CHAPTER 2

MASTER PLANS OF TOWNS IN ASSAM

The aim of this chapter is to investigate the myths and realities of master plans, set in the context of urban design methodologies in the towns of Assam. It deals with the first objective of this research i.e. study of the road systems in the existing master plans. But, as the master plans are many, it is obvious that this study is based on some sample master plans taking randomly from among the existing master plans. Besides, it also tries to answer the two basic research questions (Section 1.6) that- whether the master plans adopted by different towns of Assam have considered the transport planning as a part of them and if so, to what extent? And, whether the reciprocal influence between land use and transport was taken into account or not?

The master plan documents for the towns have encouraged an increasing number of towns in Assam to adopt these for the purpose of urban planning. The proposers of new and/or revised master plans have stated that necessary attention has been given to the previous deficiencies and the current generation of plans has overcome them. Thus, it is accepted by the policy-makers and practitioners as a legitimate technique, although the theoretical underpinning appears dated and ripe for academic evaluation. Meanwhile, a number of concerns have been raised. Included is the notion that such plans are going to become an end in themselves and bear little relation to real urban settings. For example, the built environmental aspects are only considered two-dimensionally, the plans are deterministic, inflexible and based on the concept of a completed product, whereas the evolution of the town is a process.

As per 2001 Census, Assam has an urban population of nearly 13% distributed in 125 towns (both civic and census towns). Here, the Urban Master Plans are prepared under Section 9 of the Assam Town and Country Planning Act, which was enacted and amended by the Government of Assam in 1959. This document lays down the planning guidelines, policies, and development code and space requirements for various socio-economic activities during the plan period. It is also the basis for all infrastructure requirements. This is a legal document to not only guide the future growth of an urban area in a planned manner, but also to arrest the haphazard development that comes up organically.
At present, as many as 27 towns of Assam have their master plans (Fig. 2.1). But the question is - how relevant and effective are such plans, both in their objectives and in their implementation? Do they pragmatically take into consideration the ground realities or are they utopian in nature? Is due consideration given to the financial viability of such plans? And, in the context of the present research, the important question is - to what extent does this planning process give attention to the provision for road traffic planning? There has been a lack of comprehensive analysis on this major policy document, at least in Assam, till now and there is no significant research work available on these master plans at present.

![ASSAM TOWNS HAVING MASTER PLAN](Image)

Fig. 2.1: Towns of Assam having master plan (Source: Office of the Town and Country Planning, Guwahati, 2010)

### 2.1 History of urban planning in Assam

The year 1955 can be stated as the beginning of Town and Country Planning in Assam (Sarma, 2004). This is the year when the State Government initiated planning of a township for Palashbari in Kamrup District by creating a cell under the Public Works Department (PWD) and, subsequently, the Government entrusted the organisation with the work of designing master plans for Guwahati and Tinsukia. In 1972, the organisation was also entrusted with the work of making a master plan for the temporary capital of Assam in Dispur. Gradually, the scope and activities of the organisation were widened, particularly
with emphasis on planning of urban centres during the Five Year Plan period, with central assistance. As has been mentioned earlier, in 1959, the Assam Town and Country Planning Act was enacted and amended by the Government of Assam, and the Urban Master Plans were prepared under Section 9 of the said Act. In 1978, the Government created a full-fledged Directorate under the Town and Country Planning Department. Today, the Department of Town & Country Planning has prepared master plans for almost all the district headquarters towns. As per the publication of the Government of Assam entitled *Agragatir Pathat Nagar Unnayan Bibhag, 2006-2010*, the State Government has so far created 24 Development Authorities to implement the master plans and different zoning regulations. At present, 27 towns (Tinsukia, Guwahati, Dibrugarh, Sibsagar, Jorhat, Golaghat, Nagaon, Diphu, Silschar, Tezpur, Bongaigaon, Nalbari, North Lakhimpur, Biswanath Chariali, Jagiroad, Mangoldoi, Karimganj, Nazira-Simaluguri, Sonari, Kokrajhar, Dhubri, Barpeta, Dergaon, Goalpara, Palashbari-Mirza-Bijaynagar, Namrup and Rangia) have their master plans and two others - Morigaon and Silapathar - have submitted their plans, which are now pending with the government press. Among the 27 towns, there are as many as five towns that have already revised their master plans. These towns are Tinsukia, Guwahati, Dibrugarh, Silchar and Tezpur.

