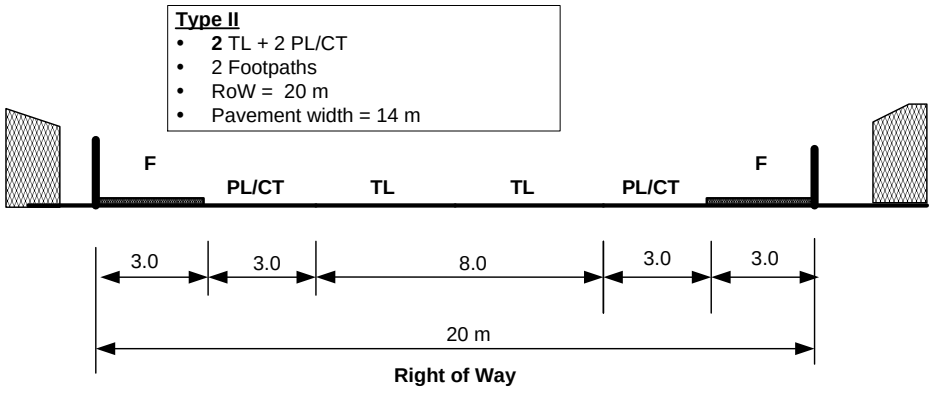

Figure 8, Typical Cross-section for DCRN Roads (with RoW 20 m)

2.3 Review of Municipality Strategy and other Reports

The minimum road density on existing municipality has planned to make at least 7.5 km/sq.km area. [1]. Again the clause number-40 has described the overall strategy of municipal roads. It has focused on:

- Integration of land use and transportation
- Provision of hierarchical and balanced urban road infrastructure development
- Sustainable urban public transportation system
- Standards for urban road management
- Intercity high speed transportation system

४०. सडक/परिवहन: शहरी यातायात संबन्धमा एउटा फराकिलो दृष्टिकोण राखिएको छ । यस अन्तर्गत प्रमुख रुपमा भूउपयोग र यातायात/परिवहनलाई शहरी तथा क्षेत्रीय योजना तर्जुमा प्रकृयामा एकीकृत गर्दै तत्सम्बन्धी संस्थागत संयन्त्र र क्षमताको विकास गर्ने, तहगत र सन्तुलित शहरी सडक पूर्वाधारको प्राबधान गर्ने, दिगो शहरी सार्वजनिक परिवहनको प्रबन्ध गर्ने, शहरी यातायात व्यवस्थापनका लागि मानकहरुका साथै बिस्तृत योजना तयार/कार्यान्वयन गर्ने, र प्राथमिकता प्राप्त प्रदेशहरुमा उच्च-गति अन्तर-शहरी यातायात पूर्वाधारको प्रावधान गर्ने जस्ता रणनीतिहरु रहेका छन् ।

(Source: Nepal Urban Development Strategy, 2015 [1])

2.5 Visionary City Development Plan

The definition of visionary is someone or something that thinks about the future or advancements in a creative and imaginative way. A person who is ahead of his time and who has a powerful plan for change in the future is an example of a visionary.

Kageshwari Manahara municipality, is a city with prosperous for tourism sector. The visionary plan includes its future development pattern, the possible income sources of municipality and the future land use pattern. The municipality area is found quite developed as compared to other municipality while still there is a lot of work that should be incorporated for sustainable development. The identified sources of income along with the taxes of market are the tourist service. It is going to be late for planning the land-use pattern however still there are various ways for proper land use plane development and implementation. Detail of land use plan is however the out of scope of the study, it is the pioneer driver for the trip pattern and the transportation system must address the future trip pattern.

The visionary plan of the city is mixed type as the different kind of land use and the development potentials. The visionary city plan has identified the major development potential in following sector.

1. Planned Settlement for development of settlement area

2. Large mountains (Forest Conservation Area) lying in the Northen side of the municipality for attraction of tourists
3. Agriculture and agro-based industries for the production of perishable foods
4. Inter-linkages among neighbor districts and municipalities

2.6 Constraints in Implementation of MTMP

The Kageshwari Manahara municipality has directly connected with the Metropolitan city, Kathmandu; the capital city of Nepal, the land value of the municipality area is quite high. Again the city has already taken its shape with existing infrastructures. However the existing Right of Way (RoW) and the carriageway width of the existing road are about 4-6 m. For the development of city with efficient transportation system it is inherent to provide appropriate roadway width. Thus the major constraint for the implementation of MTMP is to provide sufficient right of way of the roads. Again, the cost of blacktopping for a unit length of road (per kilometer) is 57 lakh [10] and the budget per year of the municipality for road construction is few crores. Thus, the budget constraint is also the main constraints for the implementation of the MTMP. In a year the available budget shall only be sufficient for a few (1 to 2) kilometers only. For the implementation of the master plan the participation of local people is also quite often challenging for the municipality. The government has planned to develop planned settlement along the 250 m way of the outer ring, however till 2015; the alignment of outer ring road has changing due to land acquisition problem and also for preserving agricultural land.

2.7 Trend of urbanization

Transportation is more than moving people, goods and services on roads, buses and sidewalks. It is basic infrastructure that shapes urban form, impacts economic well-being and is a primary determinant of municipality's environmental, financial and social sustainability. Municipal transport master plan is a strategic planning document designed to define policies, programs and interventions required for the municipality's transportation needs for next 20 years and beyond. Developed through study of indicative development potential and probable land use changes the plan reflects the growth and development of the municipality.

Kageshwari Manahara is a rapidly urbanizing area in the central development region of the country along North-East of the Kathmandu district. As it is connected with Kathmandu Metropolitan, the Capital of the country, it has the potential for development in economic activity and prosperity serving municipal area and surrounding municipalities and Sindhupalchowk district as well. The trend of urbanization of the area has found on following ways:

1. Urbanization based on planned residential settlement
2. Historic settlement based urbanization
3. Agriculture based urbanization
4. Industrial urbanization

The older type of settlement in the area was found based on agriculture based while the newer are planned settlement. Most of the houses constructed within the area were found to be used for residential purpose and these are constructed without development of land-use plane.

Settlements based on historic places were not found but the residences are staying in the area for hundreds of years.

Chapter-3 Indicative Development Potential Map

3.1 Municipality Profile

Geographic Location

Latitude : 27.7654° N
Longitude : 85.3653° E

Relative Location

East : Shankharapur Municipality
North : Sindhupalchowk Disrict
West : Gokarneshwara Municipality
South : Kathmandu Metropolitan City

Administrative and Political Division

Development Region	:	Central Development Region
Zone	:	Bagmati zone
District Headquarter	:	Kathmandu
Municipality	:	Kageshwari Manahara municipality

Festivals

Dashin, Tihar, Chaita dashin, Holi, Sekale, religious celebration, Barabarshamachindra Rath Celebration, Gai jatra, Ghoda Jatra, Buddha jayanti, Krishna Jayanti etc [10].

Important Markets

Aalapot, Bhadrabas, Daanchhi, Gagalphedi, Gothatar and Mulpani

Population and Population Density

Total Population	:	60,237
Male Population	:	30,233 (50.19%)
Female Population	:	30,004 (49.81%)
Number of Households	:	14,329
Average Household size	:	4.204
Population Density	:	2,190 person / sq.km.

(Source: Census, 2011)

Ethnicity

Newar, Bahun, Chhetri, Tamang and Magar

Table 5, Population distribution in various wards within the municipality [11]

Name of Major Settlement	Ward No.	2011 AD					2001 AD				
		No. of HH	Population	Male	Female	HH Occupancy	No. of HH	Population	Male	Female	HH Occupancy
Gagalphedi 1-2-3	1	528	2,626	1,302	1,324	4.97	443	2239	1116	1123	5.05
Gagalphedi 4-5-6	2	426	1,882	901	981	4.42	384	1989	974	1015	5.18
Aalapot 1-3-6-7-8	3	323	1,553	782	771	4.81	266	1415	736	679	5.32
Bhadrabas 4-6-7-8-9	4	252	1,176	604	572	4.67	206	1005	504	501	4.88
Daanchhi 1-2-3	5	605	2,806	1,409	1,397	4.64	468	2404	1209	1195	5.14
Daanchhi 4-5-6	6	484	2,181	1,102	1,079	4.51	375	1912	972	940	5.10
Daanchhi 7-8-9	7	1,504	6,259	3,186	3,073	4.16	684	3360	1924	1436	4.91
Mulpani 1-2-3	8	763	3,212	1,631	1,581	4.21	346	1617	809	808	4.67
Mulpani 4-8	9	1,052	4,879	2,401	2,478	4.64	401	1895	1081	1142	4.73
Mulpani 5-6-7-9	10	832	3,651	1,857	1,794	4.39	401	2662	1029	0	6.64
Gothatar 1-2-3-4	11	1,386	5,750	2,902	2,848	4.15	669	3254	1661	1593	4.86
Gothatar 5-6-7	12	1,805	6,819	3,427	3,392	3.78	410	2046	1037	1009	4.99
Gothatar 8-9	13	3,558	13,600	6,855	6,745	3.82	609	2969	1471	1498	4.88
Gagalphedi 7-8-9	14	212	1,025	504	521	4.83	194	1001	485	516	5.16
Aalapot 2-4-5-9	15	348	1,606	779	827	4.61	289	1469	706	763	5.08
Bhadrabas 1-2-3-5	16	251	1,212	591	621	4.83	206	1134	565	569	5.50
Total		**14,329**	**60,237**	**30,233**	**30,004**	**4.465**	**6,351**	**32,371**	**16,279**	**14,787**	**5.131**

The age-group-wise population distribution of Kageshwari Manahara Municipality according to census (2011) is shown in Figure 9.

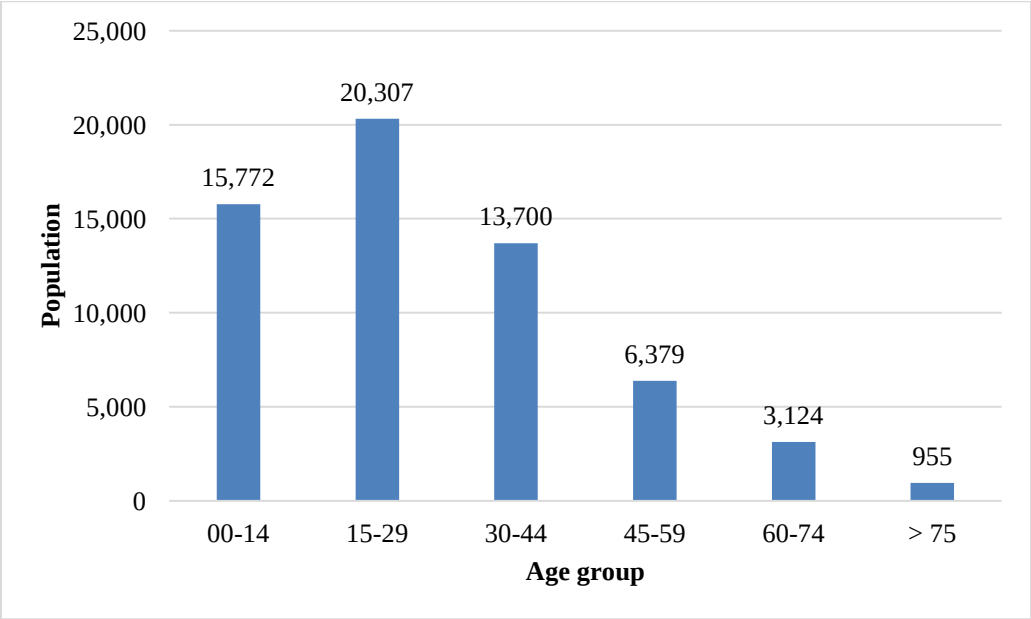

Figure 9, Age-group-wise population distribution [11]

Education

According to census (2011), majority of population (5 years and above) in Tarkeshwor Municipality have attained school level education, about 15% have attained SLC and equivalent level education, about 15% have attained inter-mediate and equivalent level education and nearly 8% have attained graduate or other higher level education.

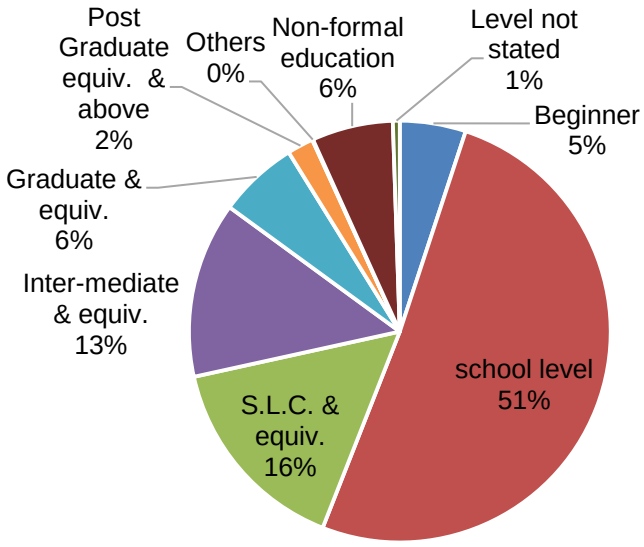

Figure 10, Population by educational attainment (Source: Census, 2011)

3.2 Lists of Development Potential Area

1. Kageshwori Temle

2. View Tower
3. International Cricket Stadium
4. Geeta Temple
5. Krishna Pranami Dham
6. River corridor area for vegetation and agro-based industries

3.4 Briefs of Development Potential Area

- **View Tower**

  It is one of the important areas based on tourist point of view. People shall look over the valley from this location covering almost all locations. This tower shall be developed as a tourist potential area of the municipality in Gagalphedi Forest area.

- **Religious Area (Temple and Gumba)**

  There are a lot of temples within the municipality area including Kageshwari, Krishna Pranami Dham, Geeta Temple etc. These centers shall be developed as tourist area as potential development area of the municipality.

  Trekking Route

  The trekking routes which shall be developed in northern belt of the municipality will be very near to Kathmandu city. So this route has importance for tourist point of view.

3.4 City Growth Centre

1. Aalapot
2. Bhadrabas
3. Daanchhi
4. Gagalphedi
5. Gothatar and
6. Mulpani

These areas are important for residential purpose. The most of the houses are found as build by people individually rather integrated and land-use plan. This is the reason that the road constructed in these locations are narrow having width less than 6.0m. The city development in densely populated area is technically not justifiable.

3.5 Environmental Sensitive Areas

1. Bagmati River area
2. Manahara River area
3. Gagalphedi Foreset Area

3.6 Indicative Development Potential Map (IDPM)

The ultimate target point for the development of the area shall be based on visionary plan of the city. The visionary plan however itself is insufficient to tell us about the land use plan and the development process. The development of a city shall be based on the potential of the area, their characteristics and the willingness of the resident people. The elaborated form of the visionary plan shall be reflected in potential map. The transportation system shall be such that, the interlink among these potential area should be efficient with high priority lines. The Kageshwari Manahara municipality is important destination for internal tourists however the most of the area near to ring road has been occupied for residential purpose. So it the city of residence. The indicative development potential map has presented in Appendix-II.

Chapter-4 Municipality Inventory Map of Road Network

Road Inventory Survey was done with the help of the earlier prepared GIS base map of the municipality and Road inventory form. Field verification of the base map is done. Road inventory survey was done from one nodal point to another in each road sections collecting information related to road surface, crossing structure, road condition, and linkages to the large settlements, economically active spaces, existing service centers, potential growth centers, potential areas of development, areas of special considerations and direct link to another linkage. From data of the road inventory survey, MIM is prepared. And based on the earlier study of Potential areas and MIM, IDPM is prepared which was approved from municipality and MRCC.