2.2 General characteristics

The existing master plans of different towns of Assam provide a good idea about the situation, future perspective, vision and the zoning regulation for the individual towns. These plans envisage a scientific approach for developing the town and also lay emphasis on the future development potential of the villages adjoining the existing town area.

As reported by Town and Country Planning Office, Tezpur, the demarcation of the ‘Plan Area’ of the master plans has been made after careful study of the present trend of growth of the towns, the physical features of the surrounding areas, communication network and the potential for future development of the region. It is seen from the study that the main objective of these master plans is to achieve a balanced growth and to avoid haphazard development in the town. Besides this general objective, the following are the major aims and objectives which are seen to be taken by different master plans of the towns of Assam:

(i) to give impetus to the town so that it acts as a growth centre for its surrounding region;
(ii) to give shape to the urban structure in such a manner that the town functions for better urban services; and

(iii) functional disposition by land use so as to achieve

- harmonious and coherent interrelationship among various uses and activities through efficient and judicious utilisation of land; and

- functional distribution of work centres and living areas, minimisation of travel distances and increase of efficient functional activities.

The guiding factors for the preparation of most of the master plans of the towns in Assam are:

(i) development of neighbourhood shopping centres to relieve congestion in the town centre and to provide opportunities for growth of commercial activities;

(ii) development of civic centre and specific areas for socio-cultural activities to provide facilities for cultural and emotional integration among the people;

(iii) encouragement of small and medium scale industrial units, allocating land to prevent conflict in land use pattern;

(iv) provision for proper circulation pattern for easy and safe movement of traffic;

(v) rational distribution of residential areas and linkage between neighborhoods;

(vi) efficient use of government land and properties by putting them to most proper use; and

(vii) ensure proper environment through environmental improvement schemes.

2.3 Contents of the master plans

The purpose of the plans, as their drafts state, is to guide the growth of the concerned town on scientific lines. The plans establish planning as the surest way of attaining this goal and developing the town according to certain pre-ordained guidelines as opposed to 'uncontrolled and chaotic development' which they believe would result if the town is allowed to grow at its own organic pace and its needs.

The master plan documents are generally divided into the following main chapters or into the following main topics:

1. **Introduction**: It deals with the location and situation of the town. Then, after having established the importance of the town under the regional framework, it also highlights the
need for an overall development strategy by focusing on expansion according to the urbanisation process and the related problems.

2. **History and existing physical characteristics:** Every town has a history of its own. It bears a strong implication for the present pattern of the town. So, this chapter deals briefly with - how the present pattern of the town has evolved over time.

3. **Population and employment:** It describes the demographic profile of the town, with data on population growth and migration trends, workforce, employment etc.

4. **Physical growth and existing land use pattern:** It deals briefly on the physical growth trends i.e. how the urban spread is conditioned by the natural landscape and the resources and technology employed for development. It also deals with the existing land use analysis (land resources, land use pattern and land use variation etc.).

5. **Shelter:** It envisages housing needs of the town, housing strategy in new housing areas, restructuring and upgrading the existing areas. The chapter also outlines the occupancy rate, structural condition and housing shortage in the town.

6. **Commerce and industry:** It entails the activities that are carried out at each tier of commercial areas: district centre, community centre, local shopping centre, and convenient stores. The chapter also briefly talks about the problems of trade and commerce. Further, it lists out the industrial units in the town and touches briefly upon the growth of the industries and industrial infrastructure.