4.1 Overview of Road Inventory

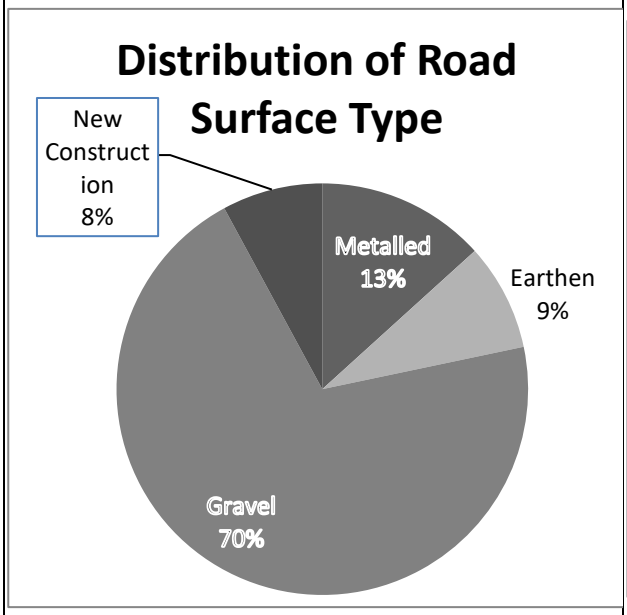

Figure 11, Road Length according to surface type (Source: Field Survey, 2016)

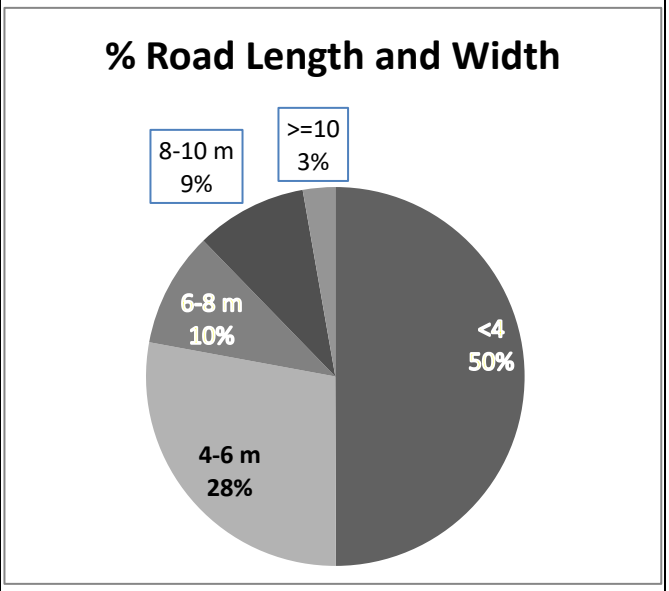

Figure 12, Road Length according to it width (Source: Field Survey, 2016)

Most of the roads in Kageshwari-Manahara municipality are graveled followed by Metallic road. A few kilometers of road are Concrete paved roads while other metallled roads are bituminous. Again, about half of the roads are below 4.0 m wide. Only 3% are wider than 10.0 meter and most of these roads fall under SRN.

4.2 Road Density

According to national urban strategy the target of urban road density is 7.5 km per square km land area. The most of the roads are earthen and are very narrow (<4.0 m) to address the trip generated from various area. Again the ward wise distribution of road and land-use pattern has presented. The table presents some new roads that have planned to be constructed within the municipality. The road density as observed for total area of municipality is found as 10.81 km road per square km area. Again the density of road per 1000 population is found as 3.61 km. the density is found quite varying at the amount of about 5 times, however this shall not replicated the very worst to very good accessibility situation. The varying level of density (based on area) shall be checked by using density based on population served. The density based on population replicates that the density so high and low is not of real difference in usable area of land. Again the density of the road in municipality is found to meet the national strategy. However the major challenge for the development of road is to make them more operational.

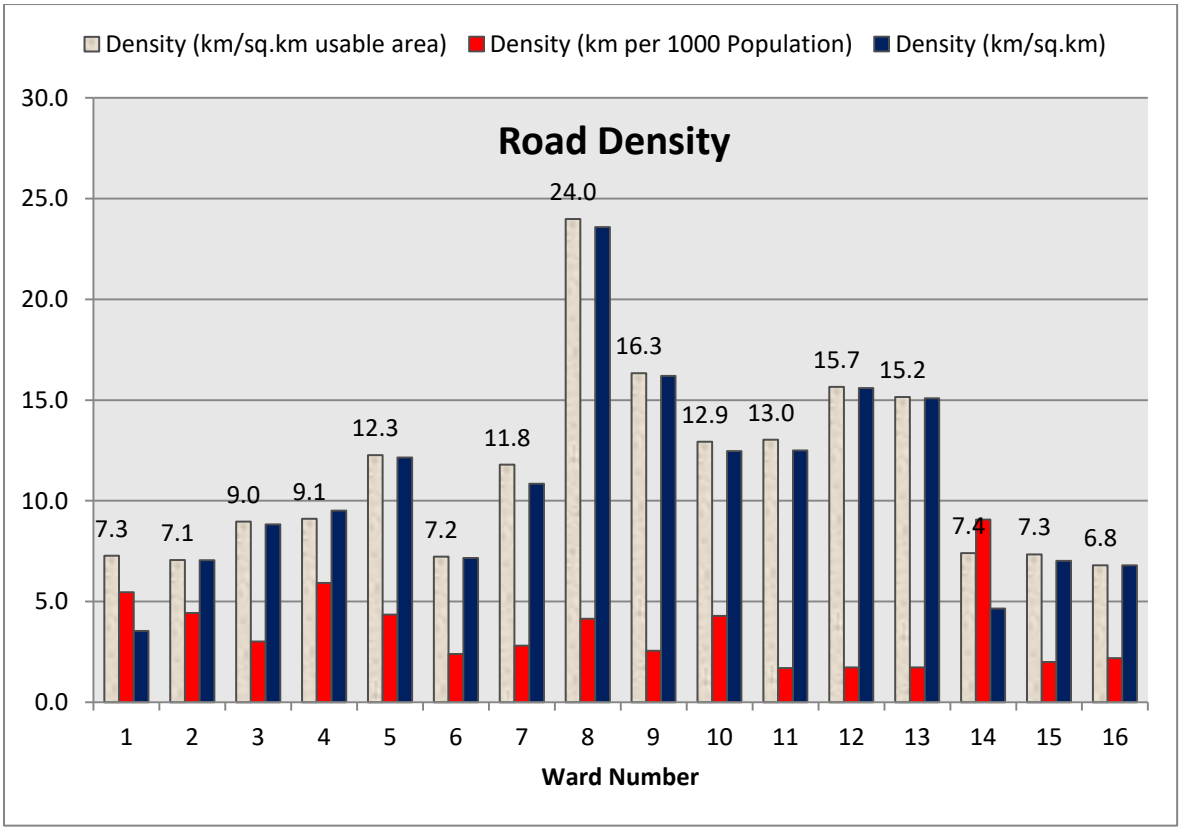

Figure 13, Ward-wise Distribution of Road Density

Table 6, Ward-wise Road Attributes

Ward No.	Name of Major Settlement	Road Length (km)						Surface Type				Ward
		SRN	DRCN	Class A	Class B	Other Roads	All Roads	Gravel	Earthen	Metalled	New	Area
1	Gagalphedi 1-2-3	7.108	0.000	0.000	0.312	13.925	21.345	14.578	6.343	0.424	0.000	6.020
2	Gagalphedi 4-5-6	3.469	0.000	0.000	2.656	6.289	12.414	9.343	0.114	2.804	0.153	1.760
3	Aalapot 1-3-6-7-8	1.785	0.000	0.192	0.180	4.821	6.978	4.141	0.541	2.104	0.192	0.790
4	Bhadrabas 4-6-7-8-9	1.054	0.000	1.208	2.944	5.160	10.366	7.079	0.184	1.188	1.915	1.090
5	Daanchhi 1-2-3	1.849	2.428	0.722	3.160	10.058	18.217	13.029	1.482	2.352	1.354	1.500
6	Daanchhi 4-5-6	1.050	1.252	1.550	0.041	3.922	7.815	2.829	1.134	1.050	2.802	1.090
7	Daanchhi 7-8-9	0.787	2.876	1.139	2.940	18.398	26.140	20.471	0.571	3.395	1.703	2.410
8	Mulpani 1-2-3	0.000	2.101	7.889	0.984	8.840	19.814	9.977	0.239	2.087	7.511	0.840
9	Mulpani 4-8	0.000	1.274	2.175	1.279	13.894	18.622	15.434	0.774	2.414	0.000	1.150
10	Mulpani 5-6-7-9	0.386	5.043	0.639	1.685	15.554	23.307	18.103	0.809	3.256	1.139	1.870
11	Gothatar 1-2-3-4	0.000	2.415	1.759	1.684	8.648	14.506	11.671	0.737	2.098	0.000	1.160
12	Gothatar 5-6-7	0.000	0.640	0.354	0.906	15.728	17.628	15.684	0.872	1.072	0.000	1.130
13	Gothatar 8-9	0.029	3.023	2.515	0.600	28.852	35.019	27.482	0.739	6.183	0.615	2.320
14	Gagalphedi 7-8-9	2.185	0.000	0.000	1.970	9.699	13.854	5.732	5.699	0.866	1.557	2.980
15	Aalapot 2-4-5-9	1.662	0.000	0.576	0.047	2.486	4.771	1.509	0.660	1.953	0.649	0.680
16	Bhadrabas 1-2-3-5	0.218	0.000	0.546	1.176	2.004	3.944	2.267	0.544	0.587	0.546	0.580
Total		**21.582**	**21.052**	**21.264**	**22.564**	**168.278**	**254.740**	**179.329**	**21.442**	**33.833**	**20.136**	**27.370**

Table 7, Ward-Wise Population, Area and Road Density

Ward No.	Length of Road (km)	Area (sq. km)	Usable Area (sq. km)	Total Population (2011)	Total Population (2016)	Density (km/sq.km)	Density (km/sq.km usable area)	Density (km per 1000 Population)
1	21.345	6.020	2.934	2,626	3,912	3.546	7.275	5.457
2	12.414	1.760	1.758	1,882	2,803	7.053	7.061	4.428
3	6.978	0.790	0.778	1,553	2,313	8.833	8.969	3.017
4	10.366	1.090	1.138	1,176	1,752	9.510	9.109	5.918
5	18.217	1.500	1.485	2,806	4,180	12.145	12.267	4.358
6	7.815	1.090	1.081	2,181	3,249	7.170	7.229	2.406
7	26.140	2.410	2.216	6,259	9,323	10.846	11.796	2.804
8	19.814	0.840	0.826	3,212	4,784	23.588	23.988	4.141
9	18.622	1.150	1.140	4,879	7,268	16.193	16.335	2.562
10	23.307	1.870	1.802	3,651	5,438	12.464	12.934	4.286
11	14.506	1.160	1.113	5,750	8,565	12.505	13.033	1.694
12	17.628	1.130	1.126	6,819	10,157	15.600	15.655	1.736
13	35.019	2.320	2.311	13,600	20,258	15.094	15.153	1.729
14	13.854	2.980	1.871	1,025	1,527	4.649	7.405	9.074
15	4.771	0.680	0.650	1,606	2,392	7.016	7.340	1.994
16	3.944	0.580	0.580	1,212	1,805	6.800	6.800	2.185
Total	**254.74**	**27.37**	**22.81**	**60,237**	**89,726**			
Mean						**10.81**	**11.40**	**3.61**

4.3 Routes Operating Public Vehicles

The travel pattern of people in the municipality area is to go towards CBD area at morning peak and reverse at evening peak time. The major settlements of generating public transport trips are dense settlement area as stated earlier. The details of the map has presented in Annex.

Table 8, List of Existing Transport Routes linking Kageshwari Manahara Municipality

S. N.	Route Description	Vehicle Type	No. of Vehicles	Asso-ciations(S)
1	Pepsicola-Jadibuti-Koteswor-Thapathali-	Mini	41	Nepal Yatayat

S. N.	Route Description	Vehicle Type	No. of Vehicles	Asso-ciations(S)
	Kalimati-Balkhu-Ekantakuna-Jawalakhel-Kopundole-Thapathali-Naya Baneswor-Koteswor-Jadibuti-Papsikola	Bus		Mini Bus Sewa Committee
2	Gothatar-Pepsicola-Jadibuti-Koteswor-Naya Baneswor-Maitighar-Sinhadurbar-Shahidgate- Tripureswor-Thapathali-Maitighar-Naya Baneswor-Koteswor-Jadibuti-Pepsicola-Gothatar	Mini Bus	50	Nepal Yatayat Mini Bus Sewa Committee
3	Sakhu-Indrabati-Thali-Jorpati-Chabhil-Airport- Koteswor-Satdobato-Reverse	Micro Bus	55	Sakhu Bus Entrepreneurs Association
4	Sakhu-Indrabati-Thali-Jorpati-Chabhil-Purano Baneswor-Putali Sadak-Old Bus Park-Reverse	Mini Bus	60	Sakhu Bus Entrepreneurs Association
5	Sakhu-Indrabati-Thali-Jorpati-Chabhil-Naya Baneswor-Reverse	Micro Bus	45	Sakhu Bus Entrepreneurs Association
6	Jorpati-Shakhu-Villege Area[6']	Mini Bus	25	Aama Ghaylmo Yatayat P. Ltd.
7	Gothatar-Pepsicola-Koteswor-New Baneswor-Maitighar-Putali Sadak-Ratnapark-Singh Durbar-Reverse	Gas Tempo Mini Bus	21 20	Gas Yatayat Entrepreneurs Association
8	Mulpani-Koteswor-New Baneswor-Singhdurbar- Old Bus Park-Reverse	Mini Bus	10	Madyapur Bus Sewa Committee

4.4 Inventory of Road Traffic Accidents

No location has been identifies as major locations having high frequency of occurring accident. The vulnerable road users (i.e. pedestrians, bicycle riders, motorbike riders) were found the major victims of accidents. Major involved vehicles are tippers and motorbikes.

4.5 Parking Inventory

Till 2015/16 the nature of traffic found moving to and fro form CBD of Kathmandu valley. So the critical location for parking is observed to be needed in KMC. Again, field inventory shows that most of the vehicles were found parked on road-side due to lack of separate parking spaces of market centers. Some of the offices have their own parking area; however the most of the market centre in the area do not have sufficient parking spaces. The parking problem will get rise in future. So it is the time to plan the parking space in the municipality area especially for public crowding places, like shopping mall, play ground, market area etc.

4.6 List of Major Municipality Roads with Coding

Table 9, List on Major Municipality Roads with Coding (Class A & B Roads)

S. N.	Road Code	Name of the Road	Length (km)
1	27M04A001	Bagmati Corridor	5.644
2	27M04A002	Mahantaar-Tej Binayak-Baba Chowk-Baba Chowk-Cricket Stadium-Norling	3.795
3	27M04A003	Khahare-Airport-Bagmati River	2.136
4	27M04A004	Manahara Corridor	9.690
5	27M04B001	Saraswoti Basti-Kageshwori Mandir	1.085
6	27M04B002	subedi gaun-Kageshwori	1.760
7	27M04B003	Subedi GAun-Pokhari-Bhimeshwor Mandir	0.896
8	27M04B004	B004 Road	0.707
9	27M04B005	Nayapati- Krishna ChaurSadak	2.261
10	27M04B006	Brahmakhel-suseko chaur-Thapa Danda	0.824
11	27M04B007	Adarsh HSS-Kalimati-Bagmati River (towards BP chowk)	0.797
12	27M04B008	Sahid Adarsha campus pahunch Marg	0.390
13	27M04B009	Dur Snchar- Bencha dole-Bhadrabaas pahunch Marg	1.557
14	27M04B010	Khatri Pokhari-Bagh dhara youth Club-Sankhu Road (Baghdhara chakrapth)	0.574
15	27M04B011	Dur Sanchar-Changunarayan (Manahara Bridge)	0.392
16	27M04B012	Kantipur Campus Paschim Uttar gate-Ban ko Xeu-Kolmateshwor-Uttar Bahini	2.299
17	27M04B013	Thali Milan Chowk- Jautar-Khahare Sadak	1.350
18	27M04B014	Dhungel Gaun-Khahare-Patiko Chaur	0.575
19	27M04B015	Patitaar Chaur-MAnhara	0.400
20	27M04B016	Gajurel Danda- Cricket Stadium	0.769
21	27M04B017	Phuyal GAun-Kavre Katuwa-Sat Ghatte-Adhikari Gaun	1.244
22	27M04B018	Manahara Khola-Amar Singh Chowk-Fikkal Danda-Chap Bot	1.075
23	27M04B019	Bagmati- Madan Ashrit-Tez Binayak-Manmohan Chowk	1.626
24	27M04B020	Madan Ashrit College-Jumbo Danda-bagmati Corridor	0.841
25	27M04B021	MAnetaar-Behind Airport road	0.204

S. N.	Road Code	Name of the Road	Length (km)
26	27M04B022	Khahare Chowk-GAndhi mode	0.293
Total Length of Road			**43.184**

4.7 Briefs on Major Municipality Roads

The the municipal level roads as per technical judgments and perspective has presented in Table. The whole municipality roads shall be classified into four categories including class A, class B, class C and class D. The roads in the table are the major roads which fall under road class A and class B. The details of each road with various attributes has presented in Annex in report.