7. **Traffic and transportation:** It touches briefly on the different aspects of transport policy, highways, arterial roads, local streets and provisions for bicycle and cycle rickshaws. It also deals with the norms for parking provisions.

8. **Urban infrastructure:** It describes the planning norms and the development controls for various social infrastructures like water supply, sewerage, health facilities, education, sports facilities and other socio-cultural and community facilities.

9. **Urban function and future urban needs:** A clear understanding of the major urban functions and their impact on the future growth of a town is desirable. So, on the basis of projected population, household, and vehicles and so on, this chapter deals with the major urban functions and the future space requirements.
10. **Proposed land use plan:** This chapter deals, first with the basic considerations, which form the guiding factors for the preparation of a master plan for the town. Then, it talks about the plan concept to be adopted, the prepared planning units, and finally the proposed plan for the use of land for residential, commercial, public and semi-public as well as the land for public utilities and services. In simple words, it gives the projected requirements of land for different uses and the policies for meeting these requirements and providing for better civic amenities in the town.

11. **Proposed circulation plan:** It deals with the circulation plan concept, regional linkages, circulation pattern in terms of hierarchical classification of roads and then the proposed plan regarding traffic and parking.

12. **Plan implementation and enforcement:** It describes the division of the town into earmarking broad use areas or administrative zones and the zonal plans for the same. It also gives the implementation program and the monitoring framework for reviewing the plan progress and the targets in different areas that is to be achieved by the time of each review and the formulation and working of action groups to look at different sections of the plan.

13. **Zoning regulations:** Zoning regulations form an integral part of any master plan. This part of the master plan lists out the division of the town into different land uses and use premises and controls applicable to each. The zoning regulations are meant for controlling and promoting urban development and re-development on rational lines. Thus, these regulations can do a great service in correctly portraying the intention of the master plan and promoting its objectives. It is to be noted that this part of the master plan is in the form of a schedule that lays down different regulations for the use of land and buildings built thereon consistent with maintaining minimum standard of density of buildings, protection of open spaces, sanitation and environment hygiene.

2.4 **The shortcomings**

The objective for planners, urban designers, architects and constructors is building sustainable cities, and all the policies, plans and designs are only a means to that end. In Assam, it has been found that master planning is a part of the utopian methodology in urban design and is associated with grand plans. But, there seems to be a number of inconsistencies between this approach and the features of a sustainable town. For example,
sustainability appears to be related to community and people, building on existing and mutually supportive activities and encouraging residency, public places and spaces, help for the local economy and the concept of the town as a process. But, here, master planning is generally a top-down approach by experts, creating large single use areas of private or ambiguous ownership and it promotes the scheme as a product.

The urban master plans of Assam are produced by professionals. As such, they continue the theme of top-down urban management. Apart from a little potential in the consultation phase, the community is effectively excluded from taking an active part. As master plans have become more visionary, they seem to become more self-contained and abstracted from the urban settings that they are supposed to enhance. In fact, the more that master plans become detailed representations of specific proposals, the more they become deterministic and inflexible. There has been an accusation that, especially the architects have become so obsessed with the images and details of the proposals that they have lost sight of the objectives for producing plans and that the plans have become an end in themselves. Moreover, the footprint of single use activity is remaining relatively large in these master plans.

There is no doubt that master planning in Assam, aimed at the scheme as product rather than the town in process. In this regard, the British scholar L. Krier (1993) had opined that one can only have a master plan if he has certainties. It should be a broad brush technique covering not just the location but the layout of the site, transport infrastructure, the spaces between buildings, the overall design style and land uses. This tends to produce coarse grained structures and large static buildings on their independent plots of land (Krier, 1993). It seems that the master plans in Assam follow this perspective, and hence, master planning today, is a tool of property-led urban regeneration. But the observations in some of the towns in Assam having master plans suggest that this approach actually creates very little in terms of new activities, employment and support for the local economy. It appears that the most significant outcome of property-led regeneration is that the existing businesses move around seeking better premises and financial arrangements.