4.8 Lists of Major Ward Roads

Table 10, List on Major Ward Roads with Coding (Class C & D Roads)

S. N.	Road Code	Name of the Road	Length (km)
1	27M04C001	Khahare-Nageshwori Mandir-Sunrise Chowk-Manahara Khola	0.691
2	27M04C002	Sun City Gate-Manahara Khola	0.320
3	27M04C003	Gandhi Mode-Manahara Chowk-Police Office	0.359
4	27M04C004	Gandhi-Birendra Chowk-Mulpani Sadak	1.735
5	27M04C005	Ward office11,12,13-Birendra Chowk-Khadka Guthi-Police Office	1.907
6	27M04C006	Force park-Har Har mahadev Chowk-Manahara river	0.751
7	27M04C007	Hajurko Dharo-Ganesh Mandir	0.425
8	27M04C008	Chiplegaunda-Airport-nawatandham	1.050
9	27M04C009	Tej Binayak-Echot Khursani Bari	0.284
10	27M04C010	(Radha Krishna Mandir-KC gaun) (Shanti Marg)	0.656
11	27M04C011	Uddhav Karki House-Basudev Bohara house	0.246
12	27M04C012	K.C. Tole-Dhara Pakho	0.282
13	27M04C013	Adhikari Gaun Chowk-Lamichhanne GAun-Laxminarayan Mandir	0.366
14	27M04C014	Gitanjali School-Chalise Dobato-Pepsi Road	0.888
15	27M04C015	Baba Chowk-Dahal Gaun-Bachanalaya	0.470
16	27M04C016	Gokarneshwor-Fohor Maila-Manakamana Mandir	0.264
17	27M04C017	Bar Peepal-Dhungel Gaun-Jautaar Sadak	1.508
18	27M04C018	Mulpani Pepsi Road-Dumadevi Temple-Bar Peepal	1.140

S. N.	Road Code	Name of the Road	Length (km)
19	27M04C019	Dhunge Dhara-Jautaar	0.234
20	27M04C021	Thali Chowk-NP office-Gokarna purbi GAte	0.336
21	27M04C022	Thali Chaur-Aakashdevi-Tamang tole-Baghuwa Bagmati Sadak	0.294
22	27M04C023	Thali Chowk-Simkhada Chowk-Naya Gaun	1.492
23	27M04C024	Pepsi Gajkot-Simkhada Gaun-bagmati-nayapati	0.439
24	27M04C025	Simkhada GAun Peepal Bot-Kanakot Mandir-Kolmateshwor	0.449
25	27M04C026	Pepsi Gajkot-Simkhada Gaun-bagmati-nayapati	0.838
26	27M04C027	Naya Gaun-Champak Binayak Mandir-Bagmati	0.341
27	27M04C028	Bhutanpur-Krishna Mnadir-Satyataar pahunch MArg-Adarsh Hss	0.776
28	27M04C029	Brahmakhel Dhunge Dhara Manahara Khola	0.254
29	27M04C030	Pudasaini Naya basti-Mahadev Khola chaur	0.476
30	27M04C031	Aalapot Krishna Chaur-Thula Dhik	1.194
31	27M04C032	Aalapot-Surya mandali-Indrayani Sadak	1.958
32	27M04C033	Patali-Lakilla	0.342
33	27M04C034	Ghattekhola-Lalika Indrayani Sadak	0.177
34	27M04C035	Sundarijal-Dhakal GAun-Puwar tole-Satghatte	3.612
35	27M04C036	Ganeshmaan Pratishan-Dhakal Gaun	1.481
36	27M04C037	Dhakal Gaun-Gokarneshwor NP	0.393
37	27M04C038	Bajrayogini-ManiLingeshwor School	3.265
38	27M04C039	Thula Dhik-Sat Ghatte-Krishi Sadak	0.517
39	27M04C040	Dwareko Ghatta-Peepal Danda-Sunar TOle	0.716
40	27M04C041	Peepal Danda-Makai Chaur	3.538
41	27M04C042	SoleDhunga-Kuinkel GAun-Sahid PArk	1.750
42	27M04D001	GAndhi School-Gym Club-Pepsi ROad	0.290
43	27M04D002	Purano Micro Park-Khahare	0.423
44	27M04D003	Sahakali mode-Bhimeshwor Academy-Purano Micro Park (JwalaDevi Marga)	0.468
45	27M04D004	Sahakali Chowk-Monastic School	0.444
46	27M04D005	Medical Chowk-Sahakali Mode (Aashapuri Marg)	0.354
47	27M04D006	Sahakali Mod-Gothataar Highway	0.592

S. N.	Road Code	Name of the Road	Length (km)
48	27M04D007	ghariko Bato	0.633
49	27M04D008	Muktinath temple-Arjun Chautari-Kalghatta Pokhari	0.258
50	27M04D009	Rayamajhi Tole-NawaDurga Tole	0.161
51	27M04D010	Shanti Deep Marg-Tej Binayak	1.780
52	27M04D011	thapa Gaun-Kalamthali Road	0.756
53	27M04D012	KAndaghari-Kha.PA. Project	0.457
54	27M04D013	Vidhya Vikas School-White House MAnetaar Road	0.582
55	27M04D014	Kaluko Pasal Dekhi-Gothataar BS	0.561
56	27M04D015	Sano Bhai Chapagai Ghar-Prem Pandey Ghar-Gothataar BS	0.094
57	27M04D016	Echot Road	0.492
58	27M04D017	Tej Binayak School-Fikal	0.406
59	27M04D018	Purano Dharo-Tej Binayak (Chapagaun Tole))	0.362
60	27M04D019	Thapa Chowk-Gothataar Pati	0.448
61	27M04D020	Namuna Planning	0.594
62	27M04D021	Bista GAun Chowk-Manakamana Tole	1.155
63	27M04D022	Manakamana Temple-Micro Bus Park	0.804
64	27M04D023	Amar Singh Chowk-Som Tirtha	0.390
65	27M04D024	Shanti Marg-Som TIrtha- Pepsi Road	0.805
66	27M04D025	Gita mandir-Basnet Tole	0.253
67	27M04D026	Takha Manahara Tole Road	0.867
68	27M04D028	BAba Chowk-Gajurel Danda-Adhikari GAun-Chap Bot	1.026
69	27M04D029	Ward Office -Durga Mandir (Lamichhane Gaun)	0.225
70	27M04D030	Mulpani Peepal Bot-Laxmi Narayan Chowk	0.505
71	27M04D031	Pepsi Road-Mahalaxmi Tole	0.512
72	27M04D032	MAhankaal Mandir-Manakamana Mandir	0.961
73	27M04D033	Baba Chowk-Panta Tole-Bhuriyataar	0.473
74	27M04D034	Majhbari-Jhool	0.215
75	27M04D035	Majhbari-Jhool	0.575
76	27M04D036	Pati Chaur Jhool Sadak	0.668

S. N.	Road Code	Name of the Road	Length (km)
77	27M04D037	Devkota Schooli-Jhool	0.375
78	27M04D038	Tiwari Tole-Nepal Yatayat BS-Mulpani Chaur	0.427
79	27M04D039	Mulpani Khahare-Kapurbase-Thali	0.288
80	27M04D040	Sim Bhanjyang-pudasaini Gaun	0.299
81	27M04D041	Milan Chowk-Radha Krishna Mandir-Dhungel Gaun	0.423
82	27M04D042	Srijana tole-Khahare	0.269
83	27M04D043	Ghimire Gaun Uttar Tarfa-Kapurbase Sadak	0.494
84	27M04D044	Dumarkhal Pepsi road	0.495
85	27M04D045	Purano mayal Ko Bot-Dumarkhal Pepsi Sadak	1.453
86	27M04D046	Shiva Panchayan-Manakamana Mandir (Fohor Maila)	0.749
87	27M04D047	Gokarneshwor Boundary-Ram Janaki Mandir	1.045
88	27M04D048	Gajarkot bhitri sadak	0.255
89	27M04D049	Sano Dhara-Bhimmadi-Kalchako Ghar	0.324
90	27M04D050	KAlchako ghar bata uttar-Balkumari Mandir-Thali Chowk	0.208
91	27M04D051	Sankhu Road-Kanti Bhairav School-Paudel GAun-Krishna Mandir	0.413
92	27M04D052	Ram Pandey Ko ghar purba-Thula Dhara jane Bato	0.157
93	27M04D053	Laxman Simkhada House-Aakashdevi Chaur	0.281
94	27M04D054	Laxman Simkhadako Ghar-Khatri Gaun-Binod Thapako Ghar	1.202
95	27M04D055	0.376153964	0.877
96	27M04D056	Simkhada Gaun Peepal Bot-Majh Gaun-Kolmateshwor-Gokarna	0.681
97	27M04D057	Ban BAtika Paschim Tarfabata uttar hudain-Gobardhan Thapako Ghar chheu Niskane Bato	0.389
98	27M04D058	Danchhi Chowk-Bhairabsthan Road	0.540
99	27M04D059	bijulichako Ghar-Peepal Bot	0.398
100	27M04D060	Baghdhara Tallo Gaun-Peepal Bot-Pepsi Sadak	0.496
101	27M04D061	MAhadev Mandir-Kale Sarki House	0.196
102	27M04D062	Pepsi Sadak-Kale Sarki House	0.301
103	27M04D063	Ganesh Shresthako Ghar-Khane pani tyanki jaane bato	0.408
104	27M04D064	Radhakrishna Mandir-Plotting	0.252

S. N.	Road Code	Name of the Road	Length (km)
105	27M04D065	Bhimsen MAndir-Bhitri Naya GAun-Ganesh MAndir	0.200
106	27M04D066	ganeshthan Mandir-Pokhrel Danda-ABC Pahunch Marg	0.358
107	27M04D067	Bindhyabasini Matyangri Dhik	0.379
108	27M04D068	Bhandari Tole Bhitri Sadak	0.372
109	27M04D069	Hp-Bhatmase	0.180
110	27M04D070	Kalimati-Triveni Marg-Thapa Danda	0.590
111	27M04D071	Bhatmase Bhitri Sadak	0.239
112	27M04D073	0.148666013	0.149
113	27M04D074	Natheshwori Pra.Vi.-Bagmati-Bp Chowk	0.564
114	27M04D075	Ganesh Mandir-Nauko Pati-Bagmati Corridor	0.339
115	27M04D076	Bhadreshwor-Eknale-Dur Sanchar	0.817
116	27M04D077	Dhunge Dhara-JAspur-Bhadrabas-Ward 16	0.496
117	27M04D078	NAyapati- Jagreshwor Mandir	0.400
118	27M04D079	Dhunge Dhara-Jaspur	0.525
119	27M04D080	Danda Gaun-Brahmakhel	0.570
120	27M04D081	Syal Danda Bhitri Sadak	0.293
121	27M04D082	Basnet Gaun Bhitri Sadak	0.305
122	27M04D083	Gairi Sero-Sindhu Sero-Odanchi	0.993
123	27M04D084	Thapagaun Healthpost-Thapa gaun Pasne Road	0.226
124	27M04D085	Thula Khet-Aakashe Sadak	0.646
125	27M04D086	Basaha Kholcha Sadak	0.373
126	27M04D087	Surya Mandali-Subedi Gaun	0.411
127	27M04D088	Janak ko Ghar- Surya mandali	0.316
128	27M04D089	Surya Mandali-Lakilla	0.283
129	27M04D090	Bhorletaar Motor Bato	0.113
130	27M04D091	Phuyal GAun-Kavre Katuwa-Puwar Gaun Sadak	0.553
131	27M04D092	alapot Chowk-Bal bikas SS-Krishna Mandir	1.275
132	27M04D093	Rabi Tamang HOuse-FAdke-Khahare-Alapot Road	0.591
133	27M04D094	Krishna Mandir-Shib Bdr Khadka House-Kageshwori Mahadev Temple	0.870

S. N.	Road Code	Name of the Road	Length (km)
134	27M04D095	savik 7 No gauri Khadka House-Ward 1 Lokktantra Sahid Park jaane Bato	0.687
135	27M04D096	Falange-Sundarijal-Mulkharka	1.467
136	27M04D097	gumba-Mathillo Tole	0.657
137	27M04D098	Bhorla Bot- Bal Uddhar Ma.Vi.	1.650
138	27M04D099	Shree Siddhi Ganesh Mandir-Rittha bot	0.248
139	27M04D100	WArd Office-Fulbari-Bhorlabot Road	0.580
140	27M04D101	Waed Office-Fulbari-Bhorlabot Road	0.541
14	27M04D102	Sat Ggatte Chowk-Sunar Basti	0.851
142	27M04D103	Prem Bdr Thapa house-Parasi Devi Mandir	0.119
143	27M04D104	KAlimati Chowk-Nikhildham Krishi Sadak	0.633
144	27M04D105	Buddha Chowk-Gothataar Peepal Bot	1.465
145	27M04D106	Khanepani ko Pump -Nabaraj pant ko ghar samma	0.222
146	27M04D107	Tandan Tole-Khahare	0.249
147	27M04D108	Pudasaini Naya Basti-Indrayani	0.129
Total Length of Road			**137.606**

4.8 Briefs on Major Ward Roads

The Ward roads as recorded from inventory has presented in Table 10. The whole municipality roads shall be classified into four categories including class A, class B, class C and class D. The roads in Table 10 are the major roads which fall under road class C and class D. The details of each road with various attributes has presented in Annex in report.

4.9 Lists of Other Non-classified Tole Roads

Table 11, List of Other Roads (Non-categorized Roads)

S. N.	Symbol	Name of the Road	Length (km)
1	N	Non-classified Tole Roads	74.512

4.10 Briefs on Selective Non-classified Tole Roads

These are the roads which do not fall under any classes (Class A, B, C and D). The roads as owned by private institution in colony fall under this category. Again the those roads which shall not meet the criteria as set by MTMP road classification in which widening is technically not justified within MTPP period shall also be fall under this category. However, the municipality

shall have the plan to widen these roads with appropriate options (resettlement, land pooling etc) for people.

4.11 Municipality Inventory Map of Road Network (MIM)

The inventory map of road network of the municipality has presented as a map which is attached in annex.

Chapter-5 Perspective Plan of Municipal Transport Network

5.1 Accessibility and Trip Pattern

The ultimate goal of most transportation is “access,” people’s ability to reach desired goods, services and activities. Transportation decisions often involve tradeoffs between different forms of access. How transport is measured can have a major impact on these tradeoffs [12]. Land use patterns affect mobility and accessibility in various ways:

1. *Density* (number of people or jobs per unit of land area) increases the proximity of common destinations, and the number of people who use each mode, increasing demand for walking, cycling and transit.

2. *Land use mix* (locating different types of activities close together, such as shops and schools within or adjacent to residential neighborhoods) reduces the amount of travel required to reach common activities.

3. *Non-motorized conditions*. The existence and quality of walking and cycling facilities can have a major effect on accessibility, particularly for non-drivers.

4. *Network connectivity* (more roads or paths that connect one geographic area with another) allows more direct travel.

There are many ways to measure transportation system performance, each reflecting particular perspectives concerning who, what, where, how, when and why. Different methods favor different types of transport users and modes, different land use patterns, and different solutions to transport problems. *Vehicle traffic* is easiest to measure, but this approach only considers a narrow range of transportation problems and solutions. *Mobility* is more difficult to measure, since it requires tracking people’s travel behavior. It still considers physical movement an end in itself, rather than a means to an end, but expands the range of problems and solutions considered to include alternative modes such as transit, ridesharing, cycling and walking. *Accessibility* is most difficult to measure, because it requires taking into account land use, mobility and mobility substitutes, but most accurately reflects the ultimate goal of transportation, and allows widest range of transport problems and solutions to be considered. For example, an accessibility perspective may identify low-cost solutions to transportation problems, such as improving local walkability; encouraging land use mix so common destinations such as stores, schools and parks are located near residential areas; and improving communications services for isolated people and communities [12].

5.2 Procedure for collecting demands from wards

Ward level meeting in every ward or ward cluster is done where information on MTMP are collected. Demand form for each ward are provided which are later on collected after the form are duly filled in given time [3]. As road demand from the settlement level is collected bottom up approach of planning is applied.

Data Analysis and Field Verification of the Roads from Demand Form

Analysis of data regarding the accessibility situation in each settlement, population forecasting for each sector, major road linkages will be done. Similarly, all the roads demanded in demand form are verified in field by the survey team. Details of ward demand has presented in Voume-II of the MTMP report.

5.3 Scoring System for Screening

Development of the scoring criteria and prioritization criteria based on the provided guidelines are prepared and its approval from the municipality and MRCC is done [3].

Transport linkage in an urban area has greater importance for its overall development. The development of road transport linkages to each plot of land or each residential unit is ideal approach for transport planner. Various types of land use pattern require different category of road transport linkage. The development of road linkage requires tremendous amount of public fund. However, the public authorities doesn't have adequate amount of funding. Therefore, a prioritization approach should be adopted for the rational allocation of limited funds for the construction, maintenance and rehabilitation of various categories of road linkage. Conventionally, each construction or maintenance projects are justified on the basis of cost-benefit ratio. This conventional approach disregards the benefit due to non monetary aspects of the transport projects. Therefore, a multi-criteria approach for the selection of transport linkage is adopted as an justified approach for the project selection.

Transportation services are highly demanded infrastructure for urban as well as rural areas. The objective of the transport linkage is to provide accessibility for the given degree of mobility. Accessibility and mobility requirements are guided by the people's demand for better living standard and economic opportunities. The objectives and importance of individual roads should guide the development of scoring criteria for the project selection for implementation. A term of Reference (ToR) for the preparation of MTMP has formulated the criteria and their respective weights for the evaluation. Consultant has worked out the following weights for the criteria for the prioritization of road links. These scores for the particular criteria are needed to be discussed and approved by MRCC.