There are many areas where these plans fall short, both in terms of content and focus, as well as overall layout and user-friendliness. The following are some of them-
1. Data insufficiency

The first glaring insufficiency in the existing master plans of Assam is the lack of data and information. As a whole, these master plans give priority to the available data from the Municipal Boards of the concerned towns and hence only the Municipal Board areas got focused on almost all the sections. Detail survey data are almost non-existent for all the aspects.

For a plan that is supposed to chalk out the effective management of land resources in the town, the availability of actual data is very important. However, it is unfortunate that very little actual data have been provided on the availability of land and the various uses to which it is being put. For instance, most of the plans talk about the number of housing units for commercial or industrial uses, but there are no estimates given for the total land area under each of these uses. Moreover, if at all the data are provided for the proposed land use pattern, it has not been substantiated with reasons for using that particular estimate or the source from which it has been obtained.

In order to accommodate the projected population within the town, a review of available land for urbanisation becomes important for the preparation of a regional plan. But, in terms of availability of urbanisable land in the town for the plan period, officials have reported that there are severe limitations.

2. Tone of the document

The master plan is a legally enforceable document. They are supposed to provide clear guidelines on urban planning and infrastructure. Yet this document reads more like a policy document and not a clear legally enforceable text.

The tone is vague and it only attempts to provide suggestions in terms of things that 'should/ought to be done'. There is an attempt made to provide positive and enforceable guidelines. In the section on housing strategy, for example, the Tezpur master plan suggests that the most pressing demands of the economically weaker sections for housing will be promoted by someone at some given date and there will be Land Development-Building Construction Scheme for the more affluent section. But the main objective of the master plan should not merely be just a guideline – it must also provide the legal side, so that the policy can be implemented.
3. Abbreviations

The master plan drafts make extensive use of abbreviations without giving any information on keys to decipher their meaning. This makes the document very difficult to comprehend, especially for the layman. There are also numerous grammatical errors and the layout is not very user-friendly, with the text repeatedly being cut in by endless tables, instead of these being provided in a separate appendix.

4. Lack of financial accounting

Last but not the least, the plan almost completely fails to address the fiscal aspect of the situation. There are no estimates provided for the additional expected cost of catering to the additional demands of the city or town and how this will be borne. There is also no accounting for what kind of rents and revenues the state departments expect to earn and how much of these are to be channelised into urban development, and how funds are to be distributed among the different civic and planning agencies.

2.5 Zoning regulations: the chief tool in the master plans

The chief implementation tool of the existing master plans is its authority to formulate development codes and land use norms for different uses. The origins of zoning date back to the growth of towns during the industrial revolution in Europe. Zoning was developed as a tool to protect residential environment from industrial and commercial encroachment and to provide good living conditions to the residents. Most cities today follow some form of zoning code or the other. There are two types of zones that are used in common terminology: one is the division of the town into area-wise zones and sub-zones for purposes of decentralisation of planning. Thus, one of the objectives of the master plans for the towns of Assam should be the preparation of zonal plans for all the prescribed zones for the town. On this front as well, the track record of planning has not been appreciable. The other aspect of zoning enumerated in the development code for the town consists of the division of the town into various 'use-zones' and 'use-premises', which determine the land use policy in the town. A use-zone is an area for any of the specified land use categories. A use-premise means one of the many sub-divisions of a use-zone, designated in an approved layout plan for a specific use. Land use of premise has to be determined on the basis of an approved layout plan, which has to be consistent with the land ownership and the approval
of the building plans. The existing master plans for the towns of Assam generally divide the
town among the following use-zones prescribed in the zoning regulations, as accepted and
approved by the Government of Assam:

1. Residential
   - Low density
   - Medium density
   - High density

2. Commercial
   - Retail shopping, General Business and Commerce, District Centre,
     Community Centre, Non-hierarchical Commercial Centre.
   - Wholesale, Warehousing, Cold Storage and Oil Depot

3. Industry
   - Light industry
   - Medium industry
   - Others

4. Public and Semi-public Zone

5. Recreational and Open Space

6. Green Belt Zone

7. Agriculture Zone

8. Circulation

9. Government Land

The study in this regard shows that existence of such zoning codes has resulted in
heated debates among economists, planners, government officials and residents, not just in
the capital city of the state but in other towns as well. It should be noted here that a section
of people are of the view that only the Government or the planners should be responsible for
the maintenance of public spaces, and must not interfere in the functioning of private
residential areas or privately-owned commercial spaces. The rationale behind this opinion is
that residents of an area are the best judge of their needs and should be allowed to decide
their plans of construction, management and disposal of their properties. They believe that
market forces of demand and supply should be allowed to determine the most appropriate
use of their land. If there is a margin for profit and if there is demand of the people for a
commercial establishment, like a restaurant or a boutique, within a residential area,
residents should be well within their rights to allow such a development. Another significant
drawback of land use regulation, besides it being an infringement on the right to private property, is its impact on housing development and pricing. For instance, the inevitable outcome of these regulatory constraints is a large and increasing proportion of urban land development happens outside the formal, officially sanctioned process. Turning to the pricing, existing research suggests that a wide range of government regulations, including building codes, environmental laws, land use regulations and impact fees, as well as government procedures to administer these regulations, reduce the supply of housing and enhance the costs of housing significantly.

Nevertheless, not all of these regulations can be termed as 'barrier'. On the contrary, some regulations can be justified because they promote public health and/or safety. Others increase price because they generate amenities and thereby, increase the demand for housing.

Opinions also place many forms of state regulation as unnecessary or inefficient. A section of the people had opined that although some of the regulations seem to be efficient for the affluent class, they generate unacceptable affordability problems for low- and moderate-income households. Opinion is also divided on what extent of zoning would be desirable. While some schools of thought put their faith in the invisible hand of the market in determining the best possible land use, others are of the opinion that a balanced and planned approach is the only way to ensure smooth growth of a city and a good life for its residents. The solution, as always, would lie somewhere in between.

Another criticism of these zoning regulations is that, in a country like India, where the judicial machinery is slow and inefficient and takes years to decide criminal cases, it would be too optimistic to expect nuisance laws and the right to sue to take care of any externalities that would arise in the course of privately determined land use. Practically speaking, it is evident from the growing list of non-conforming uses of land that existing laws have failed to keep up with the times.

2.6 Network structure in the urban master plans

To study the nature of the network structure of the existing master plans, out of the 27 master plans, 9 master plans were chosen randomly. The chosen master plans were then carefully studied for the road categories (i.e. surfaced or unsurfaced) and percentage share of land used for transportation.
The study also tries to examine the general strength of the existing network in terms of road density and degree of connectivity and the effort, which the master plans of concerned towns are giving on the development of road network. The degree of connectivity is studied by assessing the nature of road network by using connectivity indices of cyclomatic number (\(\mu\)), alpha index (\(\alpha\)), beta index (\(\beta\)) and gamma index (\(\gamma\)). All these indices are aggregate indicators and they tell of the network connectivity measure for a network.

For computation of these indices, every road crossing and terminus found in the road network presented in the existing and proposed circulation plan map of the concerned master plans are taken as nodes and the road section in between two such nodes as edges. The facts found are as follows.