Table 12 Weights for the Prioritization Criteria [3]

S. No.	Criteria	Scoring Unit	Method of Measurement	Score (ToR)	Score
1.	Link providing service to large settlement areas/population.	Population served/km (continuously Scored)	Measurement of served HH from map and multiplying with HH occupancy of respective wards	15 - 20	15
2.	Link providing service to areas with high potential for agriculture, horticulture, livestock production.	Annual production equivalent to NRs……/km (continuously Scored)	Measurement of Agriculture land area from map, livestock from inventory and multiplying with unit rate of production	5 -10	5
3.	Link providing service to existing market centers: 1. commerce and business centers or market sites (local haat) 2. tourism attraction centers 3. Areas having agro-based and cottage industries 4. Other obligatory centers as decided by the municipality.	Estimated annual transaction in these centres equivalent to NRs……../km (continuously Scored)	Inventory survey along with consultation with people (MRCC) and land cover map are used to identify their location and transactions.	20 - 25	20
4.	Link providing service to the existing service centers: 1. health centers, 2. education centers (school/campus), 3. Office (municipality/ government) 4. Communication centre (post office, communication)	Population served by these service centres expressed as persons per km per year. (continuously Scored)	Inventory survey, Map along with consultation with people (MRCC) identifies their location and served population.	15-20	20

S. No.	Criteria	Scoring Unit	Method of Measurement	Score (ToR)	Score
5.	Link providing service to the potential growth or service centers identified by municipality (IDPM) such as Waste management site.	Anticipated number of people to be directly benefited expressed as persons per km per. (scored continuously)	Consultation with MRCC and IDPM shall also be used	5-15	5
6.	Link providing service to the potential future development sites such as: 1. Potential town growth 2. Land pooling 3. Potential industrial area 4. Forming ring road to municipality	It is technically sound to score these service discretely based on existence. For each service centers, a score of 2.5 is allocated.	Consultation with MRCC and IDPM shall also be used	10-20	10
7.	Link providing service to the areas recognized by the municipality as areas for special consideration, such as areas inhabited by backward and poor ethnic groups/ communities, isolated remote areas, historic sites, religious sites etc.	• Very important =5 • Important =2.5 • less important =0 (Scored discretely)	Inventory survey along with consultation with local people identifies their location and Importance.	10 - 15	5
8.	Direct link with another linkage	• National Highway=10 • Feeder Roads=8 • District Roads=6 • Neighboring Municipality/ district= 4 • Otherwise= 0	Road Network Map and attribute table.	5 - 10	10

S. No.	Criteria	Scoring Unit	Method of Measurement	Score (ToR)	Score
9.	Ward Demand	• Priority-1, =10 • Priority-2, =8 • Priority-3, =6 • Priority-4, =4 • Priority-5, =2 • Others, =0	Ward Meeting using demand form	5 – 15	10

5.4 Grading and Nomenclature of Roads

Road network serve for direct access to the particular land-use by the provision of pedestrian footpaths, bicycle tracks, bus and vehicle routes and cater through traffic that is not related to immediate land uses. Functional provisions of passenger and goods movement mainly define the hierarchy of roads and their classification. On the basis of this concept, roads are classified as per their function. Road class is related to the technical standard and functional requirements. Therefore, road classification should be based on its functional hierarchy. It is important to distinguish roads in different class or type based on various criteria. A road hierarchy is a means of defining each roadway in terms of its function such that appropriate objectives for that roadway can be set and appropriate design criteria can be implemented. It is an important instrument of road network and land use planning.

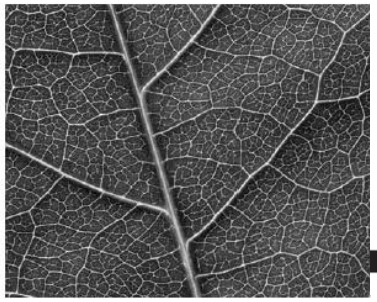

Figure 14, Conceptual Hierarchy

Figure 15, Road Network Hierarchy

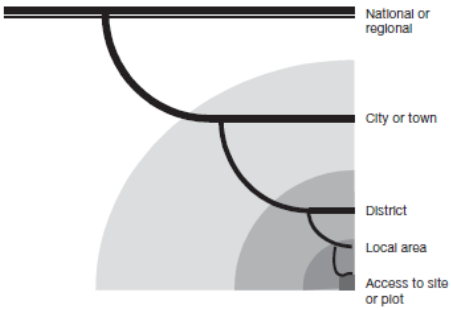

Figure 16, Urban Road Hierarchy

There are restrictions of direct linkage between various kinds of road-hierarchy. In other words, direct connections between certain types of road links should be reduced, for example residential streets and arterial roads. Connections between similar order streets should be made (e.g. arterial to arterial) or between street types that are separated by one level in the hierarchy (e.g. arterial to highway and collector to arterial.). This conceptual framework can be seen from Figure 2, Figure 3 and Figure 4. These hierarchical distinctions of road types becomes more clear when considering the recommended design specifications for the number of through lanes, design speed, intersection spacing and driveway access.

A well-formed road hierarchy increases the performance and efficiency of the particular type of road as well as of the entire road network. Furthermore, it reduces overall impact of traffic by concentrating longer distance flow onto routes in less sensitive locations, ensuring land

uses and activities that are incompatible with traffic flow are restricted from routes where traffic movement should predominate and preserving areas where through traffic is discouraged.

The concepts of road hierarchy assist in planning of overall road network and its transport services. Different hierarchy of road has different effect in surrounding areas and other roadways. Hierarchies of roads enable urban design principles such as accessibility, connectivity, efficiency, amenity and safety. Further, it also identifies treatments such as barriers, buffers and landscaping to preserve amenity for adjacent land uses. Thus, a proper plan should accommodate all users of the urban streets in planning, designing and construction of the road infrastructure and furniture. Municipality road network can be conceptualized by considering the functional hierarchy as arterial, sub-arterial and urban roads of various categories such as Class A, Class B, Class C and Class D.

Right of Way for Roads of different Classes:

The DTMP guideline has expected roads under category of National Highway (NH), Feeder Roads (FR) and District Roads (DRCN) within the municipality area. The RoW of these roads are considered as per respective Guidelines. i.e the RoW of National Highways, Feeder Roads and District Roads are 50.0 m, 30.0 m and 20.0 m [6] [7] [3] [13]. The guideline has clearly stated about the setback distance for these roads (having RoW ≥ 20.0 m) as 6.0 m on either side. All of these standards shall be applied to the municipality accordingly.

Table 13, Urban Road Class and Features [6] [7] [3] [13]

Road Class	Descriptions	Minimum RoW (m)	Minimum Set-back Distance (m)
NH	National Highways	As prescribed	As Prescribed
FR	Feeder Roads		
DRCN	District Roads		
A	Main Collector	14	2.0m (DTMP Guideline) and 1.5m (Building Guideline)
B	Other Collector	10	
C	Main Tole Road	8	
D	Other Tole Road	6	

Based on DTMP guideline, the building line or setback shall be maintained 6.0 m for roads having RoW equal to or more than 20.0 m and 2.0 m for other roads. However Nepal Road Standards-2070 has considered the setback distance at curved section only and that should be sufficient to provide the adequate sight distance. It is silent about the building line.

१४.३१ अब निर्माण हुने सडकको कुनै पनि बाटोको न्यूनतम चौडाई ६ मी. हुनु पर्नेछ र नापी तथा मालपोत कार्यालयहरुलाई सोही बमिजिमले स्रेस्ता, नक्सा तथा अभिलेखहरुमा बाटो कायम गरी यस व्यवस्थाको कार्यन्वयन गर्न लेखि पठाउनु पर्नेछ। । यस्ता बाटोमा भवन निर्माण स्वीकृत दिंदा केन्द्रबाट कम्तिमा ३ मीटर सडकको क्षेत्राधिकार (RoW) र सडक क्षेत्राधिकार सिमाबाट १.५ मीटर सेट ब्याक छाडेर मात्र निर्माण स्वीकृति दिनु पर्नेछ । तर हिमाली/पहाडी जिल्लाका उपत्यका (valley) एवं समथल भू-भाग देखि बाहेकका भिरालो क्षेत्रमा प्राविधिकरुपमा उक्त ६ मिटर चौडाई कायम गर्न सम्भव नभएमा प्राविधिकको प्रतिवेदनको आधारमा सम्बन्धित स्थानीय निकायको परिषद्को निर्णयबाट ४ मिटरमा नघट्ने गरी निर्धारण गर्न सक्नेछ।

(Source: Fundamental Guidelines for Settlement Development, Urban Planning and Building Construction-2072 (2015 AD) [13])

१४.३६ नगरपालिका क्षेत्रमा सडक सम्बन्धी ऐन लगायत प्रचलित कानूनले तोकेमा सोही अनुसार र सो नभएमा नगर यातायात गुरुयोजनाले निर्धारण गरे अनुरुप सेटब्याक कायम हुनेछ। तर नगरपालिकाले यस्तो सेटब्याक सडक किनारबाट १.५ मिटर भन्दा कम हुने गरी निर्धारण गर्ने छैन।

१४.३८ नयाँ बाटोको घुम्ति वा मोडको न्यूनतम अर्धव्यास बाटोको चौडाई भन्दा २०% ले बढी चौडा भएको हुनु पर्नेछ।

However, according to **Fundamental Guidelines for Settlement Development, Urban Planning and Building Construction-2072 (2015 AD),** the minimum setback distance for urban roads as 1.5 m on either side. Again the minimum of RoW of roads has set as 6.0 m. i.e. 3.0 m on either side form the centerline. A portion of this guideline has presented herewith.

Urban Road Classification

Roads under jurisdiction of Municipal authority are referred as urban roads. The classification practices of urban roads basically are guided by the functional hierarchy of roads. In the context of Nepal, Department of Roads (DoR) has classified urban roads as Arterial, Sub-arterial, Collector and Local/Residential Street in its Urban Road Standard 2068 (draft). The ToR provided for the preparation of MTMP has formulated the class of roads into A, B, C and D.

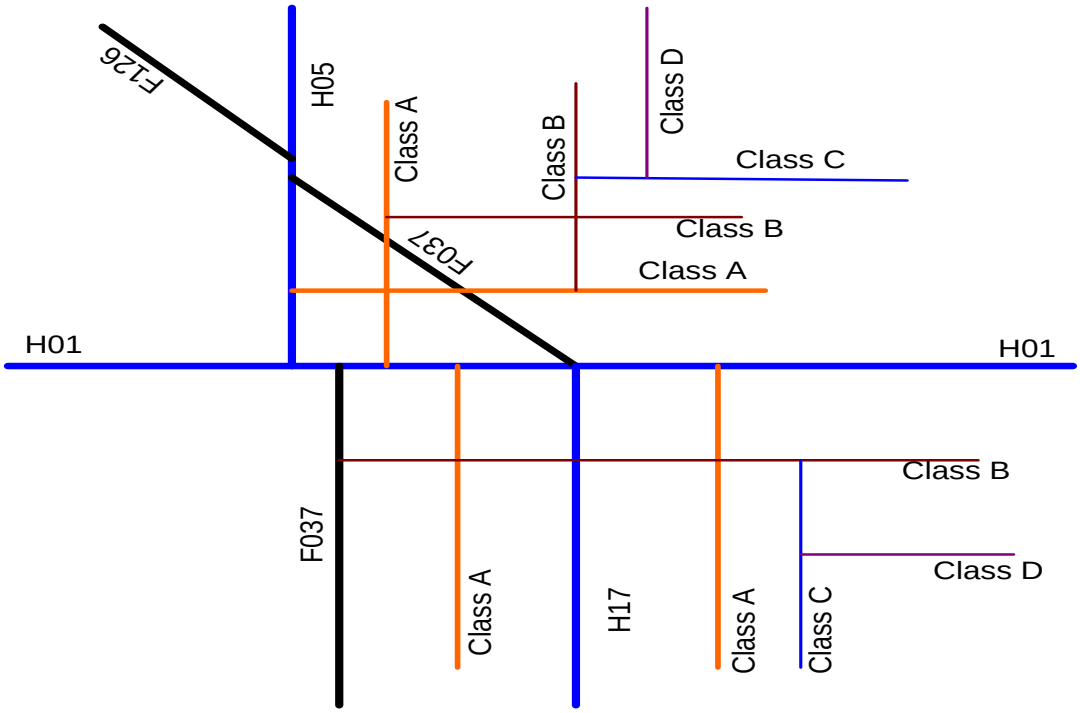

Figure 17, Detail description of road class

The fundamental parameters of the urban road are shown in Table 13. Municipality has a complete road network hierarchy consisting of National Highways, Feeder Roads, District Roads and Urban Roads of all four classes. The conceptual layout based on the functional hierarchy of the entire road network is shown in Figure 17.

National Highways

Arterial roads in Municipality are taken as the links of National Highways. The technical standards of these roads are taken from the DoR directives for Right of Way (RoW) and other features.

Feeder Roads

Feeder roads are taken as the sub-arterial road in Municipality. The technical standards for this category are taken as mentioned by the DoR road Standard. These roads have relatively higher traffic with through movement of local vehicles.

Class A Roads

Class A roads serve as the major collector roads. These roads start either from the Arterial or Sub-Arterial road. These roads are of relatively long distance which connect big market or settlement areas or two or more wards centers within the Municipality.

Class B Roads

Class B roads are of secondary type of collector roads. These may serve as the collector to the Class A roads with the relatively lower geometric standard. Intersection and other parameters may be taken as similar as Class A roads.

Class C and Class D Roads

Class C roads are residential street and they provide access to the private property and small industrial or public place. These roads serve mainly for small/light vehicular movement for low volume intensity. If these roads connect one or more residential blocks then they are taken as Class C. If they collect from or end to the single residential block then they are referred as Class D roads. These serve for internal traffic movement without through traffic movement.

Coding of Municipality Roads

All road links within the Municipality are given unique code number consisting of ten digits [3]. The coding system for particular road link is described below:

- First digit (1 to 5) represents the number of Development Region. Code 1 stands for Eastern Development Region, 2, 3, 4 and 5 indicate Central, Western, Mid-Western and Far Western Development Regions respectively.
- Second and third digits represent particular district (1 to 75). Kathmandu District is coded by 27.
- Fourth code M represents for the Municipality.
- Fifth and sixth digits represent particular name (1 to 99 for particular municipality) of the municipality in the district. Kageshwari Manahara Municipality is coded by 04.
- Seventh code indicates letter A to D for particular Class of road.
- Next three digits (001 to 999) represent the particular transport linkage.

After all the code numbers, road name is written. An example of the code number and road in Kageshwari Manahara Municipality is shown as

2	2	7	M	0	4	A	0	0	1

Baba Chowk-Cricket Stadium-Mahadevsthan Chowk Road

Typical Cross Sections of Municipal Roads

The existing transport linkages (except the Strategic Road Network (SRN) linkages) within the Municipality are referred as Municipal Roads. These roads have been classified based on their functional hierarchy. Geometric features of these roads may vary as per the availability of RoW and roadside land-use pattern. Typical cross-sections of these roads have been described below.

Road Class A (Main Collector)

These roads are major transportation corridors within the municipal territory. These roads are assumed to have higher traffic and they pass through along the east to west or north to south of the municipal area. Further, these roads connect major settlements or market areas within the municipality. Functionally, these roads collect the traffic from major settlements, tourist area to the SRN linkages. As per the available RoW and land-use pattern typical cross-sections may be selected as shown in Figure 18. Minimum RoW for class A road is 14 m.

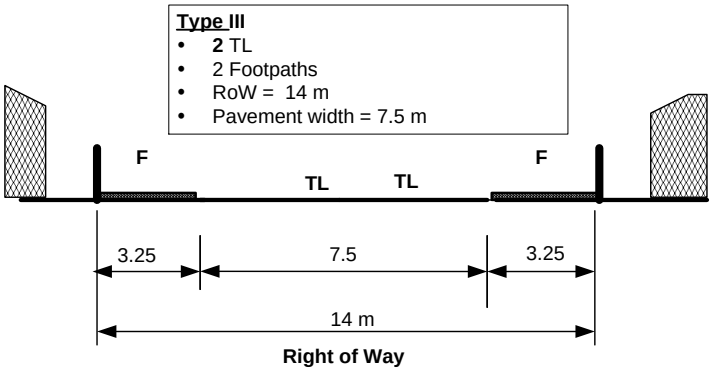

Figure 18, Typical Cross-section for Class A Roads (with RoW 14 m)

Road Class B (Other Collector Roads)

These roads serve as collector road from relatively small settlements and having less traffic flow. The minimum RoW for such class of roads is 10 m. The typical cross section with the minimum RoW is shown in **Error! Reference source not found.**.

Road Class C (Tole Roads)

These types of urban roads are for the purpose of residential access. Residential streets are designed for the lower traffic volume, especially private transport. Therefore, RoW for this class of roads is designed for single lane pavement. Minimum RoW strip for such class of road is 6 m. Typical cross-sections as per the available RoW are shown in Figure 19 and Figure 20.

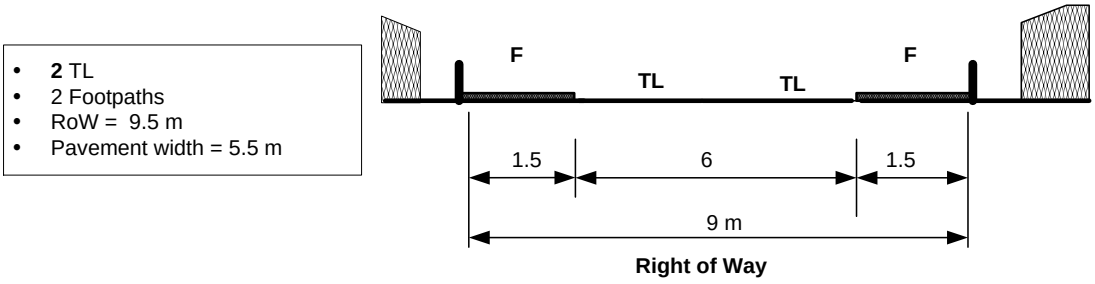

Figure 19, Typical Cross lass C Roads (RoW 9 m)

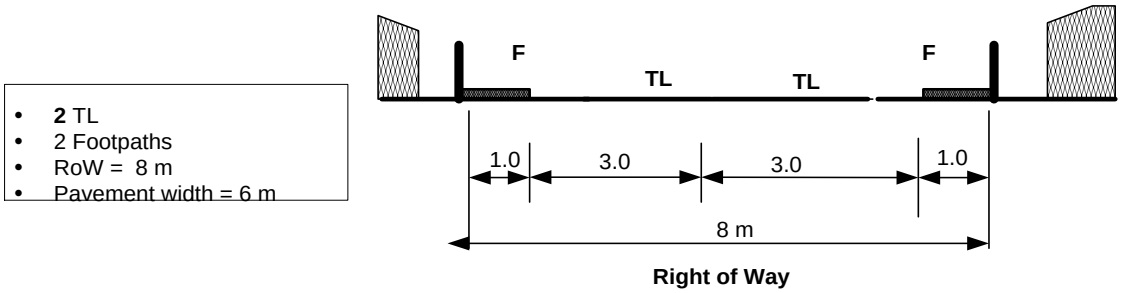

Figure 20, Typical Cross lass C Roads (RoW 8 m)

Road Class D (Other Tole Roads)

These types of roads are constructed only in residential areas. Minimum RoW for such roads is 4 m. However, the RoW for new or planned Class D roads (residential roads) should have at least 6 m RoW. Typical cross section for such road is shown in Figure 21 and Figure 22.

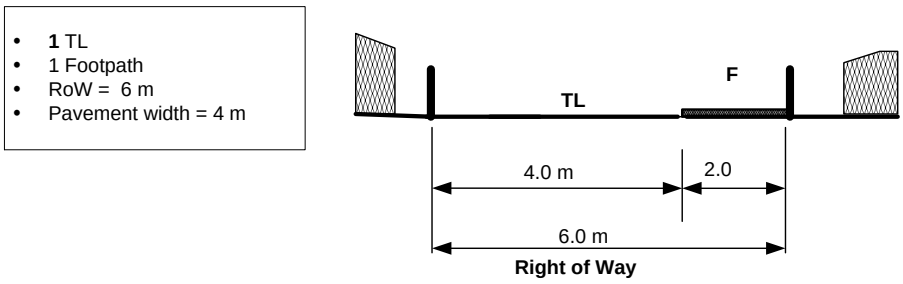

Figure 21, Typical Cross lass C Roads (RoW 6 m)

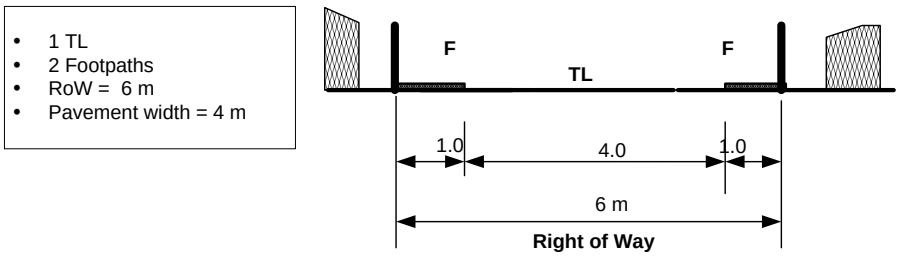

Figure 22, Typical Cross lass C Roads (RoW 6 m)

Non-classified (N) Roads (Other Tole Roads and Main Trails)

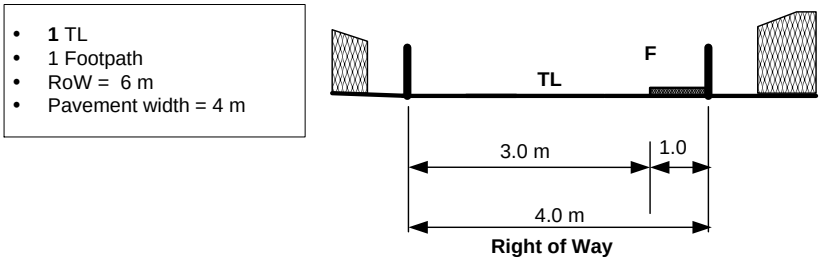

Figure 23, Typical Cross section for N Roads (RoW 4 m)

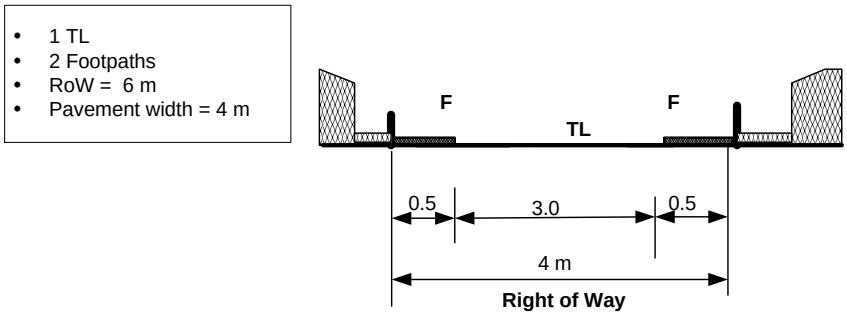

Figure 24, Typical Cross section for N Roads (RoW 4 m)

These types of roads are constructed only in residential areas. The RoW for such roads is less than 6.0 m m. However, the building guideline has clearly stated that the minimum width or road as 6.0 m, the widening of roads at city core area without land planning is no justified technically. Municipality shall develop a plan to widen these roads in order to meet the building guideline criteria soon. But the new construction of road should have minimum width of 6.0 m. The typical cross section for such road is shown in Figure 23 and Figure 24.

5.5 List of Feasible New Linkages

Municipality do not have a clear plan for developing land planning, auditorium, play ground, Hospitals and other developments that shall influence the trip nature and pattern. These development areas should be connected with high class roads. The feasible new linkages were identified through MRCC meetings and consultation with ward representatives. The route of Outer ring road shall also lie in the municipality area.

River Corridors

There is one river corridor road along both side of the Bagmati River and Manohara Khola which lies along approximate North-South direction of the municipality. The construction of the corridor has been started but not completed yet. The corridor has planned to construct with following specification by Kathmandu Valley Development Authority which shall not be intervene by municipality.

Table 14, Feasible River Corridor Linkages and its status

S. N.	Name of Road	Class	RoW (M)	Length (km)
1.	Manohara Khola Corridor	A	20	
4.	Bagmati River Corridor	A	20	

KTM Outer Ring Road

The route of outer ring also lies in the municipality, however the construction, operation and maintenance of these roads shall not be owned by municipality. Again the Government has planned to develop planned settlement having width of 500.0 m along the route of this road.

Table 15, Possible SRN within the Municipality Area as new linkage [5]

S. N.	Name of Road	Class	Code	RoW (m)	Length (km)
1.	Outer Ring Road	National Highway	H21	50	(Planned)

5.6 Briefs on Feasible New Linkages

Municipality shall develop auditorium, play ground, Hospitals etc. which shall influence the trip nature and pattern. These development areas should be connected with high class roads. In future the Bagmati and Manahara river corridor will be used as a part of road along North-South direction of the municipality. Most of the above mentioned new linkages are as per the demands from ward level.

5.7 Possible Inter-municipality/District Linkages

There is a possibility of connecting with neighboring municipality as well as neighboring district. The proposed outer ring road is one of the major routes for inter-municipality linkages. This shall connect the Kageshwari Manahara with Gokarneshwar and Shankharapur municipality in Kathmandu district. Along with this ring road, some other roads are also important for inter-municipality linkages. DR034 and F026 shall connect KMC with Kageshwari Manahara municipality. The interlinkage with neighboring district and municipality shall be summarized as:

Table 16, Possible Inter-municipality/District Linkages

Interconnection with district	Interconnection with city/municipality/VDC	Location of Interconnection	Problem associated with the connection
Kathmandu	Kathmandu Metropolitan City	Pepsicola	
		Pashupati Area	
		Jorpati	
	Gokarneshwar municipality	Sundarijal	
	Shankharapur Municipality	In east	
Sindhupalchowk		Through F026	

5.8 Ring roads

5.8.1 Kageshwari Manahara Inner Ring Road

DR032 has considered as Kageshwari Ring road. The ring road shall pass through all wards except ward number 1. The length of ring road in each ward has presented in table herewith. The detail map of this ring road has presented in map at Annex.

Table 17, Ring Road

Ward No.	Length (km)
2	3.553
3	1.019
4	1.139
5	2.881
6	1.134
7	2.792
8	1.982
9	2.074
10	2.344
11	0.199
12	0.959
13	3.856
14	0.293
15	0.722
16	0.302
Total	**25.244**

5.9 Public Transportation

The travel pattern of people in the municipality area is to go towards CBD area at morning peak and reverse at evening peak time. This travel pattern is fundamental for the planning of public transport routes. In this regard the proposed route of public transportation routes follows ring road and the link roads. For short to medium term planning the routes of public transportation follow short term or Inner ring road. However the long term planning the public transportation route shall follow both the route of inner and outer ring road. Link roads are important for inter-linkages. The routes of Kageshwari Manahara Inner and Outer Ring road shall be sufficient for public transport route up to 20 years perspective plan however low occupancy vehicles shall be used for other small routes via linkage roads.

5.10 Road Safety and Vehicle Parking

Municipality should think about the facilitation of parking area and the measures for enhancing safety along Feeder road. While preparing parking strategy/policy evidence based research on parking demand and occupancy of parking space should be carried out. Conventional approach of solving parking problems by providing more parking spaces should be avoided and market-based or responsive approach should be adopted [14].

5.11 Road Interventions

Strategic Roads and District Roads are excluded for determining the cost of interventions, as the road standard and per unit cost of it also quite different than local level roads. The cost for the construction has determined based on these interventions. The interventions has categorized into two parts: one is road geometry while the other one is the road surface interventions. The road geometry interventions includes requirement of widening while the surface type interventions includes all interventions other than widening. The cost of interventions required is then determined based on interventions thus determined from the field inventory (other than maintenance). All the costs associated have determined adopting rate of interventions given by [3] and which has presented in. Table 18, Road Interventions the details of perspective plan have shown in map in annex.

Table 18, Road Interventions and Associate Costs including all stages up to Metallic (Black Top)

S. N.	Road Code	Length (km)	Cost of Widening (NRs.)	Cost of Upgrading (NRs.)	Total Cost of Intervention (NRs.)
1	27M04A001	0.456	-	5,902,400.00	5,902,400.00
2	27M04A001	1.019	-	13,185,100.00	13,185,100.00
3	27M04A001	2.964	-	38,335,600.00	38,335,600.00
4	27M04A001	0.634	15,850,000.00	654,000.00	16,504,000.00
5	27M04A001	0.277	6,925,000.00	1,875,900.00	8,800,900.00
6	27M04A001	0.294	7,350,000.00	1,989,800.00	9,339,800.00
7	27M04A002	2.199	54,975,000.00	2,279,000.00	57,254,000.00
8	27M04A002	1.118	27,950,000.00	7,530,600.00	35,480,600.00
9	27M04A002	0.478	11,950,000.00	3,222,600.00	15,172,600.00
10	27M04A003	2.136	-	12,255,200.00	12,255,200.00
11	27M04A004	9.690	-	125,381,000.00	125,381,000.00
12	27M04B001	1.085	27,125,000.00	7,309,500.00	34,434,500.00
13	27M04B002	1.760	44,000,000.00	1,820,000.00	45,820,000.00
14	27M04B003	0.896	22,400,000.00	6,023,200.00	28,423,200.00
15	27M04B004	0.707	17,675,000.00	4,756,900.00	22,431,900.00
16	27M04B005	2.261	56,525,000.00	15,228,700.00	71,753,700.00
17	27M04B006	0.824	20,600,000.00	5,540,800.00	26,140,800.00
18	27M04B007	0.797	19,925,000.00	5,359,900.00	25,284,900.00
19	27M04B008	0.390	9,750,000.00	2,633,000.00	12,383,000.00
20	27M04B009	1.030	25,750,000.00	6,941,000.00	32,691,000.00
21	27M04B009	0.222	5,550,000.00	1,487,400.00	7,037,400.00
22	27M04B009	0.305	7,625,000.00	2,063,500.00	9,688,500.00
23	27M04B010	0.574	14,350,000.00	3,865,800.00	18,215,800.00
24	27M04B011	0.392	9,800,000.00	2,646,400.00	12,446,400.00
25	27M04B012	2.299	57,475,000.00	15,483,300.00	72,958,300.00
26	27M04B013	1.350	33,750,000.00	1,390,000.00	35,140,000.00
27	27M04B014	0.270	6,750,000.00	1,829,000.00	8,579,000.00
28	27M04B014	0.305	7,625,000.00	2,063,500.00	9,688,500.00
29	27M04B015	0.400	10,000,000.00	2,700,000.00	12,700,000.00
30	27M04B016	0.769	19,225,000.00	5,172,300.00	24,397,300.00
31	27M04B017	0.956	23,900,000.00	6,425,200.00	30,325,200.00
32	27M04B017	0.288	7,200,000.00	1,949,600.00	9,149,600.00
33	27M04B018	1.075	26,875,000.00	7,242,500.00	34,117,500.00
34	27M04B019	0.194	4,850,000.00	1,299,800.00	6,149,800.00
35	27M04B019	0.272	6,800,000.00	1,842,400.00	8,642,400.00
36	27M04B019	1.160	29,000,000.00	7,812,000.00	36,812,000.00

S. N.	Road Code	Length (km)	Cost of Widening (NRs.)	Cost of Upgrading (NRs.)	Total Cost of Intervention (NRs.)
37	27M04B020	0.841	21,025,000.00	5,654,700.00	26,679,700.00
38	27M04B021	0.204	5,100,000.00	1,366,800.00	6,466,800.00
39	27M04B022	0.293	7,325,000.00	1,983,100.00	9,308,100.00
40	27M04C001	0.691	17,275,000.00	4,649,700.00	21,924,700.00
41	27M04C002	0.320	8,000,000.00	340,000.00	8,340,000.00
42	27M04C003	0.359	8,975,000.00	2,425,300.00	11,400,300.00
43	27M04C004	0.019	475,000.00	127,300.00	602,300.00
44	27M04C004	0.194	4,850,000.00	1,299,800.00	6,149,800.00
45	27M04C004	0.247	6,175,000.00	1,654,900.00	7,829,900.00
46	27M04C004	0.361	9,025,000.00	2,438,700.00	11,463,700.00
47	27M04C004	0.914	22,850,000.00	6,143,800.00	28,993,800.00
48	27M04C005	1.907	47,675,000.00	12,836,900.00	60,511,900.00
49	27M04C006	0.751	18,775,000.00	5,051,700.00	23,826,700.00
50	27M04C007	0.425	10,625,000.00	2,867,500.00	13,492,500.00
51	27M04C008	1.050	26,250,000.00	1,090,000.00	27,340,000.00
52	27M04C009	0.138	3,450,000.00	924,600.00	4,374,600.00
53	27M04C009	0.146	3,650,000.00	978,200.00	4,628,200.00
54	27M04C010	0.656	16,400,000.00	4,415,200.00	20,815,200.00
55	27M04C011	0.246	6,150,000.00	1,648,200.00	7,798,200.00
56	27M04C012	0.282	7,050,000.00	1,909,400.00	8,959,400.00
57	27M04C013	0.366	9,150,000.00	2,472,200.00	11,622,200.00
58	27M04C014	0.263	6,575,000.00	1,782,100.00	8,357,100.00
59	27M04C014	0.101	2,525,000.00	676,700.00	3,201,700.00
60	27M04C014	0.524	13,100,000.00	3,530,800.00	16,630,800.00
61	27M04C015	0.470	11,750,000.00	3,169,000.00	14,919,000.00
62	27M04C016	0.264	6,600,000.00	1,788,800.00	8,388,800.00
63	27M04C017	1.508	37,700,000.00	10,163,600.00	47,863,600.00
64	27M04C018	0.137	3,425,000.00	917,900.00	4,342,900.00
65	27M04C018	0.183	4,575,000.00	1,226,100.00	5,801,100.00
66	27M04C018	0.820	20,500,000.00	5,514,000.00	26,014,000.00
67	27M04C019	0.234	5,850,000.00	1,567,800.00	7,417,800.00
68	27M04C021	0.336	8,400,000.00	356,000.00	8,756,000.00
69	27M04C022	0.294	7,350,000.00	1,989,800.00	9,339,800.00
70	27M04C023	1.492	37,300,000.00	10,036,400.00	47,336,400.00
71	27M04C024	0.439	10,975,000.00	2,961,300.00	13,936,300.00
72	27M04C025	0.449	11,225,000.00	3,028,300.00	14,253,300.00
73	27M04C026	0.838	20,950,000.00	5,634,600.00	26,584,600.00
74	27M04C027	0.341	8,525,000.00	2,304,700.00	10,829,700.00