### Table 2.1: Road densities and Percentage share of roads in some of the master plans

<table>
<thead>
<tr>
<th>Master plan of Town</th>
<th>Total area (sq. km)</th>
<th>Road length (km)</th>
<th>Road density (km/sq. km)</th>
<th>% share</th>
<th>% of Land under transport and communication</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Surfaced</td>
<td>Kutcha</td>
</tr>
<tr>
<td>Dhubri</td>
<td>62.98</td>
<td>183.58</td>
<td>2.92</td>
<td>30.5</td>
<td>69.5</td>
</tr>
<tr>
<td>Goalpara</td>
<td>71.49</td>
<td>149.43</td>
<td>2.09</td>
<td>31.16</td>
<td>68.84</td>
</tr>
<tr>
<td>B. Chariali</td>
<td>58.86</td>
<td>122.84</td>
<td>2.09</td>
<td>22.8</td>
<td>77.2</td>
</tr>
<tr>
<td>Golaghat</td>
<td>31.6</td>
<td>94.21</td>
<td>2.98</td>
<td>33.15</td>
<td>66.85</td>
</tr>
<tr>
<td>Mangoldoi</td>
<td>48.12</td>
<td>27.52(MB)</td>
<td>5.56(MB)</td>
<td>9.43(MB)</td>
<td>90.57(MB)</td>
</tr>
<tr>
<td>N. Lakhimpur</td>
<td>77.93</td>
<td>124.97</td>
<td>1.6</td>
<td>27.09</td>
<td>72.91</td>
</tr>
<tr>
<td>Dibrugarh</td>
<td>66.14</td>
<td>82.58(MB)</td>
<td>5.32(MB)</td>
<td>47.45(MB)</td>
<td>52.54(MB)</td>
</tr>
<tr>
<td>Tezpur</td>
<td>126.6</td>
<td>400</td>
<td>3.16</td>
<td>58</td>
<td>42</td>
</tr>
<tr>
<td>Nagaon</td>
<td>82.28</td>
<td>133.04</td>
<td>1.62</td>
<td>42.37</td>
<td>57.62</td>
</tr>
</tbody>
</table>

Data source: Master plans of respective towns, MB = Municipal Board

Table 2.1 shows that the density of roads in these master plans ranges in between 2 to 3 km per sq.km. It indicates that the distance between two parallel roads is about 400 to 500 m. If compared to the road density of large cities like Delhi, there seems to be enough scope for increasing the road density. Because, as per data obtained from the record of World Bank, 2008, Delhi has a road density of 19.22 km per sq.km of land area. But the questions like how much road construction these small towns need and where the new roads should be located etc. must be answered first by carefully evaluating the future demand for traffic. Another thing, which should be realised in this point, is that the needs for road space can be quiet different among towns of similar level of motorisation. It is because there are many other interrelated factors that affect the travel demand. For instance, the level of
public transit service, the spatial distribution of jobs and residences, urban topography and so on. Hence, there is no single formula applicable to all towns. Urban road planning should also be based on the plan for the regional economic development. From this point of view, it is better to follow the master plan approach. However, any short-term plan for urban road construction should be an integrated part of the long-term plan. Moreover, close attention should be paid to improving the whole road network system planning. The study of the master plans collected for different towns of Assam reveals that although the urban planners wish to influence urban development policy on many issues, including land use, social services, construction of infrastructure etc., the existing planning system limits its function to physical planning only. The Government also still expects to have a ‘blueprint’ plan guiding the town’s physical construction. Therefore, town officials are most interested in the road network plan and short-term construction projects. They have not given due attention to transport development strategies, demand-supply policy, public transport development for the town and transport management. The separation of physical planning from policy-making has also put constraints on developing methods and technology in transport planning, especially the transport strategy and policy research capability. Even when the physical aspect of transport planning receives some attention, there is still no assurance that urban road construction will follow the transport plan. Therefore, at present, it is difficult for the master plans to have any significant effect on the rapidly growing transport demands.

Table 2.1 also shows that most of the urban roads are unsurfaced. They can be properly used only in fair weather as it becomes muddy and unfit for transportation during the rainy season. So, efforts need to be made to construct as many surfaced roads as practically possible. From this end, one of the future challenges will revolve around building all-weather urban roads. The table also shows that in each of the master plans, the proposed land use for transport purpose encompasses more area than the existing one. But question arises as to whether the proposed enhancement can fulfill the growing demand for urban transport in these towns? Whether they have considered differential demands that arise from different parts of the town?