S. N.	Road Code	Length (km)	Cost of Widening (NRs.)	Cost of Upgrading (NRs.)	Total Cost of Intervention (NRs.)
75	27M04C028	0.776	19,400,000.00	5,219,200.00	24,619,200.00
76	27M04C029	0.254	6,350,000.00	1,721,800.00	8,071,800.00
77	27M04C030	0.476	11,900,000.00	3,209,200.00	15,109,200.00
78	27M04C031	1.194	29,850,000.00	8,039,800.00	37,889,800.00
79	27M04C032	1.958	48,950,000.00	13,178,600.00	62,128,600.00
80	27M04C033	0.342	8,550,000.00	2,311,400.00	10,861,400.00
81	27M04C034	0.177	4,425,000.00	1,185,900.00	5,610,900.00
82	27M04C035	0.355	8,875,000.00	2,398,500.00	11,273,500.00
83	27M04C035	1.595	39,875,000.00	10,746,500.00	50,621,500.00
84	27M04C035	0.640	16,000,000.00	4,308,000.00	20,308,000.00
85	27M04C035	1.022	25,550,000.00	6,887,400.00	32,437,400.00
86	27M04C036	1.481	37,025,000.00	9,962,700.00	46,987,700.00
87	27M04C037	0.393	9,825,000.00	2,653,100.00	12,478,100.00
88	27M04C038	3.265	81,625,000.00	21,995,500.00	103,620,500.00
89	27M04C039	0.517	12,925,000.00	3,483,900.00	16,408,900.00
90	27M04C040	0.716	17,900,000.00	4,817,200.00	22,717,200.00
91	27M04C041	0.949	23,725,000.00	6,378,300.00	30,103,300.00
92	27M04C041	2.589	64,725,000.00	17,446,300.00	82,171,300.00
93	27M04C042	0.258	6,450,000.00	1,748,600.00	8,198,600.00
94	27M04C042	1.492	37,300,000.00	10,036,400.00	47,336,400.00
95	27M04D001	0.290	7,250,000.00	310,000.00	7,560,000.00
96	27M04D002	0.423	10,575,000.00	443,000.00	11,018,000.00
97	27M04D003	0.468	11,700,000.00	488,000.00	12,188,000.00
98	27M04D004	0.444	11,100,000.00	464,000.00	11,564,000.00
99	27M04D005	0.354	8,850,000.00	374,000.00	9,224,000.00
100	27M04D006	0.592	14,800,000.00	3,986,400.00	18,786,400.00
101	27M04D007	0.633	15,825,000.00	653,000.00	16,478,000.00
102	27M04D008	0.077	1,925,000.00	515,900.00	2,440,900.00
103	27M04D008	0.181	4,525,000.00	1,212,700.00	5,737,700.00
104	27M04D009	0.161	4,025,000.00	1,078,700.00	5,103,700.00
105	27M04D010	1.112	27,800,000.00	7,490,400.00	35,290,400.00
106	27M04D010	0.668	16,700,000.00	4,495,600.00	21,195,600.00
107	27M04D011	0.756	18,900,000.00	5,085,200.00	23,985,200.00
108	27M04D012	0.457	11,425,000.00	3,081,900.00	14,506,900.00
109	27M04D013	0.582	14,550,000.00	3,919,400.00	18,469,400.00
110	27M04D014	0.561	14,025,000.00	3,778,700.00	17,803,700.00
111	27M04D015	0.094	2,350,000.00	629,800.00	2,979,800.00
112	27M04D016	0.242	6,050,000.00	1,621,400.00	7,671,400.00

S. N.	Road Code	Length (km)	Cost of Widening (NRs.)	Cost of Upgrading (NRs.)	Total Cost of Intervention (NRs.)
113	27M04D016	0.250	6,250,000.00	1,675,000.00	7,925,000.00
114	27M04D017	0.406	10,150,000.00	2,740,200.00	12,890,200.00
115	27M04D018	0.362	9,050,000.00	2,445,400.00	11,495,400.00
116	27M04D019	0.448	11,200,000.00	3,021,600.00	14,221,600.00
117	27M04D020	0.287	7,175,000.00	1,942,900.00	9,117,900.00
118	27M04D020	0.307	7,675,000.00	2,076,900.00	9,751,900.00
119	27M04D021	0.722	18,050,000.00	4,857,400.00	22,907,400.00
120	27M04D021	0.433	10,825,000.00	2,921,100.00	13,746,100.00
121	27M04D022	0.804	20,100,000.00	5,406,800.00	25,506,800.00
122	27M04D023	0.167	4,175,000.00	1,118,900.00	5,293,900.00
123	27M04D023	0.223	5,575,000.00	1,494,100.00	7,069,100.00
124	27M04D024	0.234	5,850,000.00	1,567,800.00	7,417,800.00
125	27M04D024	0.571	14,275,000.00	3,845,700.00	18,120,700.00
126	27M04D025	0.253	6,325,000.00	1,715,100.00	8,040,100.00
127	27M04D026	0.867	21,675,000.00	5,828,900.00	27,503,900.00
128	27M04D028	0.644	16,100,000.00	4,334,800.00	20,434,800.00
129	27M04D028	0.382	9,550,000.00	2,579,400.00	12,129,400.00
130	27M04D029	0.225	5,625,000.00	1,507,500.00	7,132,500.00
131	27M04D030	0.202	5,050,000.00	1,353,400.00	6,403,400.00
132	27M04D030	0.226	5,650,000.00	1,514,200.00	7,164,200.00
133	27M04D030	0.077	1,925,000.00	515,900.00	2,440,900.00
134	27M04D031	0.512	12,800,000.00	3,450,400.00	16,250,400.00
135	27M04D032	0.961	24,025,000.00	6,458,700.00	30,483,700.00
136	27M04D033	0.184	4,600,000.00	1,232,800.00	5,832,800.00
137	27M04D033	0.289	7,225,000.00	1,956,300.00	9,181,300.00
138	27M04D034	0.215	5,375,000.00	1,440,500.00	6,815,500.00
139	27M04D035	0.066	1,650,000.00	442,200.00	2,092,200.00
140	27M04D035	0.162	4,050,000.00	1,085,400.00	5,135,400.00
141	27M04D035	0.169	4,225,000.00	1,132,300.00	5,357,300.00
142	27M04D035	0.178	4,450,000.00	1,192,600.00	5,642,600.00
143	27M04D036	0.668	16,700,000.00	4,495,600.00	21,195,600.00
144	27M04D037	0.048	1,200,000.00	321,600.00	1,521,600.00
145	27M04D037	0.163	4,075,000.00	1,092,100.00	5,167,100.00
146	27M04D037	0.164	4,100,000.00	1,098,800.00	5,198,800.00
147	27M04D038	0.427	10,675,000.00	447,000.00	11,122,000.00
148	27M04D039	0.288	7,200,000.00	1,949,600.00	9,149,600.00
149	27M04D040	0.299	7,475,000.00	2,023,300.00	9,498,300.00
150	27M04D041	0.126	3,150,000.00	844,200.00	3,994,200.00

S. N.	Road Code	Length (km)	Cost of Widening (NRs.)	Cost of Upgrading (NRs.)	Total Cost of Intervention (NRs.)
151	27M04D041	0.297	7,425,000.00	2,009,900.00	9,434,900.00
152	27M04D042	0.269	6,725,000.00	1,822,300.00	8,547,300.00
153	27M04D043	0.494	12,350,000.00	3,329,800.00	15,679,800.00
154	27M04D044	0.495	12,375,000.00	3,336,500.00	15,711,500.00
155	27M04D045	0.257	6,425,000.00	1,741,900.00	8,166,900.00
156	27M04D045	1.196	-	6,857,200.00	6,857,200.00
157	27M04D046	0.555	13,875,000.00	3,738,500.00	17,613,500.00
158	27M04D046	0.194	4,850,000.00	1,299,800.00	6,149,800.00
159	27M04D047	0.213	5,325,000.00	213,000.00	5,538,000.00
160	27M04D047	0.832	20,800,000.00	5,594,400.00	26,394,400.00
161	27M04D048	0.255	6,375,000.00	1,728,500.00	8,103,500.00
162	27M04D049	0.324	8,100,000.00	2,190,800.00	10,290,800.00
163	27M04D050	0.208	5,200,000.00	1,393,600.00	6,593,600.00
164	27M04D051	0.234	5,850,000.00	1,567,800.00	7,417,800.00
165	27M04D051	0.179	4,475,000.00	1,199,300.00	5,674,300.00
166	27M04D052	0.157	3,925,000.00	1,051,900.00	4,976,900.00
167	27M04D053	0.281	7,025,000.00	1,902,700.00	8,927,700.00
168	27M04D054	0.473	11,825,000.00	3,189,100.00	15,014,100.00
169	27M04D054	0.729	18,225,000.00	4,904,300.00	23,129,300.00
170	27M04D055	0.376	9,400,000.00	2,539,200.00	11,939,200.00
171	27M04D055	0.501	12,525,000.00	3,376,700.00	15,901,700.00
172	27M04D056	0.681	17,025,000.00	4,582,700.00	21,607,700.00
173	27M04D057	0.389	9,725,000.00	2,626,300.00	12,351,300.00
174	27M04D058	0.540	13,500,000.00	3,638,000.00	17,138,000.00
175	27M04D059	0.398	9,950,000.00	2,686,600.00	12,636,600.00
176	27M04D060	0.496	12,400,000.00	3,343,200.00	15,743,200.00
177	27M04D061	0.196	4,900,000.00	1,313,200.00	6,213,200.00
178	27M04D062	0.301	7,532,425.00	2,038,689.90	9,571,114.90
179	27M04D063	0.408	10,200,000.00	2,753,600.00	12,953,600.00
180	27M04D064	0.252	6,300,000.00	1,708,400.00	8,008,400.00
181	27M04D065	0.200	5,000,000.00	1,340,000.00	6,340,000.00
182	27M04D066	0.358	8,950,000.00	2,418,600.00	11,368,600.00
183	27M04D067	0.379	9,475,000.00	20,000.00	9,495,000.00
184	27M04D068	0.372	9,300,000.00	2,512,400.00	11,812,400.00
185	27M04D069	0.180	4,500,000.00	1,206,000.00	5,706,000.00
186	27M04D070	0.590	14,750,000.00	610,000.00	15,360,000.00
187	27M04D071	0.239	5,975,000.00	1,601,300.00	7,576,300.00
188	27M04D073	0.149	3,725,000.00	998,300.00	4,723,300.00

S. N.	Road Code	Length (km)	Cost of Widening (NRs.)	Cost of Upgrading (NRs.)	Total Cost of Intervention (NRs.)
189	27M04D074	0.564	14,100,000.00	3,798,800.00	17,898,800.00
190	27M04D075	0.339	8,475,000.00	2,291,300.00	10,766,300.00
191	27M04D076	0.817	20,425,000.00	5,493,900.00	25,918,900.00
192	27M04D077	0.496	12,400,000.00	3,343,200.00	15,743,200.00
193	27M04D078	0.400	10,000,000.00	2,700,000.00	12,700,000.00
194	27M04D079	0.525	13,125,000.00	3,537,500.00	16,662,500.00
195	27M04D080	0.570	14,250,000.00	3,839,000.00	18,089,000.00
196	27M04D081	0.293	7,325,000.00	1,983,100.00	9,308,100.00
197	27M04D082	0.305	7,625,000.00	2,063,500.00	9,688,500.00
198	27M04D083	0.993	24,825,000.00	6,673,100.00	31,498,100.00
199	27M04D084	0.226	5,650,000.00	1,514,200.00	7,164,200.00
200	27M04D085	0.646	16,150,000.00	4,348,200.00	20,498,200.00
201	27M04D086	0.254	6,350,000.00	1,721,800.00	8,071,800.00
202	27M04D086	0.119	2,975,000.00	797,300.00	3,772,300.00
203	27M04D087	0.411	10,275,000.00	2,773,700.00	13,048,700.00
204	27M04D088	0.316	7,900,000.00	2,137,200.00	10,037,200.00
205	27M04D089	0.283	7,075,000.00	1,916,100.00	8,991,100.00
206	27M04D090	0.113	2,825,000.00	757,100.00	3,582,100.00
207	27M04D091	0.553	13,825,000.00	3,725,100.00	17,550,100.00
208	27M04D092	1.275	31,875,000.00	1,315,000.00	33,190,000.00
209	27M04D093	0.591	14,775,000.00	3,979,700.00	18,754,700.00
210	27M04D094	0.870	21,750,000.00	5,849,000.00	27,599,000.00
211	27M04D095	0.687	17,175,000.00	4,622,900.00	21,797,900.00
212	27M04D096	0.566	14,150,000.00	3,812,200.00	17,962,200.00
213	27M04D096	0.901	22,525,000.00	6,056,700.00	28,581,700.00
214	27M04D097	0.657	16,425,000.00	4,421,900.00	20,846,900.00
215	27M04D098	1.650	41,250,000.00	11,115,000.00	52,365,000.00
216	27M04D099	0.248	6,200,000.00	1,661,600.00	7,861,600.00
217	27M04D100	0.580	14,500,000.00	3,906,000.00	18,406,000.00
218	27M04D101	0.171	4,275,000.00	1,145,700.00	5,420,700.00
219	27M04D101	0.370	9,250,000.00	2,499,000.00	11,749,000.00
220	27M04D102	0.851	21,275,000.00	5,721,700.00	26,996,700.00
221	27M04D103	0.119	2,975,000.00	797,300.00	3,772,300.00
222	27M04D104	0.633	15,825,000.00	4,261,100.00	20,086,100.00
223	27M04D105	0.505	12,625,000.00	3,403,500.00	16,028,500.00
224	27M04D105	0.960	24,000,000.00	6,452,000.00	30,452,000.00
225	27M04D106	0.222	5,550,000.00	1,487,400.00	7,037,400.00
226	27M04D107	0.249	6,225,000.00	1,668,300.00	7,893,300.00

S. N.	Road Code	Length (km)	Cost of Widening (NRs.)	Cost of Upgrading (NRs.)	Total Cost of Intervention (NRs.)
227	27M04D108	0.129	3,225,000.00	864,300.00	4,089,300.00
	N	74.512	1,862,800,000.00	490,992,500.00	2,353,792,500.00
Total		**212.118**			**6,293,169,414.900**

5.12 Perspective Plan of Municipal Transport Network with Respective Scoring System and Ranking

The rank of the road has developed based on criteria given in Terms of References [3] and that that has approved by MRCC meetings. The details of the ranking system has presented in Volume-II of the report. The summary of scores and the rank has presented in Table 19, Table 20 and Table 21.

Scoring System and Ranking of Class A Roads

Table 19, Scoring System and Ranking of Class A Roads

Road Code	(km)	pop/km		Annual Transactions (NRs in x1,00,000/km)				Served Population (Pop/km)					Discretely, Exist gets score as specified otherwise 0					Road Linkages	Ward Demand	Total Scores	Priority	Remarks
	Length of Road	Served Population	Score of Served Population	Annual Agriculture Production	Score for Agriculture Production	Total Transactions (NRs. Lakh/km)	Total Score	Total Population Served (Pop/km)	Total Score	Waste Management Site	Total Population Served (Pop/km)	Total Score	Potential Town Growth	Potential Land Pooling	Potential Industrial Areas	Potential Ring Road	Ethnic Groups and Religious areas					
			15		**5**		**20**		**20**			**5**	**2.5**	**2.5**	**2.5**	**2.5**	**5**	**10**	**10**	**100**		
27M06A001	5.64	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
27M06A002	3.80	658.8	15	0	0	2.635	20	131.752	20	0	0	0	2.5	2.5	0	2.5	0	10	1	74.5	1	
27M06A003	2.14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
27M06A004	9.69	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		

Scoring System and Ranking of Class B Roads

Table 20, Scoring System and Ranking of Class B Roads

Road Code	(km)	pop/km		Annual Transactions (NRs in x1,00,000/km)				Served Population (Pop/km)					Discretely, Exist gets score as specified otherwise 0					Road Linkages	Ward Demand	Total Scores	Priority	Remarks
	Length of Road	Served Population	Score of Served Population	Annual Agriculture Production	Score for Agriculture Production	Total Transactions (NRs. Lakh/km)	Total Score	Total Population Served (Pop/km)	Total Score	Waste Management Site	Total Population Served (Pop/km)	Total Score	Potential Town Growth	Potential Land Pooling	Potential Industrial Areas	Potential Ring Road	Ethnic Groups and Religious areas					
			15		5		20		20			5	2.5	2.5	2.5	3	5	10	10	100		
27M04B001	1.09	184.3	0.081	0	0	1.843	1.1	0	0	0	0	0	0	0	0	0	5	8	0	14.16	15	
27M04B002	1.76	113.6	0.05	2.841	0.923	1.136	0.7	0	0	0	0	0	2.5	2.5	0	0	0	8	0	14.64	14	
27M04B003	0.9	334.8	0.147	5.58	1.814	2.232	1.3	0	0	0	0	0	2.5	2.5	0	0	0	8	0	16.27	10	
27M04B004	0.71	282.9	0.124	7.072	2.298	2.829	1.7	0	0	0	0	0	0	0	0	0	0	8	0	12.08	17	
27M04B005	2.26	663.4	0.292	0.885	0.287	2.211	1.3	0	0	0	0	0	0	0	0	0	0	10	2	15.87	13	
27M04B006	0.82	606.8	0.267	3.641	1.183	4.854	2.8	0	0	0	0	0	0	0	0	0	0	8	0	12.29	16	
27M04B007	0.8	250.9	0.11	12.55	4.078	11.29	6.6	376.412	0.88	0	0	0	0	0	0	0	0	8	0	19.69	6	
27M04B008	0.39	512.8	0.225	15.38	5	10.26	6	0	0	0	0	0	0	0	0	0	0	0	0	11.24	18	
27M04B009	1.56	192.7	0.085	1.285	0.417	0	0	0	0	0	0	0	0	0	0	0	0	10	4	18.5	7	
27M04B010	0.57	174.2	0.077	3.484	1.132	0	0	0	0	0	0	0	2.5	0	0	0	0	10	3	19.71	5	
27M04B011	0.39	255.1	0.112	12.76	4.145	7.653	4.5	0	0	0	0	0	2.5	2.5	0	0	0	8	0	21.74	4	
27M04B012	2.3	217.5	0.096	0	0	0	0	86.9943	0.2	0	0	0	0	0	0	0	0	10	0	10.3	19	
27M04B013	1.35	1111	0.488	1.481	0.481	5.185	3	0	0	0	0	0	0	0	0	0	0	10	1	16.01	12	
27M04B014	0.58	173.9	0.076	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	10.08	21	

Road Code	(km)	pop/km		Annual Transactions (NRs in x1,00,000/km)				Served Population (Pop/km)					Discretely, Exist gets score as specified otherwise 0					Road Linkages	Ward Demand	Total Scores	Priority	Remarks
	Length of Road	Served Population	Score of Served Population	Annual Agriculture Production	Score for Agriculture Production	Total Transactions (NRs. Lakh/km)	Total Score	Total Population Served (Pop/km)	Total Score	Waste Management Site	Total Population Served (Pop/km)	Total Score	Potential Town Growth	Potential Land Pooling	Potential Industrial Areas	Potential Ring Road	Ethnic Groups and Religious areas					
			15		**5**		**20**		**20**			**5**	**2.5**	**2.5**	**2.5**	**3**	**5**	**10**	**10**	**100**		
27M04B015	0.4	50	0.022	10	3.25	5	2.9	0	0	0	0	0	0	0	0	0	0	10	0	16.2	11	
27M04B016	0.77	390.1	0.171	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	6.171	22	
27M04B017	1.24	241.2	0.106	3.215	1.045	6.431	3.8	0	0	0	0	0	0	0	0	0	0	8	4	16.92	8	
27M04B018	1.08	1395	0.613	3.721	1.209	6.512	3.8	1860.47	4.36	0	0	0	0	0	0	0	0	10	3	23	3	
27M04B019	1.63	3075	1.351	0	0	14.15	8.3	984.01	2.31	0	0	0	0	2.5	0	0	0	10	1	25.45	2	
27M04B020	0.84	356.7	0.157	0	0	0	0	951.249	2.23	0	0	0	0	0	0	0	0	10	4	16.39	9	
27M04B021	0.2	490.2	0.215	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	10.22	20	
27M04B022	0.29	34130	15	0	0	34.13	20	8532.42	20	0	0	0	0	0	0	0	0	10	5	70	1	

Scoring System and Ranking of Class C Roads

Table 21, Scoring System and Ranking of Class C Roads

Road Code	(km)	pop/km		Annual Transactions (NRs in x1,00,000/km)				Served Population (Pop/km)					Discretely, Exist gets score as specified otherwise 0					Road Linkages	Ward Demand	Total Scores	Priority	Remarks
	Length of Road	Served Population	Score of Served Population	Annual Agriculture Production	Score for Agriculture Production	Total Transactions (NRs. Lakh/km)	Total Score	Total Population Served (Pop/km)	Total Score	Waste Management Site	Total Population Served (Pop/km)	Total Score	Potential Town Growth	Potential Land Pooling	Potential Industrial Areas	Potential Ring Road	Ethnic Groups and Religious areas					
			15		5		20		20			5	2.5	2.5	2.5	3	5	10	10	100		
27M04C001	0.69	868.3	0.073	0	0	14.47	4.9	723.589	0.08	0	0	0	0	0	0	0	0	10	5	20.07	8	
27M04C002	0.32	1875	0.158	0	0	31.25	11	1562.5	0.17	0	0	0	0	0	0	0	0	10	0	20.95	7	
27M04C003	0.36	3343	0.281	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	10.28	28	
27M04C004	1.74	11527	0.968	0	0	28.82	9.8	0	0	0	0	0	0	0	0	0	0	10	1	21.77	6	
27M04C005	1.91	2622	0.22	0	0	13.11	4.5	1468.27	0.16	0	0	0	0	0	0	0	0	10	4	18.84	9	
27M04C006	0.75	6658	0.559	0	0	33.29	11	3728.36	0.41	0	0	0	0	0	0	0	0	10	3	25.29	3	
27M04C007	0.43	11765	0.988	0	0	58.82	20	6588.24	0.73	0	0	0	0	0	0	0	0	10	2	33.71	2	
27M04C008	1.05	2190	0.184	0	0	11.43	3.9	0	0	0	0	0	0	0	0	0	5	10	3	22.07	5	
27M04C009	0.28	6338	0.532	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	6.532	32	
27M04C010	0.66	1220	0.102	3.049	0.363	0	0	0	0	0	0	0	0	0	0	0	0	10	1	11.47	23	
27M04C011	0.25	406.5	0.034	4.065	0.484	0	0	0	0	0	0	0	0	0	0	0	0	10	0	10.52	27	
27M04C012	0.28	354.6	0.03	3.546	0.422	0	0	0	0	0	0	0	0	0	0	0	0	6	0	6.452	33	
27M04C013	0.37	273.2	0.023	2.732	0.325	0	0	0	0	0	0	0	0	0	0	0	0	6	0	6.348	34	
27M04C014	0.89	4505	0.378	9.009	1.072	2.252	0.8	6756.76	0.74	0	0	0	0	0	0	0	0	10	4	16.96	12	

Road Code	(km)	pop/km		Annual Transactions (NRs in x1,00,000/km)				Served Population (Pop/km)					Discretely, Exist gets score as specified otherwise 0					Road Linkages	Ward Demand	Total Scores	Priority	Remarks
	Length of Road	Served Population	Score of Served Population	Annual Agriculture Production	Score for Agriculture Production	Total Transactions (NRs. Lakh/km)	Total Score	Total Population Served (Pop/km)	Total Score	Waste Management Site	Total Population Served (Pop/km)	Total Score	Potential Town Growth	Potential Land Pooling	Potential Industrial Areas	Potential Ring Road	Ethnic Groups and Religious areas					
			15		5		20		20			5	2.5	2.5	2.5	3	5	10	10	100		
27M04C015	0.47	425.5	0.036	4.255	0.506	2.128	0.7	0	0	0	0	0	2.5	2.5	0	0	0	10	0	16.27	13	
27M04C016	0.26	189.4	0.016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.016	40	
27M04C017	1.51	663.1	0.056	0.663	0.079	1.326	0.5	0	0	0	0	0	0	0	0	0	0	10	0	10.59	26	
27M04C018	1.14	877.2	0.074	0.877	0.104	1.754	0.6	0	0	0	0	0	0	0	0	0	0	10	0	10.77	24	
27M04C019	0.23	85.47	0.007	4.274	0.509	17.09	5.8	0	0	0	0	0	0	0	0	0	0	8	0	14.33	14	
27M04C021	0.34	#####	15	0	0	5.952	2	181548	20	0	0	0	0	0	0	0	0	10	0	47.02	1	
27M04C022	0.29	1701	0.143	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.143	38	
27M04C023	1.49	1005	0.084	2.681	0.319	3.351	1.1	335.121	0.04	0	0	0	0	0	0	0	0	10	1	12.58	17	
27M04C024	0.44	1139	0.096	0	0	0	0	1138.95	0.13	0	0	0	0	0	0	0	0	10	2	12.22	20	
27M04C025	0.45	1114	0.094	0	0	0	0	1113.59	0.12	0	0	0	0	0	0	0	0	10	2	12.22	21	
27M04C026	0.84	1193	0.1	0	0	0	0	1193.32	0.13	0	0	0	0	0	0	0	0	10	2	12.23	19	
27M04C027	0.34	879.8	0.074	8.798	1.047	0	0	0	0	0	0	0	0	0	0	0	0	8	3	12.12	22	
27M04C028	0.78	193.3	0.016	2.577	0.307	0	0	0	0	0	0	0	0	0	0	0	0	8	4	12.32	18	
27M04C029	0.25	78.74	0.007	31.5	3.748	0	0	0	0	0	0	0	0	0	0	0	0	10	0	13.75	16	
27M04C030	0.48	1050	0.088	42.02	5	10.5	3.6	0	0	0	0	0	2.5	2.5	0	0	0	8	1	22.66	4	
27M04C031	1.19	418.8	0.035	6.7	0.797	1.675	0.6	837.521	0.09	0	0	0	2.5	2.5	0	0	0	8	3	17.49	10	

Road Code	(km)	pop/km		Annual Transactions (NRs in x1,00,000/km)				Served Population (Pop/km)					Discretely, Exist gets score as specified otherwise 0					Road Linkages	Ward Demand	Total Scores	Priority	Remarks
	Length of Road	Served Population	Score of Served Population	Annual Agriculture Production	Score for Agriculture Production	Total Transactions (NRs. Lakh/km)	Total Score	Total Population Served (Pop/km)	Total Score	Waste Management Site	Total Population Served (Pop/km)	Total Score	Potential Town Growth	Potential Land Pooling	Potential Industrial Areas	Potential Ring Road	Ethnic Groups and Religious areas					
			15		5		20		20			5	2.5	2.5	2.5	3	5	10	10	100		
27M04C032	1.96	1021	0.086	4.086	0.486	4.086	1.4	510.725	0.06	0	0	0	2.5	2.5	0	0	0	8	2	17.02	11	
27M04C033	0.34	146.2	0.012	5.848	0.696	0	0	0	0	0	0	0	0	0	0	0	0	8	0	8.708	29	
27M04C034	0.18	565	0.047	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.047	39	
27M04C035	3.61	553.7	0.047	1.384	0.165	0	0	0	0	0	0	0	0	0	0	0	5	8	1	14.21	15	
27M04C036	1.48	270.1	0.023	1.35	0.161	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2.183	37	
27M04C037	0.39	127.2	0.011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	5.011	35	
27M04C038	3.27	91.88	0.008	0.613	0.073	0.306	0.1	91.8836	0.01	0	0	0	0	0	0	0	0	8	0	8.195	30	
27M04C039	0.52	96.71	0.008	9.671	1.151	0	0	0	0	0	0	0	0	0	0	0	0	0	3	4.159	36	
27M04C040	0.72	279.3	0.023	1.397	0.166	0	0	0	0	0	0	0	0	0	0	0	0	8	0	8.19	31	
27M04C041	3.54	28.26	0.002	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.002	41	
27M04C042	1.75	228.6	0.019	2.286	0.272	1.143	0.4	0	0	0	0	0	0	0	0	0	0	8	2	10.68	25	

Chapter-6 First Five Year Municipal Transport Master Plan

The previous year budget of the municipality shall be collected and the growth rated shall be then determined. Then short term and long term financial plan shall be forecasted. The Projected financial plan for five year shall be prepared.

6.1 Five year Projected Financial Plan

The current budget plan of the municipality has presented in Table 22. Based on the growth pattern, the growth factor is determined and the budget for coming year has forecasted as shown in below. The composition of source of budget in municipality shows heterogeneous in nature. The very high amount of budget is granted by the ministry. So, if there is any changes occurred in granted amount by government, there result will be significant change in the municipality budget. The budget amount as we have received from the municipality shows that about 65% higher budget for this year as compared to previous. The growth rate that has been used in all the calculations is 10%, as it is used for general purpose when we don't have precise growth rate.

Table 22, Budget Amount of Municipality

Fiscal Year	Amount (NRs.)	Rate of Increment (%)	Remarks
2016/17		10%	Revised Budget
2017/18	48,000,000.00	10%	Estimated Budget by Municipality

6.2 Sharing of Fund

The financial plan and the finalization of the MTMP shall be done based on terms of reference as given by ministry. During preparation of MTMP, the investment from total available resources under road sector for different classes of the road can be distributed as [3]. Apportion 30% for maintenance at first and remaining 30% shall be distributed as:

- Class A road, ≥ 40%
- Class B road, ≤ 30%
- Class C road, ≤ 20%
- Class D road, ≤ 10%

Figure 25 presents municipal revenue composition of Nepal as found by MoLD and GTZ in 2008. For research they have considered various municipalities from different districts since 1991/92 to 2005/6.

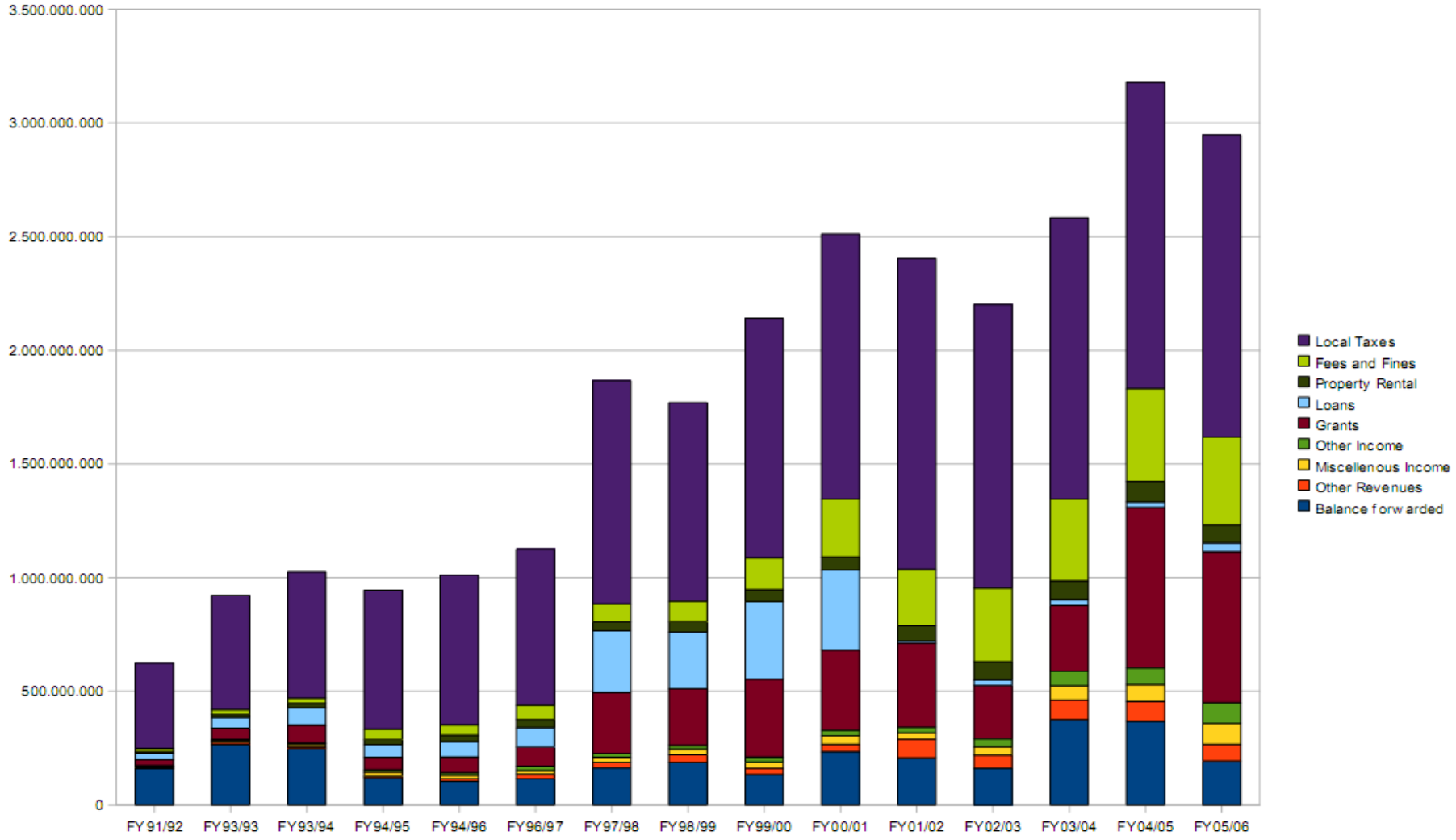

Figure 25, Municipal revenue composition in Nepal, [14]

The details of the budget sharing of interventions and maintenance and also for class A, B, C and D has presented in

Table 23, Forecasted Financial Plan of the Municipality in Road Sector								
Base Year	**Forecasted Year (Amount in NRs.)**							
	Base Year	**1 year**	**2 year**	**3 year**	**4 year**	**5 year**	**10 year**	**20 year**
2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2020/22	2026/27	2036/37
Amount	48,000,000.0	52,800,000.0	58,080,000.0	63,888,000.0	70,276,800.0	77,304,480.0	124,499,638.1	322,919,997.6
Cumulative Budget	48,000,000.0	100,800,000.0	158,880,000.0	222,768,000.0	293,044,800.0	370,349,280.0	494,848,918.1	817,768,915.7

Table 24, Forecasted Financial Plan of the Municipality in Road Sector							
Base Year		**Forecasted Year (Amount in NRs.)**					
year		0	1	2	3	4	5
f/y		**2016/17**	**2017/18**	**2018/19**	**2019/20**	**2020/21**	**2020/22**
Amount		48,000,000.00	52,800,000.00	58,080,000.00	63,888,000.00	70,276,800.00	77,304,480.00
Intervention Type	14,400,000.000	15,840,000.00	17,424,000.00	19,166,400.00	21,083,040.00	23,191,344.00	4,203,431.10
	33,600,000.000	36,960,000.00	40,656,000.00	44,721,600.00	49,193,760.00	54,113,136.00	9,808,005.90

6.3 Year-wise Targets

Year wise target shall be developed based on available budgets.