It can be seen from the Table 2.2 that the alpha values for the existing road network of these randomly selected towns of the state range form a minimum of near 3% to a
maximum of near 19%. The beta values, which are more intimately related to the levels of socio-economic development, range in and around 1.20 to 1.38. Again, the cyclomatic number varies from the minimum of 19 for North Lakhimpur to a maximum of 289 for Tezpur. Lastly, the gamma indices for these town range in and around 40% and 46%. The low values of structure indices indicate a low level of connectivity among the nodes in these networks. The physical observation of some of the networks shows that the strength of the existing network is further aggravated by the overall condition of the roadways, which is considerably worse. Most roads are narrow. Lack of sidewalks forces pedestrians to walk on the shoulder or the roadway itself. Moreover, cyclists and other slow movers also use the same shoulder and often they have to spill over onto the roadway itself. This creates additional safety problems. Uncontrolled on-street parking further exacerbates the situation by narrowing further the right of way for moving traffic. Many roads are in a dismal state of disrepair, often riddled with potholes, uneven, and unpaved. It was also observed that there is a general lack of modern traffic signals and even where they exist, travelers often ignore them.

Table 2.2: Degree of connectivity of existing and proposed road networks

<table>
<thead>
<tr>
<th>Master plan of town</th>
<th>Existing</th>
<th></th>
<th>Proposed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>α (%)</td>
<td>β</td>
<td>γ (%)</td>
</tr>
<tr>
<td>Dhubri</td>
<td>17.11</td>
<td>1.34</td>
<td>45</td>
</tr>
<tr>
<td>Goalpara</td>
<td>17.4</td>
<td>1.34</td>
<td>45</td>
</tr>
<tr>
<td>Biswanath Chariali</td>
<td>18.14</td>
<td>1.35</td>
<td>46</td>
</tr>
<tr>
<td>Golaghat</td>
<td>15.92</td>
<td>1.31</td>
<td>44</td>
</tr>
<tr>
<td>Mangoldoi</td>
<td>10.76</td>
<td>1.21</td>
<td>41</td>
</tr>
<tr>
<td>North Lakhimpur</td>
<td>6.67</td>
<td>1.12</td>
<td>38</td>
</tr>
<tr>
<td>Dibrugarh</td>
<td>2.92</td>
<td>1.05</td>
<td>35</td>
</tr>
<tr>
<td>Tezpur</td>
<td>19.15</td>
<td>1.38</td>
<td>46</td>
</tr>
<tr>
<td>Nagaon</td>
<td>13.61</td>
<td>1.28</td>
<td>44</td>
</tr>
</tbody>
</table>

NB: These indices are calculated from the road maps provided in the respective master plans.

Table 2.2 also shows that the alpha values and cyclomatic numbers display the maximum spatial and numerical range of variation. For instance, in the case of cyclomatic...
number, it can be seen that for the existing networks, it varies from a minimum of 19 for North Lakhimpur to a maximum of 289 for Tezpur and for the proposed ones, from 36 for Nagaon to 320 for Tezpur town. The higher cyclomatic numbers for towns like Tezpur or Goalpara etc. are due to the fact that they display only one graph, with larger number of edges over the nodes. In contrast to this, the spatial and numerical ranges of the values of beta index and gamma index are far less. The low range of beta index indicates that the proportions in which the number of edges and nodes either increase or decrease are not large.