Table 25, Forecasted Financial Plan of the Municipality in Road Construction

Road Type for the Construction Work	Forecasted Year (Amount in NRs.)					
	Base Year	1 year	2 year	3 year	4 year	5 year
	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
For Class "A" Roads	13,440,000.00	14,784,000.00	16,262,400.00	17,888,640.00	19,677,504.00	21,645,254.40
For Class "B" Roads	10,080,000.00	11,088,000.00	12,196,800.00	13,416,480.00	14,758,128.00	16,233,940.80
For Class "C" Roads	6,720,000.00	7,392,000.00	8,131,200.00	8,944,320.00	9,838,752.00	10,822,627.20
For Class "D" Roads	3,360,000.00	3,696,000.00	4,065,600.00	4,472,160.00	4,919,376.00	5,411,313.60
Total for Construction	33,600,000.00	36,960,000.00	40,656,000.00	44,721,600.00	49,193,760.00	54,113,136.00

Table 26, Forecasted Financial Plan of the Municipality in Road Maintenance

Road Type for the Maintenance Work	Forecasted Year (Amount in NRs.)					
	Base Year	1 year	2 year	3 year	4 year	5 year
	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
For Class "A" Roads	5,760,000.00	6,336,000.00	6,969,600.00	7,666,560.00	8,433,216.00	9,276,537.60
For Class "B" Roads	4,320,000.00	4,752,000.00	5,227,200.00	5,749,920.00	6,324,912.00	6,957,403.20
For Class "C" Roads	2,880,000.00	3,168,000.00	3,484,800.00	3,833,280.00	4,216,608.00	4,638,268.80
For Class "D" Roads	1,440,000.00	1,584,000.00	1,742,400.00	1,916,640.00	2,108,304.00	2,319,134.40
Total for Maintenance	14,400,000.00	15,840,000.00	17,424,000.00	19,166,400.00	21,083,040.00	23,191,344.00

6.5 Implementation Plan

The detailed of five year and abstract of twenty year implementation plan shall be developed. The implementation plan has prepared based on the priority/rank obtained from the prioritization criteria. For class A roads, A006 has the highest score and A004 is in second priority but it has been constructing by other agencies (KVDA). The road in priority is A005, A002, A008, A007 and A001 from highest to lowest. Total expected length of road for blacktopping within MTMP period is 7.22 km and gravelling is 3.50 km. The other roads shall be constructed in upcoming years.

Implementation Plan for Class 'A' Roads

Table 11, Implementation Plan for the Construction of the Class 'A' Roads

Road Type for the Construction Work (km)	Forecasted Year (Amount in NRs.)					
	Base Year	1 year	2 year	3 year	4 year	5 year
	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
For Class "A" Roads	13,440,000.000	14,784,000.000	16,262,400.000	17,888,640.000	19,677,504.000	21,645,254.400
Rate of Track Opening per km	4,000,000.000	4,000,000.000	4,000,000.000	4,000,000.000	4,000,000.000	4,000,000.000
Rate of Gravelling per km	2,200,000.000	2,200,000.000	2,200,000.000	2,200,000.000	2,200,000.000	2,200,000.000
Rate of Black Topping per km	5,700,000.000	5,700,000.000	5,700,000.000	5,700,000.000	5,700,000.000	5,700,000.000
Side Drain per meter	1,000.000	1,000.000	1,000.000	1,000.000	1,000.000	1,000.000
Cross Drain per unit	10,000.000	10,000.000	10,000.000	10,000.000	10,000.000	10,000.000
Widening per meter		25,000.000	25,000.000	25,000.000	25,000.000	25,000.000
Length of Track Opening						
Length of Gravelling						

Table 11, Implementation Plan for the Construction of the Class 'A' Roads						
Road Type for the Construction Work (km)	**Forecasted Year (Amount in NRs.)**					
	Base Year	**1 year**	**2 year**	**3 year**	**4 year**	**5 year**
	2016/17	**2017/18**	**2018/19**	**2019/20**	**2020/21**	**2021/22**
Length of Blacktopping				0.513	1.726	1.899
Side Drain in meter		547.556	602.311	446.000	-	-
Cross Drain per unit		-	-	-	-	-
Length of widening		547.556	602.311	446.000		
Amount of Track Opening		0	0	0	0	0
Amount of Gravelling		0	0	0	0	0
Amount of Black Topping		0	0	5846640	19677504	21645254.4
Amount ofSide Drain		1095111.111	1204622.222	892000	0	0
Amount of Cross Drain		0	0	0	0	0
Amount of Widening		13688888.89	15057777.78	11150000	0	0
Total Amount of Intervention		14,784,000.000	16,262,400.0	17,888,640.0	19,677,504.0	21,645,254.4
Prioritized Roads						
A002	Widening (6.5-14)	0+000-0+548	0+548-1+150	1+150-1+596		
A002	GR/BT (0+0-1+596)			0+000-0+513	0+513-1+596	

Table 11, Implementation Plan for the Construction of the Class 'A' Roads						
Road Type for the Construction Work (km)	**Forecasted Year (Amount in NRs.)**					
	Base Year	**1 year**	**2 year**	**3 year**	**4 year**	**5 year**
	2016/17	**2017/18**	**2018/19**	**2019/20**	**2020/21**	**2021/22**
A002	BT (1+596-3+80)					
A001 (KVDA)						
A003 (Owned by TIA)						
A004 (KVDA)						
Chainage for Construction		-	-	(0.00)	0.00	0.00

Implementation Plan for Class 'B' Roads

In MTMP period, about 6.25 km road under class ‘B’ shall be blacktopped which are graveled at present. The road with highest score is B005 and this road shall be constructed at first followed by B014. The road that come in priority lists are B004, B003, B006 and B013. The construction of other roads under class B shall be done based on priority in upcoming years.

Table 11, Implementation Plan for the Construction of the Class 'B' Roads						
Road Type for the Maintenance Work	Forecasted Year (Amount in NRs.)					
	Base Year	1 year	2 year	3 year	4 year	5 year
	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
For Class "B" Roads	10,080,000.00	11,088,000.00	12,196,800.00	13,416,480.00	14,758,128.00	16,233,940.80
Rate of Track Opening per km	4,000,000.000	4,000,000.000	4,000,000.000	4,000,000.000	4,000,000.000	4,000,000.000
Rate of Gravelling per km	2,200,000.000	2,200,000.000	2,200,000.000	2,200,000.000	2,200,000.000	2,200,000.000
Rate of Black Topping per km	5,700,000.000	5,700,000.000	5,700,000.000	5,700,000.000	5,700,000.000	5,700,000.000
Side Drain per meter	1,000.000	1,000.000	1,000.000	1,000.000	1,000.000	1,000.000
Cross Drain per unit	10,000.000	10,000.000	10,000.000	10,000.000	10,000.000	10,000.000
Length of Track Opening						
Length of Gravelling				0.290	0.102	3.349
Length of Blacktopping		0.973	1.070	1.063	1.253	0.118
Side Drain per meter	-	-	-	0.581	0.204	6.934
Cross Drain per unit		-	-	2.000	2.000	14.000
Amount of Track Opening		0	0	0	0	0
Amount of Gravelling		0	0	1277118.983	448800	14734873.46
Amount of Black Topping		11088000	12196800	12118200	14288920	1345200

Table 11, Implementation Plan for the Construction of the Class 'B' Roads						
Road Type for the Maintenance Work	Forecasted Year (Amount in NRs.)					
	Base Year	1 year	2 year	3 year	4 year	5 year
	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
Amount ofSide Drain		0	0	1161.017257	408	13867.33951
Amount of Cross Drain		0	0	20000	20000	140000
Total Amount of Intervention		11,088,000.0	12,196,800.0	13,416,480.0	14,758,128.0	16,233,940.8
Prioritized Road	Exist/Upgrade					
27M06B022	GR/BT (0.293)	0+000-0+293				
27M06B019	GR/BT (1.626)	0+000-0+680	0+680-1+626			
27M06B018	GR/BT (1.075)		0+000-0+012	0+012-1+075		
27M06B011	ER/GR (0.392)			0+000-0+290	0+290-0+392	
27M06B010	GR/BT (0.574)				0+000-0+574	
27M06B007	GR/BT (0.797)				0+000-0+679	0+679-0+797
27M06B009	ER/GR,GR/BT					0+000-1+030
27M06B017	ER/GR (1.244)					0+000-1+244
27M06B020	ER/GR (0.841)					0+000-0+841
Chainage for Construction		0.00	0.00	-	-	-

Implementation Plan for Class 'C' Roads

Table 27, Implementation Plan for the Construction of the Class 'C' Roads						
Road Type for the Maintenance Work	**Forecasted Year (NRs. Amount in Lakh)**					
	Base Year	**1 year**	**2 year**	**3 year**	**4 year**	**5 year**
	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
For Class "C" Roads	6,720,000	7,392,000	8,131,200	8,944,320	9,838,752	10,822,627
Rate of Track Opening per km	4,000,000.000	4,000,000.000	4,000,000.000	4,000,000.000	4,000,000.000	4,000,000.000
Rate of Gravelling per km	2,200,000.000	2,200,000.000	2,200,000.000	2,200,000.000	2,200,000.000	2,200,000.000
Rate of Black Topping per km	5,700,000.000	5,700,000.000	5,700,000.000	5,700,000.000	5,700,000.000	5,700,000.000
Side Drain per meter	1,000.000	1,000.000	1,000.000	1,000.000	1,000.000	1,000.000
Cross Drain per unit	10,000.000	10,000.000	10,000.000	10,000.000	10,000.000	10,000.000
Length of Track Opening						
Length of Gravelling						
Length of Blacktopping		1.296	1.426	1.568	1.725	1.897
Side Drain per meter		2.592	2.851	3.136	3.450	3.795
Cross Drain per unit						

Table 27, Implementation Plan for the Construction of the Class 'C' Roads						
Road Type for the Maintenance Work	**Forecasted Year (NRs. Amount in Lakh)**					
	Base Year	**1 year**	**2 year**	**3 year**	**4 year**	**5 year**
	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
Amount of Track Opening		0	0	0	0	0
Amount of Gravelling		0	0	0	0	0
Amount of Black Topping		7386816.269	8125497.896	8938047.686	9831852.454	10815037.7
Amount ofSide Drain		5183.730715	5702.103787	6272.314165	6899.545582	7589.50014
Amount of Cross Drain		0	0	0	0	0
Total Amount of Intervention		7,392,000.000	8,131,200.000	8,944,320.000	9,838,752.000	10,822,627.200
Prioritized Road						
27M06C021	BT					
27M06C007	GR/BT (0.425)	0+000-0+425				
27M06C006	GR/BT (0.751)	0+000-0+751				
27M06C030	GR/BT (0.476)	0+000-0+120	0+0120-0+476			
27M06C008	BT					
27M06C004	GR/BT (1+735)		0+000-1+070	1+070-1+735		
27M06C002	BT					
27M06C001	GR/BT (0.691)			0+000-0+691		

Table 27, Implementation Plan for the Construction of the Class 'C' Roads						
Road Type for the Maintenance Work	**Forecasted Year (NRs. Amount in Lakh)**					
	Base Year	**1 year**	**2 year**	**3 year**	**4 year**	**5 year**
	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
27M06C005	GR/BT (1.907)			0+000-0+907	0+907-1+907	
27M06C031	GR/BT (1.194)				0+000-1.194	
27M06C032	GR/BT (1.958)				0+000-0+531	0+531-1.958
27M06C014	GR/BT (0.888)					0+000-0.470
27M06C015	GR/BT (0.470)					
27M06C019	GR/BT (0.234)					
Chainage for Construction		0.00	-	-	-	-

Chapter-7 Discussions and Conclusions

In Nepal the area occupied by urban area is increasing rapidly with the declaration of new municipalities. About half of the area within the municipality is occupied by open space and agriculture land, thus the planning at this stage is very important. As every plan starts with present scenarios, the team has determined present status of roads by conducting field inventory and the data are then coded in GIS software for developing the maps. Finally the inventory map was prepared and the land cover map has also been prepared. The potential development map and visionary plan has used for the preliminary classification of the roads. The classification of the road shall be validated through MRCC meetings. The proposed prioritization criteria have been validated through MRCC and municipal office. Again, the financial as well as implementation plan shall be prepared in the report.

The road density reveals that the accessibility of the road in municipality is near to that of minimum level as set by government. Most of the roads are not serviceable as they are of earthen and seasonal. Again the roads are very narrow to cater the traffic. The travel pattern of people in the municipality area is to go towards CBD area at morning peak and reverse at evening peak time. There is a possibility of connecting with neighboring municipality as well as neighboring district. The proposed KTM-outer ring road is one of the major routes for inter-municipality linkages. The ring road has planned based on following two aspects. The first one is for Short term, called inner ring-road and the other is the Long Term Ring Road, called as Outer ring road. In this regard the proposed route of public transportation follows ring road and the link roads. For short to medium term planning the routes of public transportation follow short term ring road. Link roads are important for inter-linkages as the routes of long-term ring road shall be sufficient for public transport route up to 20 years perspective plan however low occupancy vehicles shall be used for other small routes via linkage roads.

The cost for the construction each road has determined based on the rate provided in the guideline. The total cost of interventions excluding SRN and DRCN was found as NRs. 26293169414.9 (6.3 billion) for the length of 212.118 km. The detailed of five year and abstract of twenty year implementation plan has been developed. The implementation plan has prepared based on the priority/rank obtained from the prioritization criteria. Within 5 year budget period 4.138 km of Class A roads, 4.477 km of Class B and 7.912 Class C roads will be metallled while 3.741 km Class B roads will eb gravelled and 1.56 km Class A road will be widened.

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Glossary

Capacity	The maximum number of vehicles that can pass over a given section of a lane or roadway in one direction (or in both directions for a two-lane or three-lane highway) during conditions.
Forecasting	The process of determining the future values of land use, socio-economic, and trip making variables within the study area.
Local road	Local roads provide direct property access in residential, industrial, commercial and downtown areas. With local streets connecting primarily to collector roads, travel distances are short, speeds are relatively low and volumes are modest, as their primary function of accommodating traffic from adjacent lands.
Maintenance	The process of preserving the original condition or function of an asset
Network	Set of nodes and connecting links that represent transportation facilities in an area.
Trip	A one-direction movement which begins at the origin at the start time, ends at the destination at the arrival time, and is conducted for a specific purpose.
Upgrading	The process of addition or change that makes something better than it was before

Appendices

Appendix 1, Maps

Map- 1: Map of Nepal showing strategic road network and location of the district

Map- 2: Indicative Development Potential Map (IDPM)

Map- 3, Municipality Road Inventory Map (MIM)

Map- 4, Land Cover Map of municipality

Map- 5, Consolidated MTPP Map showing all Road Class ‘A’, ‘B’ & ‘C’ as defined by municipality

Map- 5a: MTPP Map of Road Class ‘A’

Map-5b: MTPP Map of Road Class ‘B’

Map-5c: MTPP Map of Road Class ‘C’

Map- 6: Consolidated MTMP Map showing all Road Class ‘A’, ‘B’ & ‘C’

Map-6a: MTMP Map of Road Class ‘A’

Map-6b: MTMP Map of Road Class ‘B’

Map-6c: MTMP Map of Road Class ‘C’

Map-6d: Map showing bridges

Appendix 2. Photographs