Turning to the proposed road network it is seen that all the master plans of the respective towns have a provision of increasing the strength of the existing road network. Accordingly, in these proposed networks, it is seen that the structure indices also increase significantly. For instance, in the case of alpha index, it is seen that there is a minimum increase of 0.34% in Dibrugarh and a maximum increase of about 15% in North Lakhimpur. Similarly, maximum increase of beta and gamma values, which occurred in the case of North Lakhimpur town, increases from 1.12 to 1.42 and from 38 to 48 respectively. These increasing values of structure indices indicate that as compared to the current networks, the proposed networks seem to make improvement in the networks of the concerned towns. Even then, we may note that the links that are to be added in these proposed networks are only the possible links, the construction of which will be further determined by many other factors including the financial ones. Again, it is also not clear from the master plans whether the proposed links are based on proper study or not.

2.7 Provision for road traffic planning in the urban master plans

This section deals with the research question that - whether the master plans adopted by different towns of Assam have considered transport planning as a part of them and if so, to what extent? It has already been discussed in the introductory chapter (Section 1.3) that traffic planning in a modern fashion is the need of the hour to arrest the existing and probable traffic problems in the towns of Assam and it should be a part of these master plans. It is important because proper growth and functioning of a city or town and its efficient management is highly dependent on the circulation pattern backed by an efficient transportation system.
It is seen that there is a provision for the formulation of an efficient traffic operation plan in each and every master plan adopted by the towns of Assam. And, as has been stated earlier, the basic goal of such a plan is to achieve maximum utilisation of the road network and the transportation system for quicker movements of goods and people within the planning area. Yet, it is observed that these plans resort only to short-term programs to cope mainly with the present transport difficulties. The minor schemes taken for the removal of such difficulties are road widening, reconstruction of road junction, enforcement of traffic rules, provision for terminus facilities, parking arrangement etc. Again, as the master plan draft indicates, these plans are not based on detailed study as well as on sound traffic engineering and management measures. Only a few master plans of the state under study, like the master plans of Guwahati, Dhubri and Goalpara have done some preliminary survey of the existing traffic volume. Only the revised master plan of Guwahati is seen to project the future volume of traffic for its traffic planning. But, in this revised master plan of Guwahati too, it is found that sound theories and concepts concerning urban planning are mostly overlooked.

Today, the tendency abroad is not only towards more organic planning rather than the imposed approach of the 1950s to 1970s, but also a strengthened role for planning compared to the 1980s and 1990s. Among the new aims are - to tackle urban decline, reduce the use of greenfield land, and limit urban sprawl and to improve the quality of design and the built environment. However, it is not entirely clear as to what is the dominant policy structure in the urban master plans of Assam. They offer different levels of urban design guidance related to specific places. They seem to be based on the view that an urban design framework should provide the broad principles for an area of change.

While around the world there is a move towards the principles of new urban simulation, to the concept of transit-oriented development or containing unchecked growth of urban sprawl, the existing master plans for the towns of Assam seem to choose the other way. In trying to preserve the old structure of the town, many a time these plans prescribe greater growth in the suburbs and shifting of economic activities out to these areas in order to manage the growing population. Whether one chooses to live in the suburbs is a matter of
personal choice, but it is true that increasing sub-urbanisation leads to a large growth in the number of vehicles, road accidents, problems of pollution, congestion and parking.

Globally there is a trend to build more ‘walkable’ communities and encourage the use of bicycles, public transport etc. and have higher density living in inner town areas, besides redeveloping these areas. The master plans also fall short of stating any clear policy objectives for the redevelopment and re-densification of inner town/city areas. All the space that these proposals get in the master plan is generally one or two small paragraphs.

Thus as answer to the research question, stated above, it can be said that the master plans of Assam are yet to follow a modern approach of urban planning. As far as the problem of transportation is concerned, the master plans of Assam have a brief chapter on transport to deal with the existing and future transport facilities of the town concerned. But, no master plans under study have any sign of proper transport planning for tackling the traffic problems, nor have they taken transport planning as a basis for the future development policy decisions.

Again, to answer the research question whether the reciprocal influence between land use and transport was taken into account or not, it is found that the urban master plans in Assam are devoid of any proper land use-transport coordination to tackle the future growth of traffic for the plan period.